737
Quick Reference Handbook

Quick Action Index

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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

YD332, YD333
Fuel . . . . ___ LBS, Pumps ON

YJ813 - YQ296
Fuel . . . . ___ KGS, Pumps ON

Passenger signs . . . . ___

Windows . . . . Locked

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

Takeoff speeds . . . . V1 ___, VR ___, V2 ___

CDU preflight . . . . Completed

Rudder and aileron trim . . . . Free and 0

Taxi and takeoff briefing . . . . Completed

Anti collision light . . . . ON

BEFORE TAXI

Generators . . . . On

Probe heat . . . . ON

Anti-ice . . . . ___

Isolation valve . . . . AUTO

YJ813 - YQ296

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

YJ813 - YQ296
Engine start switches . . . . CONT

Speedbrake . . . . ARMED

Landing gear . . . . Down

Flaps . . . . ___, Green light

SHUTDOWN

Fuel pumps . . . . OFF

YQ294 - YQ296
Probe heat . . . . AUTO

YD332 - YK691
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.

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 the outflow VALVE
indication shows fully closed

This prevents water from entering the airplane.

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

APU switch . . . . OFF

GROUND PROXIMITY GEAR
INHIBIT switch . . . . GEAR INHIBIT

▼ Continued on next page ▼

▼Ditching continued▼

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

YJ813 - YJ819

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 . . . . Hold in OPEN until the outflow VALVE indication shows fully open to depressurize the airplane

Note: The intermittent cabin altitude/configuration warning horn will sound and the CABIN ALTITUDE 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 . . . . Hold in OPEN until the outflow VALVE indication shows fully open to depressurize the airplane

Note: The intermittent cabin altitude/configuration warning horn will sound and the CABIN ALTITUDE 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

YD332, YD333, YK171 - YQ296

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** ▼

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 . . . . Hold in OPEN until the outflow VALVE indication shows fully open to depressurize the airplane

Note: The intermittent cabin altitude/configuration warning horn will sound and the CABIN ALTITUDE 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

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.

■ ■ ■ ■

PASSENGER OXYGEN ON

PASS OXY 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.

■ ■ ■ ■

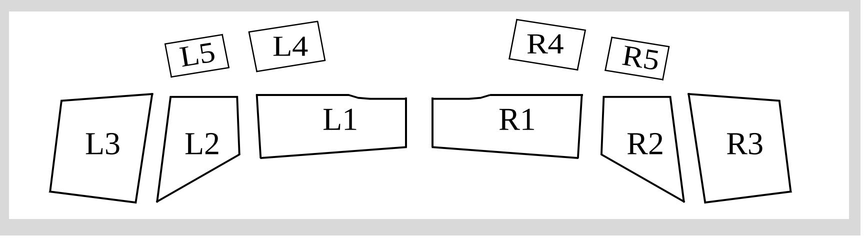
Window Damage

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

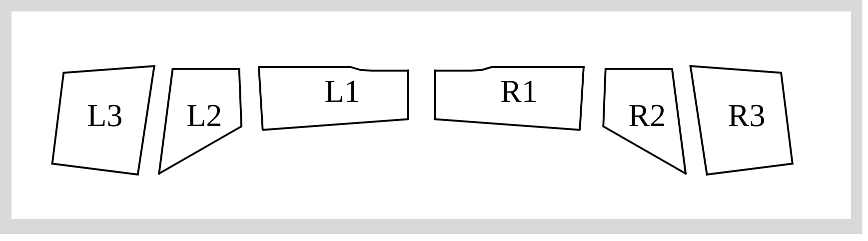
- An electrical arc
- A delamination
- A crack
- Is shattered.

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

YD332 - YJ819



YK171 - YQ296



▼ Continued on next page ▼

▼Window Damage continued▼

YJ813 - YQ296

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

►►Go to the Window Damage (Window 3 Not Heated) checklist on page 1.18

■ ■ ■ ■

2 Choose one:

◆Window is **delaminated** only:

Continue normal operation.

■ ■ ■ ■

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

►►Go to step 3

3 Don seat belts and shoulder harnesses.

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

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

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

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

Window 1 or 2 **outer** pane

YD332, YD333
Window 3 heated **outer** pane

▼ Continued on next page ▼

▼Window Damage continued▼

YD332 - YJ819
Window 4 **inner** pane

YD332 - YJ819
Window 5 **outer** pane

►►**Go to step 8**

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

Window 1 or 2 **inner** pane

YD332, YD333
Window 3 heated **inner** pane

YD332 - YJ819
Window 4 **middle or outer** pane

YD332 - YJ819
Window 5 **inner** pane

►►**Go to step 10**

8 Continue normal operation.

9 Shoulder harnesses may be removed.

■ ■ ■ ■

10 Don oxygen masks.

11 Establish crew communications.

12 Passenger signs . . . . .ON

▼ Continued on next page ▼

▼Window Damage continued▼

13 Choose one:

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

Do **not** continue the climb.

Reset the FLT ALT indicator to the actual airplane altitude.

►►Go to step 14

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

►►Go to step 14

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

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

16 Plan to land at the nearest suitable airport.

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

Oxygen masks and shoulder harnesses may be removed.

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

■ ■ ■ ■

Window Damage (Window 3 Not Heated)

YJ813 - YQ296

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

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

1 Don seat belts and shoulder harnesses.

2 Choose one:

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

►►**Go to step 3**

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

►►**Go to step 5**

3 Continue normal operation.

4 Shoulder harnesses may be removed.

■ ■ ■ ■

5 Don oxygen masks.

6 Establish crew communications.

7 Passenger signs . . . . .ON

▼ Continued on next page ▼

▼Window Damage (Window 3 Not Heated) continued▼

8 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 9

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

►►Go to step 9

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

10 Choose one:

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

►►Go to step 11

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

►►Go to step 13

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

►►Go to step 15

11 Descend to 9000 feet.

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

▼ Continued on next page ▼

▼Window Damage (Window 3 Not Heated) continued▼

►►Go to step 18

13 Descend to the minimum safe altitude.

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

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

►►Go to step 18

15 Descend to the minimum safe altitude.

16 Pressurization mode selector . . . . .MAN

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

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

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

Oxygen masks may be removed.

19 Shoulder harnesses may be removed.

■ ■ ■ ■

Window Open

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

1 Maintain the maneuvering speed for the existing flap setting until the window is closed.

2 The force needed to close the window increases with airspeed. It may not be possible to close the window at speeds above 250 knots.

3 Close and lock the window.

4 Choose one:

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

Continue normal operation.

■ ■ ■ ■

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

Level off at the lowest safe altitude.

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

■ ■ ■ ■

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CABIN ALTITUDE WARNING or Rapid Depressurization

CABIN ALTITUDE **(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 or a CABIN ALTITUDE light (if installed and operative) illuminates.

1 Don oxygen masks and set regulators to 100%.

2 Establish crew communications.

3 Pressurization mode selector . . . . MAN

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

5 **If** cabin altitude is **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 . . . Move to OPEN or CLOSE as needed to control cabin altitude and rate

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

Recall . . . . Checked

Autobrake . . . . ___

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

▼ Continued on next page ▼

▼AUTO FAIL or Unscheduled Pressurization Change continued▼

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ___

At Pattern Altitude

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

Landing Checklist

YJ813 - YQ296

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

■ ■ ■ ■

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

■ ■ ■ ■

Intentionally
Blank

PACK

PACK

Condition: One or more of these occur:
- The primary and standby pack controls are failed
- A pack overheat.

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

This reduces the workload on the affected air conditioning pack.

2 TRIP RESET switch . . . . Push

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

▼ Continued on next page ▼

▼PACK continued▼

3 Choose one:

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

Continue normal operation.

■ ■ ■ ■

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

ISOLATION VALVE switch . . . . CLOSE

PACK switch (affected side) . . . . OFF

■ ■ ■ ■

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

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

►►**Go to step 4**

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

5 **When** at level off:

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

▼ Continued on next page ▼

▼PACK continued▼

6 Choose one:

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

►►**Go to step 7**

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

Don oxygen masks.

Establish crew communications.

►►**Go to step 7**

7 Pressurization mode selector . . . . .MAN

8 Outflow VALVE switch . . . . .Hold in OPEN until the outflow VALVE indication shows fully open

This increases airplane ventilation.

9 R RECIRC FAN switch . . . . AUTO

10 L RECIRC FAN switch . . . . OFF

▼ Continued on next page ▼

▼PACK continued▼

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.

YK691 - YQ296
Turn off in-flight entertainment systems.

Close cabin window shades.

CAB/UTIL switch . . . . OFF

IFE/PASS SEAT switch. . . . . OFF

■ ■ ■ ■

WING-BODY OVERHEAT

WING-BODY OVERHEAT

Condition: An overheat from a bleed duct leak occurs.

Objective: To isolate the bleed duct leak.

1 ISOLATION VALVE switch . . . . CLOSE

2 Choose one:

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

TRIM AIR switch . . . . OFF

Note: Temperature control in the passenger cabin may be less accurate.

■ ■ ■ ■

◆**Only right** WING-BODY OVERHEAT light illuminated:

►►**Go to step 3**

◆**Only left** WING-BODY OVERHEAT light illuminated:

►►**Go to step 8**

3 R PACK switch . . . . OFF

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

4 BLEED 2 air switch . . . . OFF

▼ Continued on next page ▼

▼WING-BODY OVERHEAT continued▼

5 WING ANTI-ICE switch . . . . OFF

This prevents possible asymmetrical ice buildup on the wings.

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

7 Choose one:

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

■ ■ ■ ■

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

TRIM AIR switch . . . . OFF

Note: Temperature control in the passenger cabin may be less accurate.

■ ■ ■ ■

8 L PACK switch . . . . OFF

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

9 BLEED 1 air switch . . . . OFF

10 WING ANTI-ICE switch . . . . OFF

This prevents possible asymmetrical ice buildup on the wings.

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

▼ Continued on next page ▼

▼WING-BODY OVERHEAT continued▼

12 Choose one:

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

■ ■ ■ ■

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

►►**Go to step 13**

13 Choose one:

◆APU is **running**:

►►**Go to step 14**

◆APU is **not** running:

TRIM AIR switch . . . . OFF

Note: Temperature control in the passenger cabin may be less accurate.

■ ■ ■ ■

▼ Continued on next page ▼

14 Choose one:

◆**APU BLEED** air switch is **ON**:

APU BLEED air switch . . . . OFF

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

►►**Go to step 15**

◆**APU BLEED** air switch is **OFF**:

APU switch . . . . OFF

►►**Go to step 16**

15 Choose one:

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

►►**Go to step 17**

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

APU switch . . . . OFF

►►**Go to step 16**

▼ Continued on next page ▼

▼WING-BODY OVERHEAT continued▼

16 Choose one:

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

►►**Go to step 17**

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

TRIM AIR switch . . . . OFF

Note: Temperature control in the passenger cabin may be less accurate.

■ ■ ■ ■

17 ISOLATION VALVE switch. . . . . AUTO

18 BLEED 1 air switch . . . . .ON

19 L PACK switch . . . . AUTO

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

21 Choose one:

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

►►**Go to step 22**

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

►►**Go to step 23**

▼ Continued on next page ▼

▼WING-BODY OVERHEAT continued▼

22 Choose one:

◆APU switch is **OFF**:

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

■ ■ ■ ■

◆APU switch is **ON**:

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

■ ■ ■ ■

23 ISOLATION VALVE switch . . . . CLOSE

24 L PACK switch . . . . OFF

25 BLEED 1 air switch . . . . OFF

26 WING ANTI-ICE switch . . . . OFF

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

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

■ ■ ■ ■

ZONE TEMP

ZONE TEMP

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

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

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

2 TRIP RESET switch . . . . Push

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

3 **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: One or both of the following occurs:
- An engine COWL VALVE OPEN light stays illuminated bright blue
- An amber TAI indication is shown.

1 Choose one:

◆ENG ANTI-ICE switch 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.

■ ■ ■ ■

OFF

WINDOW HEAT OFF

YD332, YD333, YK171, YQ294 - YQ296

Condition: One of the following occurs:
- An overheat due to high ambient temperature
- A system failure.

1 Choose one:

◆On the **ground**:

WINDOW HEAT switches (all) . . . . .ON

WINDOW HEAT TEST switch . . . . .PWR

►►**Go to step 2**

◆**In flight**:

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

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

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

■ ■ ■ ■

▼ Continued on next page ▼

▼WINDOW HEAT OFF continued▼

2 Choose one:

◆**All** WINDOW HEAT OFF lights are **extinguished**:

Continue normal operation. Power has been removed from the window for overheat protection.

■ ■ ■ ■

◆**Any** WINDOW HEAT OFF light **stays illuminated**:

The window heat system is inoperative.

■ ■ ■ ■

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 is not available on the affected side with the ISOLATION VALVE switch closed.

■ ■ ■ ■

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Non-Normal Checklists — Chapter NNC

Automatic Flight — Section 4

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AUTOPILOT DISENGAGE

A/P
P/RST

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

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

■ ■ ■ ■

AUTOTHROTTLE DISENGAGE

A/T
P/RST

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

1 Control thrust manually or re–engage the autothrottle.

■ ■ ■ ■

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ACARS Electrical Power Loss

YD332, YD333, YK171, YQ294 - YQ296

Condition: ACARS AC power is lost.

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

■ ■ ■ ■

ACARS MU Fail or DU Fail

YD332, YD333, YK171, YQ294 - YQ296

Condition: The ACARS system is failed.

1 Use normal voice procedures for reporting.

■ ■ ■ ■

Radio Transmit Continuous (Stuck Microphone Switch)

Condition: A radio transmits continuously without crew input.

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

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 16**

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 16

◆APU is **not** available:

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

►►Go to step 16

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 busses 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 13**

6 **When** APU is running:

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

7 **If** REMOTE CONTROL circuit breaker (RCCB REMOTE) (STANDBY POWER CONTROL UNIT, P6: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 13**

9 BUS TRANSFER switch . . . . AUTO

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

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

11 YAW DAMPER switch . . . . ON

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

►►**Go to step 16**

Both SOURCE OFF lights stay illuminated

13 Avoid icing conditions.

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

14 Plan to land at the nearest suitable airport.

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

▼ **Continued on next page** ▼

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

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

16 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 17**

◆**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**.

17 ⚠ 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.

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

19 The MAP display is not available.

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

21 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 lights 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 busses 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.

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

YJ813 - YQ296

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

■ ■ ■ ■

Aborted Engine Start

YD332, YD333

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) . . . . AUTO

■ ■ ■ ■

◆ENGINE START switch is in **AUTO**:

►►**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) . . . . AUTO

■ ■ ■ ■

Engine Limit or Surge or Stall

Condition: One or more of these occur:
- Engine indications are abnormal
- Engine indications are rapidly approaching or exceeding limits
- Abnormal engine noises are heard, possibly with airframe vibration
- There is no response to thrust lever movement or the response is abnormal
- Flames in the engine inlet or exhaust are reported.

Objective: To attempt to recover normal engine operation or shut down the engine if recovery is not possible.

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

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

- -

3 Choose one:

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

►►**Go to step 4**

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

►►**Go to step 5**

▼ Continued on next page ▼

▼Engine Limit or Surge or Stall continued▼

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

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

■ ■ ■ ■

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

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

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

7 Choose one:

◆APU is **available** for start:

APU . . . . START

When APU is running:

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

►►**Go to step 8**

◆APU is **not** available:

►►**Go to step 8**

8 Balance fuel as needed.

▼ Continued on next page ▼

▼Engine Limit or Surge or Stall continued▼

YD332 - YQ295

9 Transponder mode selector . . . . TA

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

YQ296

10 Transponder mode selector . . . . TA ONLY

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

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

ISOLATION VALVE switch . . . . AUTO

12 Plan to land at the nearest suitable airport.

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

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

■ ■ ■ ■

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.

YD332 - YQ295

9 Transponder mode selector . . . . TA

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

YQ296

10 Transponder mode selector . . . . TA ONLY

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

11 **If** wing anti–ice is needed:

ISOLATION VALVE switch . . . . AUTO

12 Plan to land at the nearest suitable airport.

▼ Continued on next page ▼

▼Engine Failure or Shutdown continued▼

►►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 7.15

■ ■ ■ ■

◆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 7.15

■ ■ ■ ■

Engine In-Flight Start

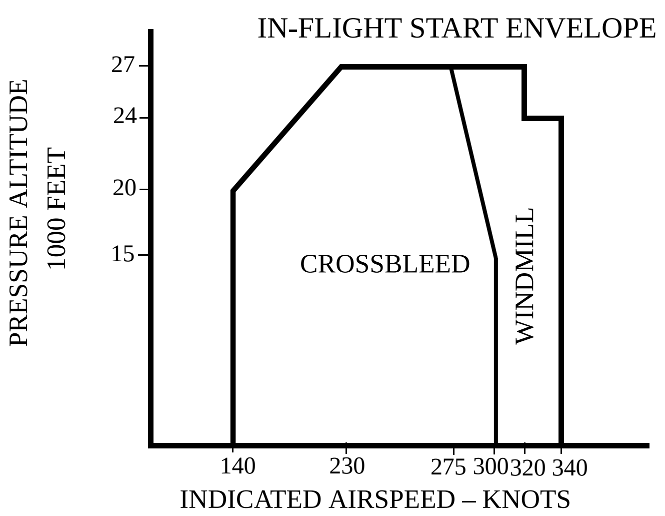
Condition: An engine start is needed and all of the following are true:
- There was **no** engine fire
- There is N1 rotation
- There is **no** abnormal airframe vibration.

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

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

2 Check the In-Flight Start Envelope. 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

YJ813 - YQ296
ENGINE START switch
(affected engine) . . . . OFF

YD332, YD333
ENGINE START switch
(affected engine) . . . . AUTO

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

▼ Continued on next page ▼

▼Engine In-Flight Start continued▼

8 Choose one:

- ◆Engine **starts** and runs normally:

  ►►Go to step 9

- ◆Engine **fails** to start:

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

■ ■ ■ ■

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

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

11 ENGINE START switch . . . . .As needed

12 APU . . . . .As needed

13 Transponder mode selector . . . . .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 7.15**

■ ■ ■ ■

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 7.15

■ ■ ■ ■

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

YJ813 - YQ296
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 7.15**

■ ■ ■ ■

START VALVE OPEN

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

YJ813 - YQ296

1 ENGINE START switch . . . . OFF

YD332, YD333

2 ENGINE START switch . . . . AUTO

3 Choose one:

◆START VALVE OPEN alert **extinguishes**:

■ ■ ■ ■

◆START VALVE OPEN alert **stays illuminated**:

►►**Go to step 4**

4 ISOLATION VALVE switch. . . . . CLOSE

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

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

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

▼ Continued on next page ▼

▼**START VALVE OPEN continued**▼

7 Choose one:

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

APU BLEED air switch . . . . OFF

►►**Go to step 8**

◆START VALVE OPEN alert stays illuminated for **engine 2**:

►►**Go to step 8**

8 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**

■ ■ ■ ■

Intentionally
Blank

Table of Contents

Table of Contents

Intentionally
Blank

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▼

YD332 - YQ295

12 Transponder mode selector . . . . TA

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

YQ296

13 Transponder mode selector . . . . TA ONLY

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

14 **If** wing anti–ice is needed:

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

15 Plan to land at the nearest suitable airport.

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

■ ■ ■ ■

ENGINE OVERHEAT

ENG 1 OVERHEAT	ENG 2 OVERHEAT

Condition: An overheat is detected in the engine.

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

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

3 **If** the ENG OVERHEAT light **stays illuminated**:

►►**Go to the ENGINE FIRE or Engine Severe Damage or Separation checklist on page 8.2**

■ ■ ■ ■

- -

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

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

■ ■ ■ ■

Engine Tailpipe Fire

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

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

2 Advise the cabin.

3 Choose one:

◆Bleed air is **not** available:

Advise the tower.

■ ■ ■ ■

◆Bleed air is **available**:

►►**Go to step 4**

4 PACK switches (both) . . . . OFF

5 ISOLATION VALVE switch. . . . . AUTO

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

7 Choose one:

◆APU is **running**:

APU BLEED air switch . . . . .ON

►►**Go to step 8**

◆APU is **not** running:

►►**Go to step 8**

▼ Continued on next page ▼

▼Engine Tailpipe Fire continued▼

8 Choose one:

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

►►Go to step 9

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

Allow the affected N2 to decrease below 20%.

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

►►Go to step 9

9 Advise the tower.

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

YJ813 - YQ296

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

YD332, YD333

12 ENGINE START switch (affected engine) . . . AUTO

■ ■ ■ ■

Smoke, Fire or Fumes

Condition: Smoke, fire or fumes occur.

1 Diversion may be needed.

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

3 Don smoke goggles, as needed.

4 Establish crew and cabin communications.

5 BUS TRANSFER switch . . . . OFF

6 CAB/UTIL switch. . . . . OFF

7 IFE/PASS SEAT switch . . . . OFF

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

9 APU BLEED air switch . . . . OFF

10 **Anytime** the smoke or fumes become the greatest threat:

►►Go to the Smoke or Fumes Removal checklist on page 8.16

▼ Continued on next page ▼

▼Smoke, Fire or Fumes continued▼

11 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 12

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

►►Go to step 13

12 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 13

▼ Continued on next page ▼

▼Smoke, Fire or Fumes continued▼

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

14 Instruct the cabin crew to:

Turn on cabin reading lights.

Turn on galley attendants work lights.

Turn off cabin fluorescent light switches.

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

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

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

18 ISOLATION VALVE switch. . . . . CLOSE

19 R PACK switch . . . . OFF

20 **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▼

21 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 22

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

23 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.

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

4 PACK switches (both) . . . . HIGH

5 Plan to land at the nearest suitable airport.

6 **Checklist Complete Except Deferred Items**

▼ Continued on next page ▼

▼CARGO FIRE continued▼

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

YJ813 - YQ296

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.

■ ■ ■ ■

Intentionally
Blank

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 indication shows 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.

■ ■ ■ ■

Table of Contents

Table of Contents

Intentionally
Blank

Runaway Stabilizer

Condition: Uncommanded stabilizer trim movement occurs continuously.

1 Control column. . . . . Hold firmly

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

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

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

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

■ ■ ■ ■

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

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

If the runaway **continues**:

Stabilizer
trim wheel . . . . Grasp and hold

5 Stabilizer . . . . Trim manually

6 Anticipate trim requirements.

7 **Checklist Complete Except Deferred Items**

▼ Continued on next page ▼

▼Runaway Stabilizer continued▼

Deferred Items

Descent Checklist

Pressurization . . . . LAND ALT ___

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

YJ813 - YQ296

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

YD332, YD333
ENGINE START switches. . . . . CONT

GROUND PROXIMITY FLAP
INHIBIT switch . . . . FLAP INHIBIT

Landing Checklist

YJ813 - YQ296
ENGINE START switches. . . . . CONT

Speedbrake . . . . .ARMED

▼ Continued on next page ▼

▼All Flaps Up Landing continued▼

YK691 - YQ296

Note: The SPEED BRAKE lever will not move beyond the FLIGHT DETENT on landing and the spoilers will not fully deploy.

Landing gear . . . . Down

Flaps. . . . . ___, **No lights**

■ ■ ■ ■

AUTO SLAT FAIL

AUTO SLAT FAIL

Condition: The auto slat system is failed.

1 Continue normal operation.

■ ■ ■ ■

Elevator Tab Vibration

Condition: An elevator tab vibration occurs in flight. One or more of the following may be an indication of an elevator tab vibration:
- Vibration that originates, and is strongest, in the aft part of the airplane but can be felt throughout the airplane
- Vibration that is felt in the control wheel and rudder pedals
- Vibration that causes items attached to the airplane, such as sun visors, to move.

1 Passenger signs . . . . ON

Do **not** use speedbrakes or change aircraft configuration to reduce airspeed. Do **not** reduce airspeed below the minimum speed for the existing flap setting and gross weight.

2 Smoothly reduce airspeed until the vibration stops.

3 Consider landing at the nearest suitable airport.

4 Stay at or below the reduced airspeed at which the vibration stopped for the rest of the flight. Limit bank angle to 15° until below 20,000 feet.

5 Do **not** deploy speedbrakes in flight.

Note: Flaps and landing gear can be extended normally for the approach.

The speedbrakes can be armed for landing.

■ ■ ■ ■

FEEL DIFF PRESS

FEEL DIFFERENTIAL PRESSURE

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

1 Continue normal operation.

■ ■ ■ ■

FLAP LOAD RELIEF

FLAP LOAD RELIEF

YD332, YD333

Condition: Flap load relief occurs.

1 Check flap position and maintain the appropriate airspeed.

■ ■ ■ ■

LOW PRESSURE

FLIGHT CONTROL LOW PRESSURE

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

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

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

■ ■ ■ ■

Jammed or Restricted Flight Controls

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

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

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

3 Verify that the thrust is symmetrical.

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

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

6 **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

Landing Checklist

YJ813 - YQ296
ENGINE START switches. . . . . CONT

Speedbrake . . . . ARMED

▼ Continued on next page ▼

▼Jammed or Restricted Flight Controls continued▼

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

YJ813 - YQ296

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

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

YJ813 - YQ296

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

YJ813 - YQ296
ENGINE START switches. . . . . CONT

Speedbrake . . . . ARMED

Landing gear . . . . Down

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

■ ■ ■ ■

STBY RUD ON

STANDBY RUDDER ON

Condition: The standby rudder hydraulic system is commanded on.

1 Choose one:

◆ STBY RUD ON light is illuminated with **no other flight deck indications**:

Avoid large or abrupt rudder pedal inputs.

■ ■ ■ ■

◆ STBY RUD ON light is illuminated due to the **pilot moving** the FLT CONTROL A or B switch to STBY RUD:

■ ■ ■ ■

◆ STBY RUD ON light is illuminated in response to a hydraulic system **non-normal** situation:

■ ■ ■ ■

Trailing Edge Flap Asymmetry

Condition: One or more of these occur:
- An uncommanded roll occurs when the flaps change position
- The left and right flap indications disagree.

Objective: To configure the airplane for landing.

1 Set the flap lever to the nearest detent that is equal to or less than the smallest indicated flap position.

Caution! Do not attempt to move the trailing edge flaps with the ALTERNATE FLAPS switch because there is no asymmetry protection.

Note: Do not use FMC 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 9.37**

■ ■ ■ ■

▼ 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

YJ813 - YQ296
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: The trailing edge flaps are not in the commanded position.

Objective: To configure the airplane for landing.

1 Choose one:

◆Trailing edge flap asymmetry **exists**:

►►**Go to the Trailing Edge Flap Asymmetry checklist on page 9.26**

■ ■ ■ ■

◆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**

3 Set VREF 30 for landing.

▼ **Continued on next page** ▼

▼Trailing Edge Flap Disagree continued▼

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▼

YK691 - YQ296

Note: The amber LE FLAPS TRANSIT light will stay illuminated until the flaps approach the flaps 15 position.

YD332 - YK171

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 9.37**

■ ■ ■ ■

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

Land using existing flaps.

Set VREF 40 + 30 knots for landing.

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

►►**Go to Landing Checklist below**

▼ Continued on next page ▼

Landing Checklist

YJ813 - YQ296

ENGINE START switches. . . . . CONT

Speedbrake . . . . ARMED

Landing gear . . . . Down

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

> **Note:** The light may be green or amber depending on the failure.

■ ■ ■ ■

Trailing Edge Flaps Up Landing

Condition: The trailing edge flaps are less than 1.

Objective: To configure for a landing with trailing edge flaps less than 1.

1 Choose one:

◆Trailing edge flap asymmetry does **not exist**:

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

►►**Go to step 4**

◆Trailing edge flap asymmetry **exists**:

►►**Go to step 2**

230K maximum.

2 ALTERNATE FLAPS master switch . . . . ARM

Note: This procedure extends the leading edge devices only.

3 ALTERNATE FLAPS position switch . . . . Momentary DOWN

Verify that the LE DEVICES annunciator indicates FULL EXT for all leading edge slats and flaps.

Note: The LE FLAPS TRANSIT light 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 9.3**

■ ■ ■ ■

◆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 . . . . ___

▼ Continued on next page ▼

▼Trailing Edge Flaps Up Landing continued▼

Additional Deferred Items

FASTEN BELTS switch . . . . .ON

YD332, YD333
ENGINE START switches. . . . . CONT

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.

Landing Checklist

YJ813 - YQ296
ENGINE START switches. . . . . CONT

Speedbrake . . . . .ARMED

YK691 - YQ296

Note: The SPEED BRAKE lever will not move beyond the FLIGHT detent on landing and the spoilers will not fully deploy.

Landing gear . . . . Down

▼ Continued on next page ▼

▼Trailing Edge Flaps Up Landing continued▼

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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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

■ ■ ■ ■

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MSG

FMC DISAGREE

YD332, YD333, YK171 - YQ296
(SB Adds YJ813 - YJ819)

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.

■ ■ ■ ■

MSG

FMC DISAGREE - VERTICAL

YD332, YD333, YK171 - YQ296
(SB Adds YJ816, YJ819)

FMC
P/RST

Condition: One of the following occur:
- Left FMC and right FMC target airspeeds disagree during descent
- Left FMC and right FMC vertical paths disagree during descent.

1 Do **not** move the FMC source select switch.

The FMC will attempt to correct the difference without crew action.

2 Monitor crossing altitudes to ensure compliance.

■ ■ ■ ■

Additional Information

The disagreement will most likely be corrected when crossing a waypoint with an altitude constraint.

If the disagreement remains when entering the approach phase, the FMC DISAGREE - VERTICAL message will be replaced with the FMC DISAGREE message. An approach with an RNP alerting requirement is not authorized when the FMC DISAGREE message is shown.

Intentionally
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FMC P/RST

FMC FAIL

YD332, YD333, YK171 - YQ296 (SB Adds YJ813 - YJ819)

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.

YJ813 - YQ296

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.

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

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.

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

▼ Continued on next page ▼

▼IRS FAULT continued▼

8 Choose one:

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

►►**Go to step 9**

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

►►**Go to step 13**

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

Action is not reversible.

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

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

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

▼ Continued on next page ▼

▼IRS FAULT continued▼

YK691

11 Choose one:

◆FAULT light **extinguishes**:

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

The MAP display on the failed side is not available.

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**

▼ Continued on next page ▼

▼IRS FAULT continued▼

YD332 - YK171, YQ294 - YQ296

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

Note: Autopilot(s) cannot be engaged.

■ ■ ■ ■

ON DC

IRS ON DC

Condition: IRS AC power is failed.

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

■ ■ ■ ■

UNABLE REQD NAV PERF - RNP

Condition: UNABLE REQD NAV PERF-RNP is shown. 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.

■ ■ ■ ■

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CONFIG

YD332, YD333, YK171 - YQ296

YD332, YD333

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.

YK171 - YQ296

Condition: All of these occur:
- Both center tank fuel pump switches are off
- There is more than 726 kgs of fuel in the center tank
- An engine is running.

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

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

Verify that the LOW PRESSURE lights extinguish.

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

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

■ ■ ■ ■

CONFIG

YJ813 - YJ819

Condition: All of these occur:
- Both center tank fuel pump pressures are low
- There is more than 726 kgs of fuel in the center tank
- An engine is running.

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

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

Verify that the LOW PRESSURE lights extinguish.

3 **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.

■ ■ ■ ■

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.

■ ■ ■ ■

Fuel Leak Engine

Condition: An engine fuel leak is suspected for the reasons listed in the Additional Information section of this checklist.

Objective: To confirm there is an engine fuel leak and shut down the affected engine if needed. This checklist does not address the unlikely possibility of a tank leak.

1 A diversion may be needed.

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

3 CROSSFEED selector . . . . Close

4 CTR FUEL PUMPS switches (both) . . . . OFF

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

The following steps check for an engine fuel leak

5 Record the main tank fuel quantities and the current time.

▼ Continued on next page ▼

▼Fuel Leak Engine continued▼

6 An engine fuel leak is confirmed if one or both of the following are true:

Fuel spray is observed from an engine or strut

YD332, YD333

A change in fuel imbalance of 500 lbs within 30 minutes or less

YJ813 - YQ296

A change in fuel imbalance of 230 kgs within 30 minutes or less

7 Choose one:

◆Engine fuel leak is **confirmed**:

►►**Go to step 12**

◆Engine fuel leak is **not** confirmed:

YD332, YD333

►►**Go to step 8**

YJ813 - YQ296

►►**Go to step 9**

YD332, YD333

8 Choose one:

◆The center tank fuel quantity is **greater than** 1000 lbs:

►►**Go to step 10**

◆The center tank fuel quantity is **less than** 1000 lbs:

►►**Go to step 11**

▼ Continued on next page ▼

▼Fuel Leak Engine continued▼

YJ813 - YQ296

9 Choose one:

◆The center tank fuel quantity is **greater than** 460 kgs:

►►**Go to step 10**

◆The center tank fuel quantity is **less than** 460 kgs:

►►**Go to step 11**

10 CTR FUEL PUMPS switches (both) . . . . .ON

11 Resume normal fuel management.

■ ■ ■ ■

An engine fuel leak is confirmed

12 The following steps shut down the engine to stop an engine fuel leak.

13 The engine to be shut down is the engine on the side where the fuel quantity decreased faster.

14 Autothrottle . . . . .Disengage

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

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

This closes the spar valve and stops an engine fuel leak.

▼ Continued on next page ▼

▼Fuel Leak Engine continued▼

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

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

YD332 - YQ295

18 Choose one:

◆APU is **available** for start:

APU . . . . START

When APU is running:

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

►►**Go to step 19**

◆APU is **not** available:

►►**Go to step 19**

YD332 - YQ295

19 Transponder mode selector . . . . TA

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

▼ Continued on next page ▼

▼**Fuel Leak Engine continued**▼

YQ296

20 Choose one:

◆APU is **available** for start:

APU . . . . START

When APU is running:

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

►►**Go to step 21**

◆APU is **not** available:

►►**Go to step 21**

YQ296

21 Transponder mode selector . . . . TA ONLY

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

22 Choose one:

◆Fuel LOW alert is **shown**:

►►**Go to step 23**

◆Fuel LOW alert is **not** shown:

►►**Go to step 25**

23 CROSSFEED selector. . . . . Open

This ensures that all fuel is available to the running engine.

▼ **Continued on next page** ▼

▼**Fuel Leak Engine continued**▼

24 FUEL PUMPS switches (all). . . . . ON

This ensures that all fuel is available for use.

25 Plan to land at the nearest suitable airport.

Note: Balance fuel as needed. All remaining fuel can be used for the running engine.

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

ISOLATION VALVE switch . . . . AUTO

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

■ ■ ■ ■

Additional Information

Reasons that an engine fuel leak should be suspected:

A visual observation of fuel spray

The total fuel quantity is decreasing at an abnormal rate

An engine has excessive fuel flow

The fuel IMBAL alert shows

The fuel LOW alert shows

The USING RSV FUEL message shows on the FMC CDU

The INSUFFICIENT FUEL message shows on the FMC CDU

The CHECK FMC FUEL QUANTITY message shows on the FMC CDU.

LOW PRESSURE

FUEL PUMP LOW PRESSURE

Condition: The fuel pump pressure is low.

Note: Fuel pump LOW PRESSURE lights may flicker when tank quantity is low and the airplane is in turbulent air or during climb or descent.

1 Choose one:

◆**One main** tank fuel pump LOW PRESSURE light is illuminated:

Main tank FUEL 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.

■ ■ ■ ■

Intentionally
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IMBAL

Condition: There is a fuel imbalance between the main tanks.

Objective: To decide if a fuel leak is suspected and balance fuel.

Note: If an engine has low fuel flow and unusual engine indications, the IMBAL alert may be due to an engine malfunction instead of a fuel leak.

1 The IMBAL alert may be caused by a fuel leak. A fuel leak should be suspected if one or more of the following are true:

The total fuel remaining is less than the planned fuel remaining.

An engine has excessive fuel flow.

One main tank is abnormally low.

2 Choose one:

◆A fuel leak is **not** suspected:

►►**Go to step 3**

◆A fuel leak is **suspected**:

►►**Go to the Fuel Leak Engine checklist on page 12.4**

■ ■ ■ ■

3 CROSSFEED selector . . . . Open

▼ **Continued on next page** ▼

▼IMBAL continued▼

4 Choose one:

◆**Main tank 1** quantity is low:

Main tank 1 FUEL PUMPS switches (both) . . . . OFF

This allows fuel from the higher quantity tank to feed both engines.

►►**Go to step 5**

◆**Main tank 2** quantity is low:

Main tank 2 FUEL PUMPS switches (both) . . . . OFF

This allows fuel from the higher quantity tank to feed both engines.

►►**Go to step 5**

5 **When** fuel balancing is complete:

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

CROSSFEED selector . . . . Close

■ ■ ■ ■

LOW

Condition: The fuel quantity is low in a main tank.

Objective: To decide if a fuel leak is suspected and ensure that all fuel is available for use.

Note: Avoid high nose up attitude. Make thrust changes slowly and smoothly. This reduces the chance of uncovering fuel pumps.

1 The fuel LOW alert may be caused by a fuel leak. A fuel leak should be suspected if one or more of the following are true:

The total fuel remaining is less than the planned fuel remaining.

An engine has excessive fuel flow.

One main tank is abnormally low.

2 Choose one:

◆A fuel leak is **not** suspected:

►►**Go to step 3**

◆A fuel leak is **suspected**:

►►**Go to the Fuel Leak Engine checklist on page 12.4**

■ ■ ■ ■

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 PUMPS switches (all). . . . . ON

This ensures that all fuel is available for use.

5 Plan to land at the nearest suitable airport.

■ ■ ■ ■

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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

YJ813 - YQ296

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 ▼

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.

YK691 - YQ296

Note: The amber LE FLAPS TRANSIT light will stay illuminated until the flaps approach the flaps 15 position.

YD332 - YK171

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

▼ Continued on next page ▼

▼LOSS OF 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.

Additional Deferred Item

GROUND PROXIMITY FLAP
INHIBIT switch . . . . FLAP INHIBIT

Landing Checklist

YJ813 - YQ296

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 ▼

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.

YK691 - YQ296

Note: The amber LE FLAPS TRANSIT light will stay illuminated until the flaps approach the flaps 15 position.

▼ Continued on next page ▼

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

YD332 - YK171

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 ▼

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

Manual Gear Extension

LANDING GEAR lever . . . . OFF

Manual gear extension handles . . . . Pull

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

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

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

LANDING GEAR lever . . . . .DN

Additional Deferred Item

GROUND PROXIMITY FLAP INHIBIT switch . . . . FLAP INHIBIT

Landing Checklist

YJ813 - YQ296

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.

Caution! Locked wheel protection is not available.

1 AUTO BRAKE select switch. . . . . OFF

The autobrake system is inoperative.

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

Automatic speedbrake extension may be inoperative.

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

4 **Checklist Complete Except Deferred Items**

Deferred Items

Landing Procedure Review

Use minimum braking consistent with runway length and conditions to reduce the possibility of a tire blowout.

Do **not** apply the brakes until the nose wheel is on the ground and the speedbrakes have been manually deployed.

▼ Continued on next page ▼

▼ANTISKID INOPERATIVE continued▼

Brake initially using light steady pedal pressure. Increase pressure as ground speed decreases. Do **not** pump the brakes.

Descent Checklist

Pressurization . . . . LAND ALT ___

Recall . . . . Checked

Autobrake **. . . . . OFF**

Landing data . . . . VREF ___, Minimums ___

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ___

Landing Checklist

YJ813 - YQ296

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

YJ813 - YQ296

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.

■ ■ ■ ■

BRAKE TEMP

BRAKE TEMPERATURE

YD332, YD333, YK171

Condition: One or more brake temperatures are high.

1 Choose one:

◆On the **ground**:

Check the Recommended Brake Cooling Schedule in the Advisory Information section of the Performance Inflight chapter for needed cooling time.

■ ■ ■ ■

◆**In flight**:

►►**Go to step 2**

270K/.82M maximum.

2 LANDING GEAR lever . . . . DN

This allows cooling air to flow around the brakes.

3 **When** the BRAKE TEMP light is **extinguished**:

Wait 7 minutes. This ensures sufficient cooling time.

235K maximum.

4 LANDING GEAR lever . . . . UP

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

LANDING GEAR lever . . . . OFF

■ ■ ■ ■

Intentionally
Blank

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 14.18**

■ ■ ■ ■

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 14.22

■ ■ ■ ■

◆**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.

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 ▼

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 14.22**

■ ■ ■ ■

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 ▼

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 14.24**

■ ■ ■ ■

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

GROUND PROXIMITY GEAR
INHIBIT switch . . . . GEAR INHIBIT

▼ Continued on next page ▼

▼Landing Gear Lever Jammed in the Up Position continued▼

Landing Checklist

YJ813 - YQ296

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

YJ813 - YQ296

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 ▼

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 14.24**

■ ■ ■ ■

6 Choose one:

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

Land normally.

■ ■ ■ ■

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

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

Land normally.

Note: Nose wheel steering is not available.

■ ■ ■ ■

Partial or All Gear Up Landing

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

1 Choose one:

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

►►**Go to step 2**

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

►►**Go to the Manual Gear Extension checklist on page 14.22**

■ ■ ■ ■

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 ▼

Landing Procedure Review

Do not extend the speedbrakes unless stopping distance is critical. When stopping distance is critical, extend the speedbrakes after all landing gear, the nose or the engine nacelle have contacted the runway.

Do not use the thrust reversers unless stopping distance is critical.

Turn all fuel pump switches OFF just before the flare.

After stopping, do the Evacuation checklist, if needed.

Additional Deferred Items

APU switch . . . . OFF

GROUND PROXIMITY GEAR
INHIBIT switch . . . . GEAR INHIBIT

When on approach:

Engine BLEED air switches. . . . . OFF

This ensures the airplane is depressurized at touchdown.

Landing Checklist

YJ813 - YQ296
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 or a TAKEOFF CONFIG light (if installed and operative) illuminates when advancing the thrust levers to takeoff thrust.

1 Assure correct airplane takeoff configuration.

■ ■ ■ ■

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

(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.

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▼

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 indication shows fully open to depressurize the airplane

3 Plan to land at the nearest suitable airport.

■ ■ ■ ■

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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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737-800SFP1 CFM56-7B26 KG FAA CATC/N (FMC MODEL 737-800.1)

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**			
	V/S (FT/MIN)	1700	1000			
30000	**PITCH ATT**	**4.0**	**3.5**	**3.5**	**3.5**	**4.0**
	V/S (FT/MIN)	2500	1900	1400	1100	800
20000	**PITCH ATT**	**7.0**	**6.5**	**6.0**	**6.0**	**6.0**
	V/S (FT/MIN)	4200	3200	2600	2100	1700
10000	**PITCH ATT**	**10.5**	**9.0**	**8.5**	**8.0**	**7.5**
	V/S (FT/MIN)	5600	4400	3600	3000	2500
SEA LEVEL	**PITCH ATT**	**14.0**	**12.0**	**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	84	87	92		
35000	**PITCH ATT**	**1.0**	**2.0**	**2.5**	**3.0**	**3.5**
	%N1	82	83	86	89	94
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**	**3.0**
	%N1	77	78	80	81	83
20000	**PITCH ATT**	**1.0**	**1.5**	**2.0**	**2.5**	**3.5**
	%N1	74	74	76	77	79
15000	**PITCH ATT**	**1.0**	**1.5**	**2.0**	**2.5**	**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**	**-2.0**	**-1.0**	**-0.5**	**0.0**	**0.0**
	V/S (FT/MIN)	-2900	-2600	-2600	-2900	-3400
30000	**PITCH ATT**	**-2.0**	**-1.0**	**0.0**	**1.0**	**1.5**
	V/S (FT/MIN)	-2400	-2100	-1900	-1800	-1900
20000	**PITCH ATT**	**-2.0**	**-1.0**	**0.0**	**1.0**	**2.0**
	V/S (FT/MIN)	-2200	-1900	-1700	-1700	-1700
10000	**PITCH ATT**	**-2.5**	**-1.0**	**0.0**	**1.0**	**2.0**
	V/S (FT/MIN	-2000	-1700	-1500	-1500	-1500
SEA LEVEL	**PITCH ATT**	**-2.5**	**-1.0**	**0.0**	**1.0**	**2.0**
	V/S (FT/MIN)	-1800	-1500	-1400	-1300	-1300

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	63	67	70
5000	**PITCH ATT**	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
	%N1	49	54	59	63	67

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**	**4.5**	**5.0**	**5.5**	**5.5**	**6.0**
(VREF40 + 50)	%N1	52	57	61	65	69
FLAPS 5 (GEAR UP)	**PITCH ATT**	**5.5**	**5.5**	**6.0**	**6.0**	**6.5**
(VREF40 + 30)	%N1	52	58	63	67	70
FLAPS 15 (GEAR DOWN)	**PITCH ATT**	**5.5**	**5.5**	**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**	**2.0**	**2.0**	**2.5**	**2.5**
(VREF15 + 10)	%N1	44	49	53	56	59
FLAPS 30	**PITCH ATT**	**0.5**	**0.5**	**1.0**	**1.0**	**1.0**
(VREF30 + 10)	%N1	48	53	58	61	65
FLAPS 40	**PITCH ATT**	**-0.5**	**-0.5**	**-0.5**	**-0.5**	**0.0**
(VREF40 + 10)	%N1	53	59	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/MACH)									
	0	5000	10000	15000	20000	25000	30000	35000	37000	41000
	280	280	280	280	280	280	280	.78	.78	.78
60	90.2	90.5	90.4	90.6	90.4	92.1	93.8	95.1	95.2	93.5
55	91.0	91.2	91.3	91.4	90.8	91.5	93.1	94.4	94.5	92.8
50	91.7	92.0	92.1	92.2	91.7	91.5	92.4	93.7	93.8	92.1
45	92.4	92.6	92.8	93.0	92.6	92.4	92.4	93.0	93.1	91.4
40	93.1	93.3	93.6	93.8	93.4	93.2	93.2	92.3	92.4	90.7
35	93.6	94.0	94.3	94.5	94.3	94.0	94.0	93.0	92.4	90.8
30	92.9	94.8	95.0	95.2	95.1	94.8	94.7	93.9	93.3	91.8
25	92.2	94.8	95.7	95.9	95.9	95.5	95.4	94.7	94.1	92.8
20	91.4	94.0	96.5	96.7	96.6	96.2	96.1	95.4	94.9	93.7
15	90.6	93.2	95.9	97.5	97.4	96.9	96.7	96.2	95.7	94.6
10	89.9	92.5	95.1	97.8	98.3	97.7	97.4	96.9	96.5	95.6
5	89.1	91.7	94.3	97.0	99.2	98.6	98.1	97.7	97.3	96.5
0	88.3	90.9	93.5	96.2	98.6	99.6	99.1	98.5	98.2	97.5
-5	87.6	90.1	92.7	95.4	97.8	99.6	100.0	99.2	99.0	98.4
-10	86.8	89.3	91.9	94.6	97.1	98.8	100.3	100.2	99.8	99.4
-15	86.0	88.5	91.0	93.8	96.3	98.0	99.6	101.1	100.8	100.4
-20	85.2	87.6	90.2	93.0	95.5	97.2	98.7	100.8	101.3	101.0
-25	84.3	86.8	89.4	92.2	94.7	96.4	97.9	100.0	100.5	100.1
-30	83.5	86.0	88.5	91.3	93.9	95.6	97.1	99.1	99.6	99.3
-35	82.7	85.1	87.7	90.5	93.1	94.8	96.3	98.3	98.8	98.4
-40	81.8	84.3	86.8	89.6	92.3	93.9	95.4	97.4	97.9	97.6

%N1 Adjustments for Engine Bleeds

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

***Dual bleed sources**

Go-around %N1

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 KG)	FLAPS		
	40	30	15
85	160	168	175
80	155	163	170
75	151	158	164
70	145	152	159
65	141	148	154
60	135	142	148
55	128	136	141
50	122	129	134
45	115	122	127
40	108	115	119

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ADVISORY INFORMATION

Normal Configuration Landing Distances

Flaps 15

LANDING DISTANCE AND ADJUSTMENT (M)

BRAKING CONFIGURATION	REF DIST 65000 KG LANDING WEIGHT	WT ADJ PER 5000 KG ABOVE/ BELOW 65000 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	TEMP ADJ PER 10°C ABV ISA	TEMP ADJ PER 10°C BLW ISA	APP SPD ADJ PER 5 KTS ABOVE VREF15	REVERSE THRUST ADJ ONE REV	REVERSE THRUST ADJ NO REV

Dry Runway

MAX MANUAL	980	75/-60	20/30	-35	125	10	-10	20	-20	35	20	40
MAX AUTO	1285	70/-70	30/40	-45	155	0	0	30	-30	60	0	5
AUTOBRAKE 3	1840	110/-120	50/65	-75	255	0	0	50	-50	100	0	0
AUTOBRAKE 2	2325	155/-165	70/95	-105	355	35	-45	70	-70	95	85	85
AUTOBRAKE 1	2550	180/-190	85/110	-120	415	70	-80	75	-75	90	230	350

Good Reported Braking Action

MAX MANUAL	1345	75/-80	35/50	-60	200	30	-30	35	-35	45	65	150
MAX AUTO	1445	80/-85	40/50	-60	210	30	-25	35	-35	55	75	165
AUTOBRAKE 3	1845	110/-120	50/65	-75	260	5	-5	50	-50	100	5	10
AUTOBRAKE 2	2325	155/-165	70/95	-105	355	35	-45	70	-70	95	85	85
AUTOBRAKE 1	2550	180/-190	85/110	-120	415	70	-80	75	-75	90	230	350

Medium Reported Braking Action

MAX MANUAL	1860	120/-125	60/80	-95	335	85	-65	50	-55	60	190	460
MAX AUTO	1905	125/-130	60/80	-95	340	80	-60	55	-55	70	195	465
AUTOBRAKE 3	2025	130/-135	60/80	-100	355	60	-40	60	-60	100	130	375
AUTOBRAKE 2	2375	160/-165	75/100	-115	395	65	-60	70	-70	95	125	235
AUTOBRAKE 1	2565	185/-190	85/115	-125	430	90	-85	75	-75	90	240	405

Poor Reported Braking Action

MAX MANUAL	2450	175/-175	85/115	-145	535	205	-135	70	-75	75	420	1115
MAX AUTO	2455	175/-175	85/120	-145	535	205	-135	70	-75	80	420	1115
AUTOBRAKE 3	2480	180/-180	85/120	-145	540	195	-125	70	-75	90	420	1125
AUTOBRAKE 2	2650	190/-190	90/125	-150	555	190	-130	80	-85	90	360	965
AUTOBRAKE 1	2760	200/-205	95/130	-155	575	200	-140	80	-85	90	405	1005

Reference distance is for sea level, standard day, no wind or slope, VREF15 approach speed and two engine detent reverse thrust.
For max manual braking and manual speed brakes, increase reference landing distance by 60 m.
For autobrake and manual speed brakes, increase reference landing distance by 50 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

	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	65000 KG LANDING WEIGHT	PER 5000 KG ABOVE/ BELOW 65000 KG	PER 1000 FT STD/ HIGH*	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 5 KTS ABOVE VREF30	ONE REV	NO REV

Dry Runway

MAX MANUAL	940	60/-55	20/25	-35	120	10	-10	20	-20	35	15	35
MAX AUTO	1215	60/-65	30/35	-45	150	0	0	30	-30	55	0	5
AUTOBRAKE 3	1725	100/-110	45/60	-75	245	0	-5	50	-50	90	0	0
AUTOBRAKE 2	2145	140/-150	65/85	-100	340	35	-40	60	-60	85	85	90
AUTOBRAKE 1	2350	165/-170	75/100	-115	395	65	-70	70	-70	80	185	310

Good Reported Braking Action

MAX MANUAL	1285	70/-75	35/45	-55	200	30	-25	30	-30	45	60	135
MAX AUTO	1385	75/-80	35/50	-60	205	30	-25	35	-35	55	65	150
AUTOBRAKE 3	1725	100/-110	45/60	-75	250	5	-10	50	-50	90	5	10
AUTOBRAKE 2	2145	140/-150	65/85	-100	340	35	-40	60	-60	85	85	90
AUTOBRAKE 1	2350	165/-170	75/100	-115	395	65	-70	70	-70	80	185	310

Medium Reported Braking Action

MAX MANUAL	1755	110/-115	55/70	-90	330	80	-60	50	-50	60	165	395
MAX AUTO	1805	115/-120	55/75	-90	335	75	-60	50	-50	70	170	405
AUTOBRAKE 3	1910	120/-125	55/75	-95	345	55	-45	55	-55	85	115	330
AUTOBRAKE 2	2200	145/-150	70/90	-110	380	65	-60	65	-65	85	120	225
AUTOBRAKE 1	2360	165/-170	75/100	-120	410	90	-80	70	-70	80	200	360

Poor Reported Braking Action

MAX MANUAL	2285	160/-160	80/105	-135	520	190	-125	65	-70	70	360	930
MAX AUTO	2295	160/-160	80/105	-135	520	190	-120	65	-70	80	355	925
AUTOBRAKE 3	2325	165/-165	80/105	-140	525	185	-120	65	-70	80	360	940
AUTOBRAKE 2	2460	170/-175	85/110	-145	540	180	-120	70	-75	85	325	820
AUTOBRAKE 1	2550	180/-185	85/115	-150	550	190	-130	75	-80	80	345	860

Reference distance is for sea level, standard day, no wind or slope, VREF30 approach speed and two engine detent reverse thrust.
For max manual braking and manual speed brakes, increase reference landing distance by 60 m.
For autobrake and manual speed brakes, increase reference landing distance by 50 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

	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	65000 KG LANDING WEIGHT	PER 5000 KG ABOVE/ BELOW 65000 KG	PER 1000 FT STD/ HIGH*	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 5 KTS ABOVE VREF40	ONE REV	NO REV

Dry Runway

MAX MANUAL	900	50/-50	20/25	-35	115	10	-10	20	-20	35	15	30
MAX AUTO	1135	55/-60	25/30	-40	140	0	0	25	-25	55	0	0
AUTOBRAKE 3	1590	90/-100	40/55	-70	235	0	-5	45	-45	85	0	0
AUTOBRAKE 2	2005	125/-135	60/80	-95	325	25	-35	55	-55	85	50	50
AUTOBRAKE 1	2210	150/-160	70/95	-110	385	60	-65	65	-65	80	150	240

Good Reported Braking Action

MAX MANUAL	1235	65/-70	30/40	-55	195	30	-25	30	-30	45	55	120
MAX AUTO	1325	70/-80	35/45	-60	205	30	-25	30	-35	55	60	135
AUTOBRAKE 3	1595	90/-100	40/55	-70	240	10	-10	45	-45	90	5	10
AUTOBRAKE 2	2005	125/-135	60/80	-95	325	25	-35	55	-55	85	50	50
AUTOBRAKE 1	2210	150/-160	70/95	-110	385	60	-65	65	-65	80	150	240

Medium Reported Braking Action

MAX MANUAL	1680	105/-110	50/70	-90	325	80	-60	45	-45	60	150	360
MAX AUTO	1715	110/-115	50/70	-90	325	70	-55	45	-50	70	155	365
AUTOBRAKE 3	1785	110/-115	55/70	-95	335	60	-45	50	-50	85	115	325
AUTOBRAKE 2	2060	130/-140	60/80	-105	370	60	-55	60	-60	85	90	185
AUTOBRAKE 1	2225	150/-160	70/95	-115	400	80	-70	65	-65	80	165	290

Poor Reported Braking Action

MAX MANUAL	2180	150/-155	75/100	-135	510	190	-125	60	-65	70	330	840
MAX AUTO	2190	150/-155	75/100	-135	515	190	-120	60	-65	75	325	840
AUTOBRAKE 3	2210	155/-155	75/100	-135	515	185	-120	60	-65	80	330	850
AUTOBRAKE 2	2325	160/-165	75/105	-140	525	175	-115	65	-70	85	280	740
AUTOBRAKE 1	2415	165/-175	80/110	-145	540	185	-125	70	-75	80	310	760

Reference distance is for sea level, standard day, no wind or slope, VREF40 approach speed and two engine detent reverse thrust.
For max manual braking and manual speed brakes, increase reference landing distance by 55 m.
For autobrake and manual speed brakes, increase reference landing distance by 45 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 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	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 RESTRICTED 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 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	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 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	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 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
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 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	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 DISTANCE AND ADJUSTMENT (M)							
		REFERENCE DISTANCE	WT ADJ PER	ALT ADJ	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		APP SPD ADJ
LANDING CONFIGURATION	VREF	FOR 60000 KG LANDING WEIGHT	5000 KG ABOVE/ BELOW 60000 KG	PER 1000 FT STD/HIGH*	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
80	0	15.1	17.0	19.3	22.4	25.3	28.9	30.9	35.0	40.2	40.4	45.9	53.0	50.8	57.9	67.3	60.8	69.6	81.2
	10	15.6	17.6	20.0	23.1	26.1	29.8	31.9	36.2	41.5	41.8	47.5	54.8	52.5	59.9	69.5	62.8	71.9	83.9
	15	15.8	17.8	20.2	23.5	26.5	30.3	32.4	36.7	42.1	42.4	48.2	55.6	53.3	60.7	70.5	63.7	72.9	85.1
	20	16.0	18.1	20.5	23.8	26.9	30.7	32.8	37.2	42.7	42.9	48.8	56.3	54.0	61.5	71.4	64.6	73.9	86.2
	30	16.4	18.5	21.1	24.4	27.6	31.5	33.7	38.2	43.8	44.0	50.0	57.7	55.3	63.1	73.2	66.2	75.7	88.4
	40	16.6	18.7	21.3	24.7	27.9	31.9	34.1	38.7	44.4	44.7	50.9	58.8	56.3	64.3	74.8	67.5	77.4	90.5
	50	16.6	18.7	21.3	24.8	28.0	32.1	34.3	39.0	44.9	45.2	51.5	59.7	57.1	65.4	76.3	68.7	79.0	92.9
70	0	13.7	15.4	17.5	20.2	22.8	26.0	27.7	31.3	35.9	36.1	41.0	47.2	45.3	51.6	59.7	54.9	62.7	72.9
	10	14.2	15.9	18.1	20.8	23.5	26.8	28.6	32.4	37.1	37.3	42.3	48.7	46.8	53.3	61.6	56.7	64.8	75.4
	15	14.4	16.2	18.4	21.1	23.9	27.2	29.0	32.8	37.6	37.8	43.0	49.4	47.5	54.0	62.5	57.5	65.7	76.4
	20	14.6	16.4	18.6	21.4	24.2	27.6	29.4	33.3	38.1	38.4	43.5	50.1	48.1	54.8	63.4	58.3	66.5	77.4
	30	14.9	16.8	19.1	22.0	24.8	28.3	30.2	34.1	39.1	39.3	44.6	51.4	49.3	56.1	64.9	59.8	68.2	79.4
	40	15.1	17.0	19.3	22.2	25.1	28.6	30.5	34.6	39.6	39.9	45.3	52.2	50.1	57.1	66.2	60.9	69.6	81.2
	50	15.1	17.0	19.3	22.3	25.2	28.8	30.7	34.8	40.0	40.2	45.8	52.9	50.7	58.0	67.4	61.8	70.9	83.0
60	0	12.3	13.9	15.7	18.0	20.3	23.1	24.4	27.6	31.6	31.7	35.9	41.2	39.6	45.0	51.8	48.1	54.8	63.5
	10	12.7	14.3	16.3	18.5	20.9	23.8	25.2	28.5	32.6	32.7	37.1	42.6	40.9	46.5	53.6	49.7	56.6	65.6
	15	12.9	14.6	16.5	18.8	21.2	24.2	25.6	29.0	33.1	33.2	37.6	43.2	41.5	47.1	54.4	50.4	57.4	66.5
	20	13.1	14.8	16.7	19.1	21.5	24.5	26.0	29.4	33.5	33.6	38.1	43.8	42.0	47.8	55.1	51.1	58.2	67.4
	30	13.4	15.1	17.2	19.6	22.1	25.1	26.6	30.1	34.4	34.5	39.1	44.9	43.1	49.0	56.5	52.3	59.6	69.1
	40	13.6	15.3	17.3	19.8	22.3	25.4	26.9	30.5	34.9	35.0	39.7	45.6	43.8	49.8	57.5	53.2	60.7	70.5
	50	13.5	15.3	17.3	19.8	22.4	25.5	27.0	30.6	35.1	35.2	40.0	46.0	44.2	50.4	58.3	53.9	61.7	71.9
50	0	11.0	12.3	14.0	15.7	17.7	20.2	21.2	23.9	27.3	27.2	30.8	35.3	33.8	38.3	44.1	40.9	46.4	53.6
	10	11.3	12.7	14.4	16.3	18.3	20.8	21.9	24.7	28.2	28.1	31.8	36.5	34.9	39.6	45.5	42.2	48.0	55.4
	15	11.5	12.9	14.7	16.5	18.6	21.1	22.2	25.1	28.6	28.6	32.3	37.0	35.4	40.2	46.2	42.8	48.7	56.2
	20	11.6	13.1	14.9	16.7	18.9	21.4	22.5	25.4	29.0	28.9	32.8	37.5	35.9	40.7	46.8	43.4	49.3	56.9
	30	11.9	13.4	15.2	17.2	19.3	22.0	23.1	26.1	29.7	29.7	33.6	38.4	36.8	41.8	48.0	44.5	50.6	58.4
	40	12.1	13.6	15.4	17.3	19.5	22.2	23.4	26.4	30.1	30.1	34.0	39.0	37.4	42.4	48.8	45.2	51.4	59.4
	50	12.0	13.6	15.4	17.3	19.6	22.3	23.4	26.5	30.3	30.2	34.2	39.3	37.6	42.8	49.3	45.7	52.1	60.3
40	0	9.6	10.8	12.3	13.5	15.2	17.3	17.9	20.2	23.0	22.8	25.8	29.4	28.1	31.8	36.4	33.7	38.2	43.9
	10	10.0	11.2	12.7	14.0	15.8	17.9	18.5	20.9	23.8	23.6	26.6	30.4	29.0	32.8	37.6	34.8	39.5	45.4
	15	10.1	11.4	12.9	14.2	16.0	18.1	18.8	21.2	24.1	23.9	27.0	30.8	29.4	33.3	38.2	35.3	40.0	46.0
	20	10.2	11.5	13.1	14.4	16.2	18.4	19.1	21.5	24.5	24.2	27.4	31.3	29.8	33.8	38.7	35.8	40.6	46.6
	30	10.5	11.8	13.4	14.8	16.6	18.9	19.6	22.1	25.1	24.9	28.1	32.1	30.6	34.6	39.7	36.7	41.6	47.8
	40	10.6	11.9	13.5	14.9	16.8	19.1	19.8	22.3	25.4	25.2	28.4	32.5	31.0	35.1	40.2	37.2	42.2	48.6
	50	10.6	11.9	13.5	14.9	16.8	19.1	19.8	22.3	25.5	25.2	28.6	32.7	31.1	35.3	40.6	37.5	42.6	49.1

***To correct for wind, enter table with the brakes on speed minus one half the headwind or plus 1.5 times the tailwind. If ground speed is used for brakes on speed, ignore wind and enter table with sea level, 15°C.**

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	29.4	30 TO 41	41 & ABOVE
	BRAKE TEMPERATURE MONITOR SYSTEM INDICATION ON CDS								
	UP TO 2.5	2.6	3	3.3	3.8	4.5	4.9	5.0 TO 7.1	7.1 & ABOVE
INFLIGHT GEAR DOWN	NO SPECIAL PROCEDURE REQUIRED	1	4	5	6	7	7.6	CAUTION	FUSE PLUG MELT ZONE
GROUND		6.7	16.0	24.1	34.2	45.9	53.3		

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

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

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

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

Intentionally
Blank

ENGINE INOP

Initial Max Continuous %N1

Based on .79M, A/C high and anti-ice off

TAT (°C)	PRESSURE ALTITUDE (1000 FT)								
	25	27	29	31	33	35	37	39	41
20	96.8	96.6	96.3	96.1	95.9	95.4	95.0	94.7	93.9
15	97.4	97.2	96.9	96.8	96.6	96.2	95.7	95.5	94.8
10	98.0	97.8	97.5	97.4	97.4	96.9	96.5	96.3	95.7
5	98.3	98.6	98.3	98.1	98.1	97.7	97.3	97.1	96.6
0	97.5	98.7	99.2	99.0	98.9	98.5	98.2	98.0	97.5
-5	96.7	98.0	99.1	99.8	99.7	99.3	98.9	98.7	98.4
-10	96.0	97.2	98.4	99.6	100.5	100.2	99.8	99.6	99.4
-15	95.2	96.4	97.6	98.8	100.1	101.0	100.8	100.6	100.3
-20	94.4	95.6	96.8	98.0	99.3	100.5	101.1	100.8	100.6
-25	93.6	94.9	96.0	97.2	98.5	99.7	100.2	100.0	99.8
-30	92.8	94.1	95.2	96.4	97.7	98.8	99.4	99.2	99.0
-35	92.0	93.2	94.4	95.6	96.8	98.0	98.5	98.3	98.1
-40	91.2	92.4	93.5	94.7	96.0	97.1	97.6	97.4	97.2

%N1 Adjustments for Engine Bleeds

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

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	81	270	17500	16200	15000
80	77	262	19200	18000	16700
75	72	255	20800	19800	18500
70	67	246	22300	21300	20300
65	62	238	23900	23000	22000
60	57	228	25800	24800	23900
55	53	219	28100	27100	26000
50	48	209	30300	29500	28500
45	43	198	32500	31800	30900
40	38	187	34900	34100	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)				
HEADWIND COMPONENT (KTS)						TAILWIND COMPONENT (KTS)				
100	80	60	40	20		20	40	60	80	100
139	129	120	113	106	100	95	90	86	82	78
277	257	240	225	212	200	189	180	171	164	156
416	386	360	338	318	300	284	270	257	245	235
554	515	480	450	424	400	379	360	343	327	313
693	643	600	563	529	500	474	450	428	409	391
831	772	720	675	635	600	568	540	514	491	469
969	900	840	788	741	700	663	630	600	573	548
1108	1029	960	900	847	800	758	720	686	655	626
1246	1157	1080	1012	953	900	853	810	771	736	704
1385	1286	1200	1125	1059	1000	947	900	857	818	783
1523	1414	1320	1237	1165	1100	1042	990	943	900	861
1662	1543	1440	1350	1271	1200	1137	1080	1029	982	939
1800	1672	1560	1463	1376	1300	1232	1170	1114	1064	1017
1939	1800	1680	1575	1482	1400	1326	1260	1200	1145	1095
2078	1929	1800	1688	1588	1500	1421	1350	1285	1227	1174
2217	2058	1921	1800	1694	1600	1516	1440	1371	1309	1252
2356	2187	2041	1913	1800	1700	1610	1530	1457	1390	1330
2496	2317	2161	2026	1906	1800	1705	1619	1542	1472	1408

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	0.5	0.5	0.5	0.5	0.6	0.6	0:17
200	0.8	0.8	0.9	1.0	1.0	1.1	1.1	1.2	1.3	1.3	0:34
300	1.3	1.3	1.4	1.6	1.7	1.7	1.9	2.0	2.1	2.2	0:50
400	1.7	1.8	2.0	2.2	2.3	2.4	2.6	2.8	2.9	3.1	1:07
500	2.1	2.3	2.5	2.7	2.9	3.1	3.3	3.5	3.7	3.9	1:24
600	2.5	2.8	3.0	3.3	3.5	3.7	4.0	4.2	4.5	4.7	1:40
700	2.9	3.2	3.5	3.8	4.1	4.3	4.6	4.9	5.2	5.5	1:57
800	3.4	3.7	4.0	4.3	4.7	5.0	5.3	5.6	6.0	6.3	2:14
900	3.8	4.1	4.5	4.9	5.3	5.6	6.0	6.4	6.7	7.1	2:30
1000	4.2	4.6	5.0	5.4	5.8	6.2	6.6	7.0	7.5	7.9	2:47
1100	4.6	5.0	5.5	5.9	6.4	6.8	7.3	7.7	8.2	8.7	3:04
1200	5.0	5.4	5.9	6.5	6.9	7.4	7.9	8.4	8.9	9.4	3:21
1300	5.3	5.9	6.4	7.0	7.5	8.0	8.6	9.1	9.7	10.2	3:37
1400	5.7	6.3	6.9	7.5	8.1	8.6	9.2	9.8	10.4	11.0	3:54
1500	6.1	6.7	7.3	8.0	8.6	9.2	9.8	10.4	11.1	11.7	4:11
1600	6.5	7.2	7.8	8.5	9.1	9.8	10.4	11.1	11.8	12.5	4:28
1700	6.9	7.6	8.3	9.0	9.7	10.3	11.1	11.8	12.5	13.2	4:45
1800	7.2	8.0	8.7	9.5	10.2	10.9	11.7	12.4	13.2	13.9	5:02

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	13800	11300	8900
80	16100	13700	11400
75	18100	16300	14000
70	20200	18500	16300
65	21800	20600	18600
60	23400	22300	20700
55	25300	24100	22700
50	28100	26700	24800
45	30700	29700	28100
40	33200	32300	31100

With engine anti-ice on, decrease altitude capability by 2100 ft.
With engine and wing anti-ice on, decrease altitude capability by 5700 ft.

ENGINE INOP

MAX CONTINUOUS THRUST

Long Range Cruise Control

WEIGHT (1000 KG)		PRESSURE ALTITUDE (1000 FT) 10	14	18	22	25	27	29	31
85	%N1	92.5	95.7						
	MACH	.561	.593						
	KIAS	311	306						
	FF/ENG	3152	3144						
80	%N1	90.8	94.2	98.5					
	MACH	.545	.585	.612					
	KIAS	302	302	292					
	FF/ENG	2951	2983	2973					
75	%N1	89.0	92.4	96.2					
	MACH	.528	.569	.599					
	KIAS	293	293	286					
	FF/ENG	2751	2781	2756					
70	%N1	87.1	90.6	94.1					
	MACH	.510	.551	.589					
	KIAS	282	284	281					
	FF/ENG	2552	2581	2578					
65	%N1	85.1	88.5	92.0	96.3				
	MACH	.491	.532	.574	.604				
	KIAS	271	273	274	266				
	FF/ENG	2356	2381	2394	2388				
60	%N1	82.9	86.3	89.9	93.8				
	MACH	.471	.511	.553	.590				
	KIAS	261	262	263	260				
	FF/ENG	2168	2183	2196	2192				
55	%N1	80.7	83.9	87.5	91.2	94.5	97.7		
	MACH	.453	.488	.530	.574	.597	.614		
	KIAS	250	250	252	252	247	244		
	FF/ENG	1991	1987	1998	2009	2010	2060		
50	%N1	78.3	81.4	84.9	88.5	91.7	94.0	97.1	
	MACH	.434	.466	.505	.549	.583	.596	.613	
	KIAS	240	239	240	241	241	236	233	
	FF/ENG	1822	1803	1801	1811	1831	1829	1873	
45	%N1	75.9	78.8	82.0	85.7	88.4	90.6	93.2	96.2
	MACH	.415	.444	.478	.522	.556	.578	.593	.610
	KIAS	229	227	227	229	229	229	225	222
	FF/ENG	1661	1629	1608	1615	1627	1647	1649	1683
40	%N1	73.4	76.0	79.1	82.5	85.2	87.1	89.2	91.8
	MACH	.395	.422	.453	.491	.525	.548	.571	.589
	KIAS	218	216	215	215	216	216	216	214
	FF/ENG	1506	1466	1434	1422	1432	1445	1461	1470

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
309	279	253	233	215	200	190	180	172	164	157
625	564	511	467	432	400	379	360	342	326	312
943	850	769	703	648	600	568	540	513	489	468
1263	1137	1028	939	865	800	758	719	683	652	623
1586	1426	1287	1175	1082	1000	947	898	853	813	778
1912	1717	1548	1412	1299	1200	1136	1076	1023	975	932
2240	2009	1810	1649	1517	1400	1324	1255	1192	1136	1086
2570	2304	2074	1888	1735	1600	1513	1434	1362	1297	1240
2903	2600	2337	2127	1953	1800	1702	1613	1531	1458	1393

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	0:46	1.1	0:43	1.0	0:41	0.9	0:39	0.8	0:38
400	2.7	1:30	2.4	1:25	2.2	1:20	2.0	1:15	1.9	1:12
600	4.0	2:14	3.7	2:07	3.4	2:00	3.1	1:52	2.9	1:46
800	5.3	3:00	4.9	2:50	4.5	2:40	4.2	2:29	4.0	2:21
1000	6.7	3:45	6.1	3:33	5.7	3:20	5.3	3:07	5.0	2:56
1200	8.0	4:32	7.3	4:17	6.8	4:01	6.3	3:45	6.0	3:31
1400	9.3	5:18	8.6	5:01	7.9	4:42	7.4	4:23	7.0	4:07
1600	10.5	6:06	9.7	5:45	9.0	5:24	8.4	5:02	7.9	4:43
1800	11.8	6:54	10.9	6:31	10.1	6:07	9.4	5:42	8.9	5:20

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	0.0	0.0	0.0	0.1	0.2	0.3	0.4	0.5
2	-0.1	-0.1	0.0	0.1	0.3	0.5	0.7	0.9	1.2
3	-0.2	-0.1	0.0	0.2	0.4	0.7	1.0	1.4	1.8
4	-0.3	-0.2	0.0	0.3	0.6	1.0	1.4	1.9	2.4
5	-0.4	-0.2	0.0	0.3	0.7	1.2	1.8	2.4	3.0
6	-0.5	-0.2	0.0	0.4	0.9	1.4	2.1	2.8	3.6
7	-0.6	-0.3	0.0	0.4	1.0	1.6	2.4	3.2	4.2
8	-0.6	-0.3	0.0	0.5	1.1	1.9	2.7	3.6	4.7
9	-0.7	-0.4	0.0	0.6	1.2	2.0	3.0	4.0	5.2
10	-0.8	-0.4	0.0	0.6	1.4	2.2	3.2	4.4	5.6
11	-0.9	-0.4	0.0	0.7	1.5	2.4	3.5	4.7	6.1
12	-1.0	-0.5	0.0	0.7	1.6	2.6	3.7	5.0	6.5
13	-1.0	-0.5	0.0	0.8	1.7	2.7	3.9	5.3	6.9
14	-1.1	-0.6	0.0	0.8	1.8	2.8	4.1	5.6	7.2

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
85	%N1	82.0	84.9	89.2	94.1				
	KIAS	252	253	254	255				
	FF/ENG	2820	2830	2850	2920				
80	%N1	80.3	83.2	87.5	92.0				
	KIAS	244	245	246	247				
	FF/ENG	2650	2650	2660	2710				
75	%N1	78.6	81.4	85.6	90.1	96.9			
	KIAS	236	238	238	239	241			
	FF/ENG	2490	2480	2480	2520	2620			
70	%N1	76.7	79.4	83.7	88.1	93.6			
	KIAS	229	229	230	231	233			
	FF/ENG	2330	2310	2310	2330	2380			
65	%N1	74.7	77.5	81.6	85.9	90.7			
	KIAS	221	221	222	223	224			
	FF/ENG	2160	2150	2130	2150	2170			
60	%N1	72.5	75.4	79.4	83.7	88.3	95.6		
	KIAS	211	212	213	214	215	216		
	FF/ENG	2000	1980	1970	1970	1980	2080		
55	%N1	70.1	73.0	77.0	81.3	85.8	91.4		
	KIAS	202	203	203	204	205	207		
	FF/ENG	1850	1820	1800	1790	1790	1840		
50	%N1	67.7	70.4	74.5	78.7	83.2	87.9	96.7	
	KIAS	192	193	194	195	195	197	198	
	FF/ENG	1690	1660	1640	1630	1620	1630	1780	
45	%N1	64.9	67.6	71.7	75.8	80.3	84.9	91.2	
	KIAS	185	185	185	185	185	186	187	
	FF/ENG	1540	1510	1480	1470	1450	1450	1510	
40	%N1	61.8	64.6	68.5	72.8	77.0	81.6	86.5	96.3
	KIAS	178	178	178	178	178	178	178	178
	FF/ENG	1380	1360	1330	1310	1280	1280	1310	1440

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

ENGINE INOP

ADVISORY INFORMATION

Gear Down Landing Rate of Climb Available

Flaps 15

TAT (°C)	RATE OF CLIMB (FT/MIN)					
	PRESSURE ALTITUDE (FT)					
	-2000	0	2000	4000	6000	8000
52	-110	-180				
50	-80	-150	-250			
48	-50	-120	-230			
46	-20	-100	-200	-310		
44	0	-70	-180	-280		
42	30	-40	-150	-260	-380	
40	60	-10	-120	-230	-350	
38	90	20	-90	-200	-320	-470
36	100	50	-60	-180	-300	-440
34	100	80	-40	-160	-280	-420
32	100	90	-20	-140	-260	-400
30	110	100	10	-120	-250	-380
20	120	110	20	-90	-210	-320
10	130	110	20	-90	-210	-320
0	140	120	30	-90	-200	-320
-20	150	130	30	-90	-210	-330
-40	160	140	40	-80	-210	-340

Rate of climb capability shown is valid for 60000 kg, gear down at VREF15+5.
Decrease rate of climb 130 ft/min per 5000 kg greater than 60000 kg.
Increase rate of climb 170 ft/min per 5000 kg less than 60000 kg.

Flaps 30

TAT (°C)	RATE OF CLIMB (FT/MIN)					
	PRESSURE ALTITUDE (FT)					
	-2000	0	2000	4000	6000	8000
52	-300	-360				
50	-270	-340	-440			
48	-240	-310	-420			
46	-220	-290	-390	-500		
44	-190	-260	-370	-480		
42	-160	-230	-340	-450	-570	
40	-140	-210	-320	-430	-550	
38	-110	-180	-290	-400	-520	-670
36	-100	-150	-260	-380	-500	-640
34	-90	-120	-240	-360	-480	-620
32	-90	-110	-220	-340	-460	-600
30	-90	-100	-200	-330	-450	-580
20	-80	-100	-190	-300	-410	-530
10	-80	-90	-190	-300	-410	-530
0	-70	-90	-190	-300	-420	-530
-20	-70	-90	-190	-310	-430	-550
-40	-70	-90	-190	-310	-440	-570

Rate of climb capability shown is valid for 60000 kg, gear down at VREF30+5.
Decrease rate of climb 130 ft/min per 5000 kg greater than 60000 kg.
Increase rate of climb 170 ft/min per 5000 kg less than 60000 kg.

GEAR DOWN

Long Range Cruise Altitude Capability

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	14600	11500	8500
80	17400	14600	11700
75	20300	17600	14900
70	22800	20500	17800
65	25400	23500	20900
60	27800	26300	24400
55	30200	29000	27300
50	32300	31300	30100
45	34500	33500	32400
40	36900	36000	34900

Long Range Cruise Control

WEIGHT (1000 KG)		PRESSURE ALTITUDE (1000 FT)									
		10	21	23	25	27	29	31	33	35	37
80	%N1	84.8									
	MACH	.468									
	KIAS	259									
	FF/ENG	2313									
70	%N1	81.1	90.4	92.6							
	MACH	.440	.541	.557							
	KIAS	243	242	240							
	FF/ENG	2010	2004	2002							
60	%N1	76.9	86.2	88.0	89.8	92.3	95.7				
	MACH	.409	.504	.525	.544	.562	.580				
	KIAS	226	225	225	224	222	220				
	FF/ENG	1722	1694	1696	1697	1709	1756				
50	%N1	72.3	81.2	83.0	84.8	86.6	88.5	91.1	94.7		
	MACH	.376	.463	.482	.502	.523	.544	.561	.580		
	KIAS	207	206	206	206	206	205	203	201		
	FF/ENG	1443	1395	1392	1394	1403	1409	1418	1461		
40	%N1	66.6	75.3	77.0	78.8	80.5	82.3	84.2	86.1	88.6	92.5
	MACH	.340	.417	.434	.452	.471	.491	.513	.535	.554	.573
	KIAS	187	185	185	185	185	185	185	185	183	181
	FF/ENG	1184	1114	1102	1102	1108	1112	1115	1119	1125	1160

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
327	291	260	236	217	200	188	177	167	159	152
657	585	524	475	435	400	377	356	337	320	305
992	882	788	714	653	600	565	534	505	480	458
1331	1182	1055	954	872	800	754	712	674	640	610
1676	1486	1323	1195	1091	1000	942	889	842	799	762
2026	1792	1593	1436	1310	1200	1130	1066	1009	958	913
2382	2103	1865	1680	1530	1400	1318	1244	1176	1116	1064
2744	2418	2140	1924	1751	1600	1506	1420	1342	1274	1214
3112	2737	2418	2171	1972	1800	1694	1597	1510	1432	1364

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	1.8	0:42	1.6	0:41
400	5.0	1:36	4.6	1:31	4.1	1:24	3.8	1:20	3.6	1:17
600	7.5	2:25	7.0	2:17	6.2	2:06	5.8	1:59	5.5	1:54
800	9.9	3:14	9.2	3:03	8.3	2:48	7.7	2:38	7.4	2:31
1000	12.3	4:05	11.5	3:51	10.3	3:31	9.7	3:18	9.2	3:08
1200	14.6	4:56	13.7	4:39	12.3	4:14	11.5	3:59	11.0	3:46
1400	16.9	5:49	15.8	5:28	14.2	4:59	13.3	4:40	12.7	4:24
1600	19.1	6:43	17.9	6:19	16.1	5:44	15.1	5:22	14.4	5:04
1800	21.3	7:39	19.9	7:11	18.0	6:30	16.9	6:05	16.1	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	0.7	1.5
6	-1.0	-0.5	0.0	1.0	2.2
8	-1.4	-0.7	0.0	1.2	2.8
10	-1.7	-0.9	0.0	1.5	3.4
12	-2.0	-1.0	0.0	1.8	4.0
14	-2.4	-1.2	0.0	2.0	4.5
16	-2.7	-1.4	0.0	2.2	4.9
18	-3.1	-1.5	0.0	2.4	5.3
20	-3.4	-1.7	0.0	2.5	5.7
22	-3.8	-1.9	0.0	2.6	6.0

GEAR DOWN

Descent

VREF40 + 70 KIAS

PRESSURE ALTITUDE (FT)	TIME (MIN)	FUEL (KG)	DISTANCE (NM)
41000	20	270	88
39000	20	270	84
37000	19	260	79
35000	18	260	75
33000	18	250	71
31000	17	250	67
29000	16	240	63
27000	15	240	59
25000	15	230	55
23000	14	220	51
21000	13	220	47
19000	12	210	43
17000	11	200	39
15000	11	190	35
10000	8	170	25
5000	6	130	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
80	%N1	74.8	77.5	81.8	86.1	90.8			
	KIAS	225	225	225	225	225			
	FF/ENG	2160	2150	2140	2160	2170			
75	%N1	73.1	76.0	80.0	84.4	89.0			
	KIAS	220	220	220	220	220			
	FF/ENG	2040	2030	2010	2020	2030			
70	%N1	71.3	74.3	78.2	82.5	87.1	93.1		
	KIAS	216	216	216	216	216	216		
	FF/ENG	1920	1900	1890	1890	1890	1940		
65	%N1	69.5	72.4	76.4	80.7	85.1	90.2		
	KIAS	211	211	211	211	211	211		
	FF/ENG	1800	1780	1770	1760	1750	1780		
60	%N1	67.5	70.3	74.5	78.6	83.1	87.7	95.7	
	KIAS	204	204	204	204	204	204	204	
	FF/ENG	1680	1660	1640	1630	1620	1630	1740	
55	%N1	65.5	68.2	72.4	76.4	80.9	85.5	91.6	
	KIAS	198	198	198	198	198	198	198	
	FF/ENG	1570	1540	1520	1500	1490	1490	1550	
50	%N1	63.3	66.0	70.0	74.2	78.5	83.0	87.9	
	KIAS	192	192	192	192	192	192	192	
	FF/ENG	1450	1430	1400	1380	1360	1360	1390	
45	%N1	60.8	63.7	67.6	71.8	76.0	80.5	85.1	92.6
	KIAS	185	185	185	185	185	185	185	185
	FF/ENG	1330	1310	1290	1270	1240	1230	1250	1320
40	%N1	58.2	61.0	65.0	69.1	73.4	77.7	82.2	87.7
	KIAS	178	178	178	178	178	178	178	178
	FF/ENG	1220	1200	1170	1150	1130	1110	1120	1140

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

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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	3000	1300	
75	71	219	5400	4000	2000
70	67	215	7800	6400	4600
65	62	210	10200	9000	7300
60	57	204	12500	11600	10200
55	53	198	15000	14100	13200
50	48	192	17500	16700	15900
45	43	185	20100	19300	18400
40	38	178	22600	21800	21000

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	700		
70	3800	1600	
65	6800	5200	2600
60	10000	8400	6200
55	12700	11600	9800
50	15600	14800	13700
45	18700	17800	17000
40	21800	20900	20000

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	95.5								
	MACH	.389								
	KIAS	235								
	FF/ENG	3850								
65	%N1	93.1	95.0							
	MACH	.376	.389							
	KIAS	228	227							
	FF/ENG	3544	3556							
60	%N1	90.7	92.4	94.3	97.3					
	MACH	.364	.375	.388	.402					
	KIAS	220	219	218	218					
	FF/ENG	3250	3252	3263	3326					
55	%N1	88.2	89.8	91.6	93.5	96.4				
	MACH	.351	.362	.374	.387	.400				
	KIAS	212	211	210	209	209				
	FF/ENG	2973	2961	2961	2971	3027				
50	%N1	85.7	87.2	88.7	90.5	92.3	95.1	99.5		
	MACH	.338	.348	.359	.371	.384	.398	.412		
	KIAS	204	203	202	201	200	199	198		
	FF/ENG	2714	2691	2676	2674	2684	2722	2824		
45	%N1	83.1	84.4	85.9	87.4	89.1	90.9	93.5	97.7	
	MACH	.325	.334	.344	.355	.367	.380	.393	.408	
	KIAS	196	195	193	192	191	190	189	189	
	FF/ENG	2468	2437	2412	2396	2393	2396	2411	2489	
40	%N1	80.2	81.5	82.9	84.3	85.8	87.5	89.3	91.5	95.1
	MACH	.311	.320	.329	.339	.349	.361	.374	.387	.402
	KIAS	188	186	184	183	182	181	180	179	179
	FF/ENG	2234	2196	2164	2139	2122	2113	2106	2107	2160

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	1.1	0:26
200	2.6	0:53	2.4	0:50	2.4	0:48
300	4.0	1:18	3.7	1:15	3.7	1:11
400	5.3	1:44	5.0	1:39	4.9	1:35
500	6.6	2:10	6.2	2:04	6.1	1:58
600	7.9	2:37	7.5	2:29	7.3	2:22
700	9.2	3:04	8.7	2:55	8.5	2:46
800	10.5	3:31	9.9	3:20	9.7	3:10
900	11.7	3:58	11.1	3:46	10.8	3:35
1000	13.0	4:25	12.2	4:12	11.9	4:00

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	-0.4	-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	-0.5	0.0	0.9	1.7
6	-1.1	-0.6	0.0	1.1	2.0
7	-1.3	-0.7	0.0	1.2	2.4
8	-1.4	-0.7	0.0	1.4	2.7
9	-1.6	-0.8	0.0	1.6	3.1
10	-1.8	-0.9	0.0	1.8	3.4
11	-2.0	-1.0	0.0	1.9	3.8
12	-2.2	-1.1	0.0	2.1	4.1
13	-2.3	-1.2	0.0	2.2	4.5

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	94.1			
	KIAS	225			
	FF/ENG	4240			
75	%N1	92.1	95.5		
	KIAS	220	220		
	FF/ENG	3960	4010		
70	%N1	90.0	93.3		
	KIAS	216	216		
	FF/ENG	3680	3730		
65	%N1	88.0	91.1	97.0	
	KIAS	211	211	211	
	FF/ENG	3430	3450	3560	
60	%N1	85.8	88.8	93.6	
	KIAS	204	204	204	
	FF/ENG	3170	3180	3230	
55	%N1	83.5	86.4	91.0	98.4
	KIAS	198	198	198	198
	FF/ENG	2920	2920	2940	3110
50	%N1	80.9	83.9	88.3	93.6
	KIAS	192	192	192	192
	FF/ENG	2670	2660	2670	2730
45	%N1	78.3	81.2	85.5	90.2
	KIAS	185	185	185	185
	FF/ENG	2440	2420	2420	2450
40	%N1	75.6	78.3	82.6	87.1
	KIAS	178	178	178	178
	FF/ENG	2210	2190	2170	2180

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/.78 climb speed schedule, normal engine bleed for packs on or off and anti-ice off. Enter the table with airport pressure altitude and TAT and read %N1. %N1 adjustments are shown for anti-ice operation.

Go-around %N1

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

VREF

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

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.79M to provide a target %N1 setting at the start of driftdown. Once driftdown is established, the Max Continuous %N1 table should be used to determine %N1 for the given conditions.

Max Continuous %N1

Power setting is based on one engine operating with one A/C pack operating and all anti-ice bleeds off. Enter the table with pressure altitude, 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 .78/280/250 descent. Enter with Air Distance as determined from the Ground to Air Miles Conversion table and read Fuel and Time required at the cruise pressure altitude. Adjust the fuel obtained for deviation from the reference weight at checkpoint as required by entering the off reference fuel adjustments table with the fuel required for the reference weight and the actual weight at checkpoint. Read fuel required and time for the actual weight.

Holding

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

Gear Down

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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737-800W CFM56-7B24 KG FAA CATC/N

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 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

General - Max Climb & Go Around %N1

Max Climb %N1
Based on engine bleed for packs on or off and anti-ice off

TAT (°C)	PRESSURE ALTITUDE (FT)/SPEED (KIAS/MACH)									
	0	5000	10000	15000	20000	25000	30000	35000	37000	41000
	280	280	280	280	280	280	280	.78	.78	.78
60	89.4	89.7	89.7	89.8	89.6	91.4	93.0	94.4	94.5	92.8
55	90.2	90.5	90.5	90.7	90.0	90.8	92.4	93.7	93.8	92.1
50	90.9	91.2	91.3	91.5	91.0	90.8	91.7	93.0	93.1	91.4
45	91.6	91.9	92.1	92.3	91.9	91.7	91.7	92.3	92.4	90.7
40	92.4	92.6	92.9	93.1	92.7	92.5	92.5	91.6	91.7	90.0
35	92.9	93.3	93.6	93.8	93.6	93.3	93.3	92.4	91.7	90.1
30	92.2	94.1	94.3	94.6	94.4	94.1	94.0	93.2	92.6	91.1
25	91.5	94.1	95.0	95.2	95.2	94.8	94.7	94.0	93.4	92.1
20	90.7	93.3	95.8	96.0	95.9	95.6	95.4	94.7	94.2	93.0
15	90.0	92.5	95.2	96.8	96.7	96.3	96.1	95.5	95.0	94.0
10	89.2	91.8	94.4	97.1	97.6	97.0	96.7	96.2	95.8	94.9
5	88.4	91.0	93.6	96.3	98.5	97.9	97.4	97.0	96.6	95.8
0	87.7	90.2	92.8	95.5	97.9	99.0	98.4	97.8	97.5	96.7
-5	86.9	89.4	92.0	94.7	97.2	98.9	99.4	98.6	98.3	97.7
-10	86.1	88.6	91.2	93.9	96.4	98.1	99.7	99.5	99.2	98.7
-15	85.3	87.8	90.3	93.1	95.6	97.4	98.9	100.5	100.1	99.7
-20	84.5	87.0	89.5	92.3	94.8	96.6	98.1	100.2	100.7	100.3
-25	83.7	86.1	88.7	91.4	94.1	95.8	97.3	99.3	99.9	99.5
-30	82.9	85.3	87.8	90.6	93.3	95.0	96.5	98.5	99.0	98.7
-35	82.0	84.5	87.0	89.8	92.4	94.1	95.6	97.6	98.2	97.8
-40	81.2	83.6	86.1	88.9	91.6	93.3	94.8	96.8	97.3	96.9

%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	91.0	91.8	91.8									
52	125	55	91.7	92.6	92.6	92.5	92.5							
47	116	50	92.5	93.3	93.3	93.3	93.3	93.3	93.2	93.2				
42	108	45	93.3	94.1	94.1	94.1	94.0	94.0	94.0	93.9	93.9	93.8		
37	99	40	94.1	94.9	94.9	94.8	94.8	94.7	94.7	94.6	94.6	94.6	94.5	94.4
32	90	35	94.3	95.8	95.8	95.7	95.7	95.6	95.5	95.5	95.4	95.3	95.3	95.2
27	81	30	93.5	95.7	96.3	96.5	96.5	96.4	96.4	96.3	96.2	96.2	96.1	96.0
22	72	25	92.8	94.9	95.5	96.1	96.7	97.3	97.3	97.2	97.1	97.0	97.0	96.9
17	63	20	92.0	94.2	94.7	95.3	95.9	96.5	97.2	97.9	98.3	98.2	98.1	98.0
12	54	15	91.3	93.4	94.0	94.5	95.1	95.8	96.5	97.2	97.9	98.7	99.4	99.4
7	45	10	90.5	92.6	93.2	93.8	94.4	95.0	95.7	96.4	97.1	97.9	98.7	99.5
2	36	5	89.7	91.8	92.4	93.0	93.6	94.2	94.9	95.6	96.4	97.1	98.0	98.8
-3	27	0	89.0	91.0	91.6	92.2	92.8	93.4	94.1	94.8	95.6	96.4	97.2	98.1
-8	18	-5	88.2	90.2	90.8	91.4	92.0	92.6	93.3	94.0	94.8	95.6	96.4	97.3
-13	9	-10	87.4	89.4	90.0	90.6	91.1	91.8	92.5	93.2	94.0	94.8	95.7	96.5
-17	1	-15	86.6	88.6	89.2	89.7	90.3	90.9	91.7	92.4	93.2	94.0	94.9	95.8
-22	-8	-20	85.8	87.8	88.3	88.9	89.5	90.1	90.8	91.6	92.3	93.2	94.1	95.0
-27	-17	-25	84.9	86.9	87.5	88.1	88.6	89.3	90.0	90.7	91.5	92.3	93.3	94.2
-32	-26	-30	84.1	86.1	86.7	87.2	87.8	88.4	89.2	89.9	90.7	91.5	92.5	93.4
-37	-35	-35	83.3	85.2	85.8	86.3	86.9	87.6	88.3	89.0	89.8	90.7	91.6	92.6
-42	-44	-40	82.4	84.4	84.9	85.5	86.1	86.7	87.4	88.2	89.0	89.8	90.8	91.8
-47	-53	-45	81.6	83.5	84.1	84.6	85.2	85.8	86.6	87.3	88.1	89.0	90.0	90.9
-52	-62	-50	80.7	82.6	83.2	83.7	84.3	84.9	85.7	86.4	87.2	88.1	89.1	90.1

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (FT)											
	-2000	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000
PACKS OFF	0.6	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	1.0	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 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

Intentionally
Blank

ADVISORY INFORMATION

Normal Configuration Landing Distances

Flaps 15

BRAKING CONFIGURATION	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	
	65000 KG LANDING WEIGHT	PER 5000 KG ABOVE/ BELOW 65000 KG	PER 1000 FT STD/ HIGH*	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 5 KTS ABOVE VREF15	ONE REV	NO REV
Dry Runway												
MAX MANUAL	1010	70/-60	25/30	-35	125	15	-10	25	-25	35	25	50
MAX AUTO	1300	65/-75	30/40	-45	155	0	0	30	-30	60	0	5
AUTOBRAKE 3	1870	105/-120	50/65	-80	260	0	0	55	-55	100	0	0
AUTOBRAKE 2	2385	155/-170	75/95	-105	360	30	-45	70	-70	100	70	70
AUTOBRAKE 1	2640	185/-200	90/115	-125	425	70	-85	80	-80	95	240	335
Good Reported Braking Action												
MAX MANUAL	1395	80/-85	40/50	-60	210	35	-30	35	-35	50	75	175
MAX AUTO	1485	85/-90	40/55	-65	215	30	-25	35	-40	55	85	190
AUTOBRAKE 3	1870	105/-120	50/65	-80	265	5	0	55	-55	100	5	15
AUTOBRAKE 2	2385	155/-170	75/95	-105	360	30	-45	70	-70	100	70	70
AUTOBRAKE 1	2640	185/-200	90/115	-125	425	70	-85	80	-80	95	240	335
Medium Reported Braking Action												
MAX MANUAL	1930	125/-130	60/80	-95	345	90	-70	55	-55	65	215	520
MAX AUTO	1965	130/-135	60/85	-100	350	85	-65	55	-55	75	215	520
AUTOBRAKE 3	2065	130/-140	60/85	-100	360	65	-45	60	-60	100	150	450
AUTOBRAKE 2	2440	160/-175	75/100	-115	405	65	-65	70	-75	100	115	250
AUTOBRAKE 1	2655	185/-200	90/120	-130	440	90	-90	80	-80	95	255	395
Poor Reported Braking Action												
MAX MANUAL	2545	180/-185	85/120	-145	550	215	-140	70	-75	80	465	1245
MAX AUTO	2545	185/-185	90/120	-145	550	220	-145	70	-75	80	465	1245
AUTOBRAKE 3	2560	185/-185	90/120	-145	550	210	-130	70	-75	95	465	1255
AUTOBRAKE 2	2730	190/-200	90/125	-155	565	200	-130	75	-80	100	375	1090
AUTOBRAKE 1	2855	205/-215	100/135	-160	585	205	-145	80	-85	95	440	1080

Reference distance is for sea level, standard day, no wind or slope, VREF15 approach speed and two engine detent reverse thrust.
For max manual braking and manual speed brakes, increase reference landing distance by 60 m.
For autobrake and manual speed brakes, increase reference landing distance by 50 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

	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	65000 KG LANDING WEIGHT	PER 5000 KG ABOVE/ BELOW 65000 KG	PER 1000 FT STD/ HIGH*	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 5 KTS ABOVE VREF30	ONE REV	NO REV

Dry Runway

MAX MANUAL	960	55/-55	20/30	-35	120	10	-10	20	-20	35	20	40
MAX AUTO	1215	60/-65	30/35	-45	150	0	0	30	-30	55	0	5
AUTOBRAKE 3	1725	95/-110	45/60	-75	250	0	0	50	-50	95	0	0
AUTOBRAKE 2	2190	140/-150	65/90	-100	345	30	-40	65	-65	95	60	60
AUTOBRAKE 1	2415	165/-180	80/105	-120	405	65	-75	70	-70	85	195	290

Good Reported Braking Action

MAX MANUAL	1330	75/-80	35/45	-60	205	35	-30	35	-35	50	70	155
MAX AUTO	1415	80/-85	40/50	-60	210	30	-25	35	-35	60	75	170
AUTOBRAKE 3	1725	95/-110	45/60	-75	250	5	0	50	-50	95	5	15
AUTOBRAKE 2	2190	140/-150	65/90	-100	345	30	-40	65	-65	95	60	60
AUTOBRAKE 1	2415	165/-180	80/105	-120	405	65	-75	70	-70	85	195	290

Medium Reported Braking Action

MAX MANUAL	1815	115/-120	55/75	-95	335	85	-65	50	-50	65	190	450
MAX AUTO	1850	120/-125	55/75	-95	340	80	-60	50	-50	75	190	455
AUTOBRAKE 3	1925	120/-125	55/75	-95	345	65	-45	55	-55	95	140	410
AUTOBRAKE 2	2245	140/-155	70/90	-110	390	65	-60	65	-65	95	105	225
AUTOBRAKE 1	2430	165/-180	80/105	-120	420	85	-80	70	-75	85	210	350

Poor Reported Braking Action

MAX MANUAL	2365	165/-170	80/110	-140	530	205	-135	65	-70	75	400	1045
MAX AUTO	2370	165/-170	80/110	-140	530	205	-135	65	-70	80	400	1050
AUTOBRAKE 3	2385	170/-170	80/110	-140	535	200	-125	65	-70	85	400	1055
AUTOBRAKE 2	2525	175/-180	85/115	-145	550	190	-125	70	-75	90	335	925
AUTOBRAKE 1	2630	185/-190	85/120	-150	565	195	-135	75	-80	85	380	930

Reference distance is for sea level, standard day, no wind or slope, VREF30 approach speed and two engine detent reverse thrust.
For max manual braking and manual speed brakes, increase reference landing distance by 60 m.
For autobrake and manual speed brakes, increase reference landing distance by 50 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

	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	65000 KG LANDING WEIGHT	PER 5000 KG ABOVE/ BELOW 65000 KG	PER 1000 FT STD/ HIGH*	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 5 KTS ABOVE VREF40	ONE REV	NO REV

Dry Runway

MAX MANUAL	915	55/-50	20/25	-35	115	10	-10	20	-20	35	15	35
MAX AUTO	1135	55/-60	25/35	-40	140	0	0	25	-25	55	0	0
AUTOBRAKE 3	1590	85/-100	40/55	-70	235	0	0	45	-45	90	0	0
AUTOBRAKE 2	2030	125/-140	60/80	-95	330	20	-35	60	-60	95	35	35
AUTOBRAKE 1	2260	150/-165	75/95	-115	390	55	-65	65	-65	85	155	220

Good Reported Braking Action

MAX MANUAL	1270	70/-75	35/45	-55	200	35	-30	30	-30	50	65	140
MAX AUTO	1350	75/-80	35/45	-60	205	30	-25	35	-35	60	70	150
AUTOBRAKE 3	1600	85/-100	40/55	-70	240	10	-5	45	-45	95	5	15
AUTOBRAKE 2	2030	125/-140	60/80	-95	330	20	-35	60	-60	95	35	35
AUTOBRAKE 1	2260	150/-165	75/95	-115	390	55	-65	65	-65	85	155	220

Medium Reported Braking Action

MAX MANUAL	1730	105/-115	50/70	-90	330	85	-65	45	-45	65	170	405
MAX AUTO	1750	110/-120	55/70	-90	335	75	-60	45	-50	75	170	405
AUTOBRAKE 3	1800	110/-120	55/70	-95	340	70	-45	50	-50	90	150	390
AUTOBRAKE 2	2090	130/-145	60/85	-105	375	55	-55	60	-60	95	75	190
AUTOBRAKE 1	2275	150/-165	75/95	-115	405	80	-75	65	-65	85	170	275

Poor Reported Braking Action

MAX MANUAL	2245	155/-160	75/100	-140	520	200	-130	60	-65	75	360	930
MAX AUTO	2250	155/-160	75/105	-140	520	200	-130	60	-65	75	360	930
AUTOBRAKE 3	2260	155/-165	75/105	-140	525	195	-125	60	-65	85	360	935
AUTOBRAKE 2	2370	160/-165	75/105	-140	535	185	-120	65	-70	90	290	830
AUTOBRAKE 1	2470	170/-180	80/110	-145	550	190	-130	70	-75	85	335	815

Reference distance is for sea level, standard day, no wind or slope, VREF40 approach speed and two engine detent reverse thrust.
For max manual braking and manual speed brakes, increase reference landing distance by 55 m.
For autobrake and manual speed brakes, increase reference landing distance by 45 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 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	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 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	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 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	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: 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	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: 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	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
80	0	15.1	17.0	19.3	22.4	25.3	28.9	30.9	35.0	40.2	40.4	45.9	53.0	50.8	57.9	67.3	60.8	69.6	81.2
	10	15.6	17.6	20.0	23.1	26.1	29.8	31.9	36.2	41.5	41.8	47.5	54.8	52.5	59.9	69.5	62.8	71.9	83.9
	15	15.8	17.8	20.2	23.5	26.5	30.3	32.4	36.7	42.1	42.4	48.2	55.6	53.3	60.7	70.5	63.7	72.9	85.1
	20	16.0	18.1	20.5	23.8	26.9	30.7	32.8	37.2	42.7	42.9	48.8	56.3	54.0	61.5	71.4	64.6	73.9	86.2
	30	16.4	18.5	21.1	24.4	27.6	31.5	33.7	38.2	43.8	44.0	50.0	57.7	55.3	63.1	73.2	66.2	75.7	88.4
	40	16.6	18.7	21.3	24.7	27.9	31.9	34.1	38.7	44.4	44.7	50.9	58.8	56.3	64.3	74.8	67.5	77.4	90.5
	50	16.6	18.7	21.3	24.8	28.0	32.1	34.3	39.0	44.9	45.2	51.5	59.7	57.1	65.4	76.3	68.7	79.0	92.9
70	0	13.7	15.4	17.5	20.2	22.8	26.0	27.7	31.3	35.9	36.1	41.0	47.2	45.3	51.6	59.7	54.9	62.7	72.9
	10	14.2	15.9	18.1	20.8	23.5	26.8	28.6	32.4	37.1	37.3	42.3	48.7	46.8	53.3	61.6	56.7	64.8	75.4
	15	14.4	16.2	18.4	21.1	23.9	27.2	29.0	32.8	37.6	37.8	43.0	49.4	47.5	54.0	62.5	57.5	65.7	76.4
	20	14.6	16.4	18.6	21.4	24.2	27.6	29.4	33.3	38.1	38.4	43.5	50.1	48.1	54.8	63.4	58.3	66.5	77.4
	30	14.9	16.8	19.1	22.0	24.8	28.3	30.2	34.1	39.1	39.3	44.6	51.4	49.3	56.1	64.9	59.8	68.2	79.4
	40	15.1	17.0	19.3	22.2	25.1	28.6	30.5	34.6	39.6	39.9	45.3	52.2	50.1	57.1	66.2	60.9	69.6	81.2
	50	15.1	17.0	19.3	22.3	25.2	28.8	30.7	34.8	40.0	40.2	45.8	52.9	50.7	58.0	67.4	61.8	70.9	83.0
60	0	12.3	13.9	15.7	18.0	20.3	23.1	24.4	27.6	31.6	31.7	35.9	41.2	39.6	45.0	51.8	48.1	54.8	63.5
	10	12.7	14.3	16.3	18.5	20.9	23.8	25.2	28.5	32.6	32.7	37.1	42.6	40.9	46.5	53.6	49.7	56.6	65.6
	15	12.9	14.6	16.5	18.8	21.2	24.2	25.6	29.0	33.1	33.2	37.6	43.2	41.5	47.1	54.4	50.4	57.4	66.5
	20	13.1	14.8	16.7	19.1	21.5	24.5	26.0	29.4	33.5	33.6	38.1	43.8	42.0	47.8	55.1	51.1	58.2	67.4
	30	13.4	15.1	17.2	19.6	22.1	25.1	26.6	30.1	34.4	34.5	39.1	44.9	43.1	49.0	56.5	52.3	59.6	69.1
	40	13.6	15.3	17.3	19.8	22.3	25.4	26.9	30.5	34.9	35.0	39.7	45.6	43.8	49.8	57.5	53.2	60.7	70.5
	50	13.5	15.3	17.3	19.8	22.4	25.5	27.0	30.6	35.1	35.2	40.0	46.0	44.2	50.4	58.3	53.9	61.7	71.9
50	0	11.0	12.3	14.0	15.7	17.7	20.2	21.2	23.9	27.3	27.2	30.8	35.3	33.8	38.3	44.1	40.9	46.4	53.6
	10	11.3	12.7	14.4	16.3	18.3	20.8	21.9	24.7	28.2	28.1	31.8	36.5	34.9	39.6	45.5	42.2	48.0	55.4
	15	11.5	12.9	14.7	16.5	18.6	21.1	22.2	25.1	28.6	28.6	32.3	37.0	35.4	40.2	46.2	42.8	48.7	56.2
	20	11.6	13.1	14.9	16.7	18.9	21.4	22.5	25.4	29.0	28.9	32.8	37.5	35.9	40.7	46.8	43.4	49.3	56.9
	30	11.9	13.4	15.2	17.2	19.3	22.0	23.1	26.1	29.7	29.7	33.6	38.4	36.8	41.8	48.0	44.5	50.6	58.4
	40	12.1	13.6	15.4	17.3	19.5	22.2	23.4	26.4	30.1	30.1	34.0	39.0	37.4	42.4	48.8	45.2	51.4	59.4
	50	12.0	13.6	15.4	17.3	19.6	22.3	23.4	26.5	30.3	30.2	34.2	39.3	37.6	42.8	49.3	45.7	52.1	60.3
40	0	9.6	10.8	12.3	13.5	15.2	17.3	17.9	20.2	23.0	22.8	25.8	29.4	28.1	31.8	36.4	33.7	38.2	43.9
	10	10.0	11.2	12.7	14.0	15.8	17.9	18.5	20.9	23.8	23.6	26.6	30.4	29.0	32.8	37.6	34.8	39.5	45.4
	15	10.1	11.4	12.9	14.2	16.0	18.1	18.8	21.2	24.1	23.9	27.0	30.8	29.4	33.3	38.2	35.3	40.0	46.0
	20	10.2	11.5	13.1	14.4	16.2	18.4	19.1	21.5	24.5	24.2	27.4	31.3	29.8	33.8	38.7	35.8	40.6	46.6
	30	10.5	11.8	13.4	14.8	16.6	18.9	19.6	22.1	25.1	24.9	28.1	32.1	30.6	34.6	39.7	36.7	41.6	47.8
	40	10.6	11.9	13.5	14.9	16.8	19.1	19.8	22.3	25.4	25.2	28.4	32.5	31.0	35.1	40.2	37.2	42.2	48.6
	50	10.6	11.9	13.5	14.9	16.8	19.1	19.8	22.3	25.5	25.2	28.6	32.7	31.1	35.3	40.6	37.5	42.6	49.1

***To correct for wind, enter table with the brakes on speed minus one half the headwind or plus 1.5 times the tailwind. If ground speed is used for brakes on speed, ignore wind and enter table with sea level, 15°C.**

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
LANDING	MAX AUTO	5.8	12.3	19.5	27.2	35.6	44.5	53.9	63.7	74.1
LANDING	AUTOBRAKE 3	4.3	9.2	14.7	20.7	27.2	34.4	42.0	50.2	59.0
LANDING	AUTOBRAKE 2	2.5	5.6	9.1	13.1	17.8	23.0	28.8	35.2	42.3
LANDING	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	NO SPECIAL PROCEDURE REQUIRED	10	20	30	40	50	60	CAUTION	FUSE PLUG MELT ZONE

Cooling Time (Minutes) - Category N Carbon Brakes

	EVENT ADJUSTED BRAKE ENERGY (MILLIONS OF FOOT POUNDS)								
	16 & BELOW	17	19	20.9	23.5	26.9	29.4	30 TO 41	41 & ABOVE
	BRAKE TEMPERATURE MONITOR SYSTEM INDICATION ON CDS								
	UP TO 2.5	2.6	3	3.3	3.8	4.5	4.9	5.0 TO 7.1	7.1 & ABOVE
INFLIGHT GEAR DOWN	NO SPECIAL PROCEDURE REQUIRED	1	4	5	6	7	7.6	CAUTION	FUSE PLUG MELT ZONE
GROUND	NO SPECIAL PROCEDURE REQUIRED	6.7	16.0	24.1	34.2	45.9	53.3	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.

Intentionally
Blank

ENGINE INOP

Initial Max Continuous %N1
Based on .79M, A/C high and anti-ice off

TAT (°C)	PRESSURE ALTITUDE (1000 FT)								
	25	27	29	31	33	35	37	39	41
20	96.1	95.9	95.6	95.5	95.2	94.8	94.3	94.0	93.2
15	96.7	96.5	96.2	96.1	96.0	95.5	95.1	94.8	94.1
10	97.3	97.2	96.8	96.7	96.7	96.2	95.8	95.6	95.0
5	97.5	97.9	97.6	97.4	97.4	97.0	96.6	96.4	95.9
0	96.8	98.1	98.5	98.3	98.2	97.8	97.5	97.2	96.8
-5	96.0	97.3	98.5	99.2	99.1	98.6	98.3	98.1	97.8
-10	95.2	96.5	97.7	99.0	99.9	99.5	99.2	99.0	98.7
-15	94.4	95.8	96.9	98.2	99.5	100.4	100.1	99.9	99.7
-20	93.6	95.0	96.2	97.4	98.7	99.8	100.4	100.2	100.0
-25	92.8	94.2	95.4	96.6	97.9	99.0	99.6	99.4	99.2
-30	91.9	93.4	94.6	95.8	97.0	98.2	98.7	98.5	98.3
-35	91.1	92.6	93.7	94.9	96.2	97.3	97.9	97.7	97.5
-40	90.3	91.8	92.9	94.1	95.3	96.5	97.0	96.8	96.6

%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	96.0	97.0	97.9	98.7	99.6	98.9	98.1	96.9	95.6	94.0	92.5	91.1
200	.63	95.4	96.3	97.2	98.1	98.9	99.8	99.5	98.7	97.8	96.8	95.6	94.5
240	.74	94.4	95.3	96.2	97.1	98.0	98.8	99.7	100.1	99.3	98.5	97.7	96.7
280	.86	93.7	94.6	95.5	96.4	97.2	98.1	98.9	99.7	100.5	100.2	99.3	98.5
35000 FT PRESS ALT		TAT (°C)											
KIAS	M	-55	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0
160	.49	95.9	96.8	97.7	98.6	99.5	99.2	98.4	97.3	96.1	94.7	93.3	92.0
200	.60	95.5	96.4	97.3	98.2	99.1	100.0	99.9	98.9	98.0	97.0	95.8	94.7
240	.71	94.4	95.3	96.2	97.1	98.0	98.8	99.6	100.2	99.5	98.9	98.0	97.0
280	.82	93.2	94.0	94.9	95.8	96.6	97.5	98.3	99.1	99.9	99.7	98.9	98.1
33000 FT PRESS ALT		TAT (°C)											
KIAS	M	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5
160	.47	96.8	97.7	98.5	99.4	100.2	99.3	98.5	97.3	96.0	94.6	93.2	92.0
200	.58	96.4	97.3	98.2	99.1	99.9	100.8	99.9	99.0	98.0	96.8	95.6	94.5
240	.68	95.3	96.2	97.1	97.9	98.8	99.6	100.4	100.2	99.6	98.7	97.7	96.7
280	.79	93.6	94.5	95.4	96.2	97.1	97.9	98.7	99.5	99.9	99.1	98.2	97.4
320	.89	93.0	93.9	94.7	95.6	96.4	97.2	98.1	98.9	99.7	100.4	100.0	99.2
31000 FT PRESS ALT		TAT (°C)											
KIAS	M	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5
160	.45	96.7	97.6	98.5	99.4	100.3	100.4	99.5	98.5	97.3	95.9	94.5	93.2
200	.55	96.5	97.3	98.2	99.1	100.0	100.8	101.0	100.1	99.1	98.0	96.7	95.5
240	.66	95.0	95.9	96.8	97.6	98.5	99.3	100.2	100.7	99.9	99.1	98.1	97.1
280	.76	93.2	94.0	94.9	95.7	96.6	97.4	98.2	99.0	99.8	99.1	98.2	97.3
320	.85	91.8	92.6	93.5	94.3	95.1	95.9	96.7	97.5	98.3	99.1	99.3	98.4
29000 FT PRESS ALT		TAT (°C)											
KIAS	M	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
160	.43	97.5	98.4	99.3	100.1	101.0	100.5	99.6	98.5	97.2	95.7	94.4	93.1
200	.53	96.9	97.8	98.7	99.5	100.4	101.2	100.7	99.7	98.7	97.5	96.2	95.1
240	.63	95.7	96.5	97.4	98.2	99.1	99.9	100.7	100.4	99.5	98.6	97.5	96.6
280	.73	93.6	94.4	95.2	96.1	96.9	97.7	98.5	99.3	99.4	98.5	97.5	96.8
320	.82	91.4	92.3	93.1	93.9	94.7	95.5	96.3	97.0	97.8	98.6	97.8	97.0
360	.91	91.4	92.3	93.1	93.9	94.7	95.5	96.3	97.0	97.8	98.6	99.3	99.4

%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

270000 FT PRESS ALT		TAT (°C)											
KIAS	M	-45	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10
160	.41	97.3	98.2	99.1	100.0	100.8	101.5	100.6	99.6	98.4	97.0	95.7	94.4
200	.51	96.3	97.2	98.1	98.9	99.8	100.6	101.1	100.2	99.2	98.1	96.9	95.7
240	.60	95.0	95.9	96.7	97.6	98.4	99.2	100.1	100.7	99.7	98.7	97.7	96.8
280	.70	93.0	93.8	94.6	95.5	96.3	97.1	97.9	98.7	99.4	98.7	97.7	96.9
320	.79	90.9	91.7	92.6	93.4	94.2	95.0	95.7	96.5	97.3	98.0	97.9	97.2
360	.88	90.2	91.0	91.8	92.7	93.5	94.3	95.1	95.9	96.6	97.4	98.2	98.7
25000 FT PRESS ALT		TAT (°C)											
KIAS	M	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	15
160	.39	98.2	99.0	99.9	100.7	101.6	101.7	100.7	99.6	98.4	97.0	95.8	94.5
200	.49	96.8	97.7	98.5	99.4	100.2	101.0	100.9	99.9	98.9	97.7	96.6	95.5
240	.58	95.1	95.9	96.8	97.6	98.4	99.2	100.0	99.8	98.9	97.9	96.9	96.0
280	.67	93.2	94.1	94.9	95.7	96.5	97.3	98.1	98.8	98.9	97.9	96.9	96.2
320	.76	90.9	91.8	92.6	93.4	94.2	95.0	95.8	96.6	97.3	97.9	97.2	96.5
360	.85	89.6	90.5	91.3	92.1	93.0	93.8	94.6	95.4	96.2	97.0	97.7	97.5
24000 FT PRESS ALT		TAT (°C)											
KIAS	M	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	15
160	.38	97.7	98.5	99.4	100.3	101.1	101.9	100.8	99.7	98.5	97.2	96.0	94.7
200	.48	96.4	97.2	98.1	98.9	99.7	100.6	101.0	99.9	98.9	97.8	96.7	95.6
240	.57	94.7	95.6	96.4	97.2	98.0	98.8	99.6	99.9	99.0	97.9	97.0	96.1
280	.66	93.0	93.8	94.6	95.4	96.2	97.0	97.8	98.6	99.1	98.0	97.0	96.3
320	.75	90.6	91.4	92.3	93.1	93.9	94.7	95.5	96.3	97.1	97.8	97.2	96.5
360	.83	89.0	89.8	90.7	91.5	92.4	93.2	94.0	94.8	95.6	96.4	97.2	97.2
22000 FT PRESS ALT		TAT (°C)											
KIAS	M	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	20
160	.37	97.5	98.4	99.2	100.1	100.9	101.0	99.9	98.7	97.5	96.3	95.2	94.0
200	.46	96.3	97.1	98.0	98.8	99.6	100.4	100.1	98.9	97.8	96.8	95.8	94.8
240	.55	94.8	95.6	96.4	97.2	98.0	98.8	99.6	99.1	98.1	97.1	96.2	95.4
280	.63	93.2	94.0	94.8	95.6	96.4	97.1	97.9	98.7	98.4	97.4	96.6	95.8
320	.72	90.9	91.8	92.6	93.4	94.2	95.0	95.8	96.6	97.4	97.5	96.8	96.1
360	.80	89.0	89.9	90.7	91.6	92.4	93.2	94.0	94.8	95.6	96.4	97.0	96.4
20000 FT PRESS ALT		TAT (°C)											
KIAS	M	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	20
160	.35	96.5	97.4	98.2	99.0	99.8	100.6	100.2	98.9	97.7	96.6	95.5	94.4
200	.44	95.4	96.2	97.0	97.9	98.7	99.4	100.2	99.1	97.8	96.8	95.8	94.9
240	.53	93.9	94.7	95.5	96.3	97.1	97.9	98.7	99.3	98.2	97.1	96.2	95.4
280	.61	92.4	93.3	94.1	94.8	95.6	96.4	97.2	97.9	98.5	97.6	96.7	95.9
320	.69	90.3	91.1	92.0	92.8	93.6	94.4	95.2	96.0	96.8	97.6	96.9	96.2
360	.77	88.5	89.3	90.2	91.0	91.8	92.6	93.5	94.3	95.1	95.8	96.6	96.4

%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	96.0	96.8	97.6	98.4	99.2	100.0	98.9	97.5	96.5	95.5	94.5	93.5
200	.42	95.1	95.9	96.7	97.5	98.2	99.0	99.3	98.0	96.7	95.9	95.0	94.1
240	.51	93.7	94.5	95.2	96.0	96.8	97.6	98.3	98.2	97.1	96.2	95.4	94.6
280	.59	92.0	92.9	93.7	94.5	95.3	96.1	96.8	97.6	97.5	96.6	95.8	95.1
320	.67	90.3	91.1	92.0	92.8	93.6	94.4	95.2	96.0	96.8	96.9	96.2	95.5
360	.75	88.7	89.5	90.4	91.2	92.0	92.8	93.6	94.4	95.2	96.0	96.4	95.8
16000 FT PRESS ALT		TAT (°C)											
KIAS	M	-30	-25	-20	-15	-10	-5	0	5	10	15	20	25
160	.33	95.0	95.8	96.6	97.4	98.2	99.0	99.4	98.2	97.0	96.1	95.2	94.2
200	.41	93.9	94.7	95.5	96.3	97.1	97.8	98.6	98.2	97.0	96.0	95.2	94.4
240	.49	92.5	93.3	94.1	94.9	95.7	96.5	97.2	98.0	97.3	96.3	95.5	94.7
280	.57	91.0	91.8	92.6	93.5	94.3	95.1	95.9	96.6	97.4	96.7	95.8	95.1
320	.64	89.4	90.3	91.1	91.9	92.8	93.6	94.4	95.2	95.9	96.7	96.1	95.5
360	.72	88.0	88.9	89.7	90.6	91.4	92.2	93.0	93.8	94.6	95.4	96.2	95.8
14000 FT PRESS ALT		TAT (°C)											
KIAS	M	-25	-20	-15	-10	-5	0	5	10	15	20	25	30
160	.31	94.9	95.7	96.5	97.3	98.0	98.8	99.2	98.2	97.3	96.4	95.5	94.6
200	.39	93.6	94.4	95.2	96.0	96.7	97.5	98.3	97.5	96.5	95.7	94.9	94.1
240	.47	92.1	92.9	93.8	94.6	95.4	96.2	96.9	97.4	96.5	95.6	94.8	94.1
280	.54	90.9	91.7	92.5	93.4	94.2	95.0	95.8	96.5	96.8	96.0	95.2	94.5
320	.62	89.6	90.4	91.2	92.1	92.9	93.7	94.5	95.3	96.1	96.2	95.5	94.8
360	.69	88.3	89.1	89.9	90.7	91.6	92.4	93.2	94.0	94.8	95.5	95.8	95.2
12000 FT PRESS ALT		TAT (°C)											
KIAS	M	-20	-15	-10	-5	0	5	10	15	20	25	30	35
160	.30	94.8	95.6	96.4	97.1	97.9	98.6	97.9	96.8	95.9	95.2	94.4	93.5
200	.38	92.7	93.5	94.3	95.1	95.9	96.7	97.1	96.1	95.1	94.4	93.6	92.8
240	.45	91.6	92.5	93.3	94.1	94.9	95.7	96.4	96.4	95.5	94.7	94.0	93.2
280	.52	90.6	91.4	92.2	93.0	93.8	94.6	95.4	96.2	95.9	95.1	94.4	93.7
320	.60	89.5	90.3	91.2	92.0	92.8	93.6	94.4	95.2	96.0	95.5	94.8	94.1
360	.67	88.3	89.1	90.0	90.8	91.6	92.4	93.2	93.9	94.7	95.5	95.1	94.4

%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	92.7	93.5	94.4	95.2	95.9	96.7	97.5	96.5	95.6	94.9	94.2	93.4
200	.36	91.3	92.1	93.0	93.8	94.6	95.4	96.1	96.1	95.2	94.4	93.7	92.9
240	.43	90.3	91.1	92.0	92.8	93.6	94.4	95.2	95.9	95.4	94.6	93.8	93.1
280	.51	89.5	90.3	91.1	91.9	92.7	93.5	94.3	95.1	95.7	95.0	94.2	93.5
320	.58	88.6	89.4	90.2	91.0	91.8	92.6	93.4	94.2	95.0	95.4	94.7	93.9
360	.65	87.5	88.3	89.2	90.0	90.8	91.6	92.3	93.1	93.9	94.7	95.0	94.3
5000 FT PRESS ALT		TAT (°C)											
KIAS	M	-10	-5	0	5	10	15	20	25	30	35	40	45
160	.26	90.5	91.4	92.2	93.0	93.8	94.5	95.1	94.4	93.6	92.9	92.2	91.4
200	.33	90.0	90.8	91.6	92.4	93.2	93.9	94.7	94.4	93.7	93.0	92.3	91.5
240	.40	89.2	90.0	90.8	91.6	92.4	93.2	93.9	94.4	93.7	92.9	92.2	91.5
280	.46	88.5	89.3	90.1	90.9	91.7	92.5	93.3	94.0	94.0	93.2	92.5	91.8
320	.53	87.8	88.6	89.4	90.2	90.9	91.7	92.5	93.2	94.0	93.6	92.9	92.2
360	.59	86.9	87.7	88.5	89.3	90.1	90.8	91.6	92.3	93.1	93.8	93.3	92.6
3000 FT PRESS ALT		TAT (°C)											
KIAS	M	-5	0	5	10	15	20	25	30	35	40	45	50
160	.26	90.5	91.3	92.1	92.8	93.6	94.4	94.6	93.9	93.2	92.4	91.6	90.7
200	.32	89.9	90.7	91.5	92.3	93.1	93.8	94.6	94.0	93.3	92.5	91.8	91.0
240	.38	88.8	89.6	90.4	91.2	92.0	92.7	93.5	93.5	92.8	92.0	91.3	90.6
280	.45	88.3	89.1	89.9	90.6	91.4	92.2	92.9	93.7	93.1	92.4	91.7	91.0
320	.51	87.6	88.4	89.2	90.0	90.7	91.5	92.2	93.0	93.5	92.8	92.0	91.3
360	.57	86.8	87.6	88.4	89.1	89.9	90.6	91.4	92.1	92.8	93.1	92.4	91.7
1000 FT PRESS ALT		TAT (°C)											
KIAS	M	-5	0	5	10	15	20	25	30	35	40	45	50
160	.25	89.0	89.8	90.6	91.4	92.2	92.9	93.7	93.4	92.7	91.9	91.2	90.3
200	.31	88.7	89.5	90.3	91.0	91.8	92.6	93.3	93.7	93.0	92.2	91.5	90.7
240	.37	87.8	88.6	89.4	90.2	90.9	91.7	92.5	93.2	92.8	92.0	91.3	90.6
280	.43	87.3	88.1	88.8	89.6	90.4	91.1	91.9	92.6	93.1	92.3	91.6	90.9
320	.49	86.7	87.5	88.2	89.0	89.8	90.5	91.3	92.0	92.7	92.7	91.9	91.2
360	.55	85.9	86.7	87.5	88.2	89.0	89.7	90.5	91.2	91.9	92.6	92.3	91.6

%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	81	269	16300	14700	12300
80	76	262	18400	16800	14900
75	72	254	20400	19000	17300
70	67	246	22500	21200	19700
65	62	238	24700	23500	22100
60	57	229	26800	25800	24600
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	0:17
200	0.8	0.8	0.9	0.9	1.0	1.0	1.1	1.1	1.2	1.2	0:33
300	1.2	1.3	1.4	1.5	1.6	1.7	1.7	1.8	1.9	2.0	0:50
400	1.6	1.8	1.9	2.0	2.2	2.3	2.4	2.6	2.7	2.9	1:06
500	2.0	2.2	2.4	2.6	2.8	3.0	3.1	3.3	3.5	3.7	1:23
600	2.4	2.7	2.9	3.1	3.3	3.6	3.8	4.0	4.2	4.5	1:39
700	2.8	3.1	3.4	3.6	3.9	4.2	4.4	4.7	5.0	5.2	1:56
800	3.2	3.6	3.9	4.2	4.5	4.8	5.0	5.4	5.7	6.0	2:12
900	3.6	4.0	4.3	4.7	5.0	5.4	5.7	6.0	6.4	6.8	2:29
1000	4.0	4.4	4.8	5.2	5.6	6.0	6.3	6.7	7.1	7.6	2:46
1100	4.4	4.8	5.3	5.7	6.1	6.6	6.9	7.4	7.8	8.3	3:02
1200	4.8	5.3	5.7	6.2	6.7	7.1	7.6	8.1	8.6	9.1	3:19
1300	5.2	5.7	6.2	6.7	7.2	7.7	8.2	8.7	9.3	9.8	3:36
1400	5.5	6.1	6.6	7.2	7.7	8.3	8.8	9.4	10.0	10.6	3:52
1500	5.9	6.5	7.1	7.7	8.3	8.9	9.4	10.0	10.7	11.3	4:09
1600	6.3	6.9	7.5	8.2	8.8	9.4	10.0	10.7	11.3	12.1	4:26
1700	6.6	7.3	8.0	8.6	9.3	10.0	10.6	11.3	12.0	12.8	4:43
1800	7.0	7.7	8.4	9.1	9.8	10.5	11.2	12.0	12.7	13.5	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 KG)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
85	9500	6400	3400
80	12400	9500	6500
75	15300	12800	9800
70	18400	15800	13200
65	21100	18600	16300
60	23700	21800	19400
55	26300	24700	22400
50	29000	27700	25800
45	31400	30500	29200
40	33800	33000	31800

With engine anti-ice on, decrease altitude capability by 2000 ft.
With engine and wing anti-ice on, decrease altitude capability by 6500 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									
	MACH	.561									
	KIAS	311									
	FF/ENG	3067									
80	%N1	90.1	94.0								
	MACH	.545	.590								
	KIAS	302	299								
	FF/ENG	2875	2870								
75	%N1	88.4	92.5	94.0							
	MACH	.528	.579	.593							
	KIAS	293	293	288							
	FF/ENG	2684	2709	2674							
70	%N1	86.5	90.7	92.3	94.0						
	MACH	.510	.562	.582	.595						
	KIAS	282	284	283	278						
	FF/ENG	2494	2518	2520	2481						
65	%N1	84.5	88.7	90.4	92.2	93.9					
	MACH	.491	.542	.563	.584	.596					
	KIAS	271	274	274	273	268					
	FF/ENG	2306	2327	2330	2330	2295					
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		14		18		22		26	
	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)
200	1.4	0:43	1.2	0:41	1.1	0:39	1.0	0:38	0.9	0:37
400	2.8	1:23	2.6	1:19	2.4	1:14	2.2	1:11	2.1	1:09
600	4.3	2:04	3.9	1:57	3.6	1:50	3.4	1:45	3.2	1:42
800	5.7	2:46	5.2	2:36	4.9	2:26	4.5	2:19	4.4	2:14
1000	7.1	3:28	6.6	3:15	6.1	3:03	5.7	2:53	5.5	2:47
1200	8.5	4:10	7.9	3:55	7.3	3:40	6.8	3:28	6.6	3:21
1400	9.8	4:53	9.1	4:36	8.5	4:18	8.0	4:02	7.7	3:54
1600	11.2	5:36	10.4	5:16	9.7	4:55	9.1	4:38	8.7	4:28
1800	12.5	6:20	11.7	5:58	10.9	5:34	10.2	5:13	9.8	5:02
2000	13.9	7:05	12.9	6:39	12.0	6:13	11.3	5:49	10.8	5:36

Fuel Required Adjustments (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG) 40	45	50	55	60	65	70	75	80
1	-0.1	-0.1	-0.1	0.0	0.0	0.1	0.1	0.2	0.3
2	-0.3	-0.2	-0.1	-0.1	0.0	0.2	0.3	0.6	0.8
3	-0.4	-0.3	-0.2	-0.1	0.0	0.3	0.5	0.9	1.2
4	-0.6	-0.4	-0.3	-0.1	0.0	0.3	0.7	1.2	1.6
5	-0.7	-0.5	-0.4	-0.2	0.0	0.4	0.9	1.4	2.0
6	-0.8	-0.6	-0.4	-0.2	0.0	0.5	1.1	1.7	2.4
7	-1.0	-0.8	-0.5	-0.3	0.0	0.6	1.2	2.0	2.8
8	-1.1	-0.9	-0.6	-0.3	0.0	0.6	1.4	2.2	3.2
9	-1.3	-1.0	-0.7	-0.3	0.0	0.7	1.5	2.4	3.5
10	-1.4	-1.1	-0.7	-0.4	0.0	0.7	1.6	2.6	3.8
11	-1.6	-1.2	-0.8	-0.4	0.0	0.8	1.7	2.8	4.1
12	-1.7	-1.3	-0.9	-0.4	0.0	0.8	1.9	3.0	4.4
13	-1.9	-1.4	-0.9	-0.5	0.0	0.9	2.0	3.2	4.7
14	-2.0	-1.5	-1.0	-0.5	0.0	0.9	2.0	3.4	4.9

Includes APU fuel burn.

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				
	KIAS	242	243	244	245				
	FF/ENG	2580	2570	2570	2610				
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.

ENGINE INOP

ADVISORY INFORMATION

Gear Down Landing Rate of Climb Available

Flaps 15

TAT (°C)	RATE OF CLIMB (FT/MIN)					
	PRESSURE ALTITUDE (FT)					
	-2000	0	2000	4000	6000	8000
52	-220	-290				
50	-200	-270	-370			
48	-170	-240	-350			
46	-140	-210	-320	-430		
44	-120	-190	-300	-410		
42	-90	-160	-270	-380	-490	
40	-60	-130	-250	-360	-470	
38	-30	-110	-220	-330	-450	-560
36	-20	-80	-190	-310	-420	-540
34	-10	-50	-160	-280	-400	-520
32	-10	-30	-140	-260	-370	-490
30	-10	-30	-110	-230	-350	-470
20	0	-30	-100	-170	-240	-340
10	0	-20	-90	-170	-240	-320
0	10	-20	-90	-160	-240	-320
-20	10	-10	-90	-160	-250	-330
-40	10	-10	-90	-170	-250	-340

Rate of climb capability shown is valid for 60000 kg, gear down at VREF15+5.
Decrease rate of climb 130 ft/min per 5000 kg greater than 60000 kg.
Increase rate of climb 180 ft/min per 5000 kg less than 60000 kg.

Flaps 30

TAT (°C)	RATE OF CLIMB (FT/MIN)					
	PRESSURE ALTITUDE (FT)					
	-2000	0	2000	4000	6000	8000
52	-400	-470				
50	-370	-440	-550			
48	-350	-420	-530			
46	-320	-400	-500	-610		
44	-300	-370	-480	-590		
42	-270	-340	-460	-570	-680	
40	-250	-320	-430	-540	-660	
38	-220	-290	-410	-520	-640	-750
36	-200	-270	-380	-500	-610	-730
34	-200	-240	-360	-470	-590	-710
32	-200	-220	-330	-450	-570	-690
30	-200	-220	-300	-420	-540	-660
20	-200	-220	-290	-360	-440	-540
10	-190	-220	-290	-370	-440	-530
0	-190	-220	-290	-370	-450	-530
-20	-200	-220	-300	-380	-460	-550
-40	-200	-230	-310	-390	-480	-570

Rate of climb capability shown is valid for 60000 kg, gear down at VREF30+5.
Decrease rate of climb 130 ft/min per 5000 kg greater than 60000 kg.
Increase rate of climb 180 ft/min per 5000 kg less than 60000 kg.

GEAR DOWN

Long Range Cruise Altitude Capability

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

WEIGHT (1000 KG)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
85	15500	12500	9300
80	18400	15500	12600
75	21100	18500	15700
70	23700	21500	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
75	70	218	1500		
70	66	213	4700	2200	
65	61	208	8000	5900	3400
60	57	202	11100	9300	7100
55	52	196	14000	12900	10900
50	47	190	16900	16000	14800
45	43	183	19800	18700	17600
40	38	176	22800	21700	20600

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
65	1600		
60	6300	3200	
55	10600	8200	5300
50	14400	13000	10400
45	18000	16900	15700
40	21700	20500	19300

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
60	%N1	90.2	91.9								
	MACH	.364	.375								
	KIAS	220	219								
	FF/ENG	3192	3191								
55	%N1	87.8	89.3	91.0	92.8						
	MACH	.351	.362	.374	.387						
	KIAS	212	211	210	209						
	FF/ENG	2924	2909	2906	2913						
50	%N1	85.3	86.7	88.2	89.9	91.7	94.2				
	MACH	.338	.348	.359	.371	.384	.398				
	KIAS	204	203	202	201	200	199				
	FF/ENG	2672	2647	2630	2626	2633	2657				
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.

Holding

Flaps Up

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)			
		1500	5000	10000	15000
70	%N1	89.4			
	KIAS	216			
	FF/ENG	3610			
65	%N1	87.4	90.5		
	KIAS	211	211		
	FF/ENG	3360	3380		
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	
	KIAS	198	198	198	
	FF/ENG	2860	2860	2880	
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.

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/.78 climb speed schedule, normal engine bleed for packs on or off and anti-ice off. Enter the table with airport pressure altitude and TAT and read %N1. %N1 adjustments are shown for anti-ice operation.

Go-around %N1

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

VREF

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

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.79M to provide a target %N1 setting at the start of driftdown. Once driftdown is established, the Max Continuous %N1 table should be used to determine %N1 for the given conditions.

Max Continuous %N1

Power setting is based on one engine operating with one A/C pack operating and all anti-ice bleeds off. Enter the table with pressure altitude, 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 .78/280/250 descent. Enter with Air Distance as determined from the Ground to Air Miles Conversion table and read Fuel and Time required at the cruise pressure altitude. Adjust the fuel obtained for deviation from the reference weight at checkpoint as required by entering the off reference fuel adjustments table with the fuel required for the reference weight and the actual weight at checkpoint. Read fuel required and time for the actual weight.

Holding

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

Gear Down

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.

737-800WSFP1 CFM56-7B26 KG FAA CATC/N (FMC Model 737-800W.1)

Performance Inflight - QRH — Chapter PI-QRH
General — Section 30

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**	**4.5**	**5.0**	**5.5**	**6.0**	6.0
(VREF40 + 50)	%N1	51	56	60	64	68
FLAPS 5 (GEAR UP)	**PITCH ATT**	**5.5**	**5.5**	**6.0**	**6.5**	**6.5**
(VREF40 + 30)	%N1	51	57	61	65	69
FLAPS 15 (GEAR DOWN)	**PITCH ATT**	**5.0**	**5.5**	5.5	**6.0**	**6.5**
(VREF40 + 20)	%N1	58	63	68	73	76

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**	**2.0**	**2.0**	**2.5**	**2.5**
(VREF15 + 10)	%N1	40	44	48	51	54
FLAPS 30	**PITCH ATT**	**0.5**	**1.0**	**1.0**	**1.0**	**1.0**
(VREF30 + 10)	%N1	47	52	56	60	63
FLAPS 40	**PITCH ATT**	**-0.5**	**-0.5**	**-0.5**	**0.0**	**0.0**
(VREF40 + 10)	%N1	52	58	62	66	70

Max Climb %N1

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

TAT (°C)	PRESSURE ALTITUDE (FT)/SPEED (KIAS/MACH)									
	0	5000	10000	15000	20000	25000	30000	35000	37000	41000
	280	280	280	280	280	280	280	.78	.78	.78
60	90.2	90.5	90.4	90.6	90.4	92.1	93.8	95.1	95.2	93.5
55	91.0	91.2	91.3	91.4	90.8	91.5	93.1	94.4	94.5	92.8
50	91.7	92.0	92.1	92.2	91.7	91.5	92.4	93.7	93.8	92.1
45	92.4	92.6	92.8	93.0	92.6	92.4	92.4	93.0	93.1	91.4
40	93.1	93.3	93.6	93.8	93.4	93.2	93.2	92.3	92.4	90.7
35	93.6	94.0	94.3	94.5	94.3	94.0	94.0	93.0	92.4	90.8
30	92.9	94.8	95.0	95.2	95.1	94.8	94.7	93.9	93.3	91.8
25	92.2	94.8	95.7	95.9	95.9	95.5	95.4	94.7	94.1	92.8
20	91.4	94.0	96.5	96.7	96.6	96.2	96.1	95.4	94.9	93.7
15	90.6	93.2	95.9	97.5	97.4	96.9	96.7	96.2	95.7	94.6
10	89.9	92.5	95.1	97.8	98.3	97.7	97.4	96.9	96.5	95.6
5	89.1	91.7	94.3	97.0	99.2	98.6	98.1	97.7	97.3	96.5
0	88.3	90.9	93.5	96.2	98.6	99.6	99.1	98.5	98.2	97.5
-5	87.6	90.1	92.7	95.4	97.8	99.6	100.0	99.2	99.0	98.4
-10	86.8	89.3	91.9	94.6	97.1	98.8	100.3	100.2	99.8	99.4
-15	86.0	88.5	91.0	93.8	96.3	98.0	99.6	101.1	100.8	100.4
-20	85.2	87.6	90.2	93.0	95.5	97.2	98.7	100.8	101.3	101.0
-25	84.3	86.8	89.4	92.2	94.7	96.4	97.9	100.0	100.5	100.1
-30	83.5	86.0	88.5	91.3	93.9	95.6	97.1	99.1	99.6	99.3
-35	82.7	85.1	87.7	90.5	93.1	94.8	96.3	98.3	98.8	98.4
-40	81.8	84.3	86.8	89.6	92.3	93.9	95.4	97.4	97.9	97.6

%N1 Adjustments for Engine Bleeds

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

***Dual bleed sources**

Go-around %N1

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 KG)	FLAPS		
	40	30	15
85	159	167	174
80	154	162	169
75	148	156	163
70	143	151	157
65	139	147	153
60	133	141	147
55	127	134	140
50	121	128	133
45	114	121	126
40	107	114	119

Intentionally
Blank

ADVISORY INFORMATION

Normal Configuration Landing Distances

Flaps 15

	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	65000 KG LANDING WEIGHT	PER 5000 KG ABOVE/ BELOW 65000 KG	PER 1000 FT STD/ HIGH*	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 5 KTS ABOVE VREF15	ONE REV	NO REV

Dry Runway

MAX MANUAL	975	75/-60	20/30	-35	120	10	-10	20	-20	35	20	40
MAX AUTO	1270	70/-70	30/40	-45	155	0	0	30	-30	60	0	5
AUTOBRAKE 3	1815	105/-115	50/65	-75	255	0	0	50	-50	100	0	0
AUTOBRAKE 2	2300	150/-160	70/95	-105	350	30	-45	70	-70	95	80	80
AUTOBRAKE 1	2530	180/-190	85/110	-120	410	70	-80	75	-75	90	220	335

Good Reported Braking Action

MAX MANUAL	1330	75/-80	35/45	-60	200	30	-25	35	-35	45	65	145
MAX AUTO	1430	80/-85	40/50	-60	210	30	-25	35	-35	55	75	165
AUTOBRAKE 3	1820	105/-115	50/65	-75	260	5	-5	50	-50	100	5	10
AUTOBRAKE 2	2300	150/-160	70/95	-105	350	30	-45	70	-70	95	80	80
AUTOBRAKE 1	2530	180/-190	85/110	-120	410	70	-80	75	-75	90	220	335

Medium Reported Braking Action

MAX MANUAL	1845	120/-120	60/75	-95	335	80	-65	50	-50	60	190	455
MAX AUTO	1885	125/-125	60/80	-95	340	75	-60	50	-55	70	190	460
AUTOBRAKE 3	2005	125/-130	60/80	-100	350	60	-40	55	-60	100	130	375
AUTOBRAKE 2	2350	155/-165	75/95	-115	395	65	-60	70	-70	95	115	230
AUTOBRAKE 1	2540	180/-190	85/110	-125	430	90	-85	75	-75	90	235	390

Poor Reported Braking Action

MAX MANUAL	2430	175/-175	85/115	-140	535	205	-135	70	-75	75	415	1105
MAX AUTO	2430	175/-175	85/115	-140	535	205	-130	70	-75	80	415	1105
AUTOBRAKE 3	2460	175/-175	85/115	-145	535	195	-125	70	-75	90	420	1115
AUTOBRAKE 2	2625	185/-190	90/125	-150	555	190	-125	75	-80	95	350	960
AUTOBRAKE 1	2740	195/-200	95/130	-155	570	195	-140	80	-85	90	400	990

Reference distance is for sea level, standard day, no wind or slope, VREF15 approach speed and two engine detent reverse thrust.
For max manual braking and manual speed brakes, increase reference landing distance by 60 m.
For autobrake and manual speed brakes, increase reference landing distance by 50 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

	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	65000 KG LANDING WEIGHT	PER 5000 KG ABOVE/ BELOW 65000 KG	PER 1000 FT STD/ HIGH*	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 5 KTS ABOVE VREF30	ONE REV	NO REV

Dry Runway

BRAKING CONFIGURATION	REF DIST	WT ADJ	ALT ADJ	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	APP SPD ADJ	ONE REV	NO REV
MAX MANUAL	935	60/-55	20/25	-35	120	10	-10	20	-20	35	15	35
MAX AUTO	1200	60/-65	25/35	-45	145	0	0	30	-30	55	0	5
AUTOBRAKE 3	1700	100/-105	45/60	-75	245	0	-5	45	-45	85	0	0
AUTOBRAKE 2	2120	140/-145	65/85	-100	335	30	-40	60	-60	85	80	80
AUTOBRAKE 1	2325	160/-170	75/100	-115	395	65	-70	70	-70	80	185	300

Good Reported Braking Action

BRAKING CONFIGURATION	REF DIST	WT ADJ	ALT ADJ	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	APP SPD ADJ	ONE REV	NO REV
MAX MANUAL	1275	70/-75	35/45	-55	195	30	-25	30	-30	45	60	130
MAX AUTO	1375	75/-80	35/45	-60	205	30	-25	35	-35	55	65	145
AUTOBRAKE 3	1705	100/-105	45/60	-75	250	5	-10	45	-45	85	5	10
AUTOBRAKE 2	2120	140/-145	65/85	-100	335	30	-40	60	-60	85	80	80
AUTOBRAKE 1	2325	160/-170	75/100	-115	395	65	-70	70	-70	80	185	300

Medium Reported Braking Action

BRAKING CONFIGURATION	REF DIST	WT ADJ	ALT ADJ	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	APP SPD ADJ	ONE REV	NO REV
MAX MANUAL	1740	110/-115	55/70	-90	325	80	-60	45	-50	60	165	390
MAX AUTO	1790	115/-120	55/75	-90	330	75	-60	50	-50	70	165	400
AUTOBRAKE 3	1885	115/-120	55/75	-95	340	55	-45	55	-55	85	115	330
AUTOBRAKE 2	2175	140/-150	65/90	-110	380	65	-60	65	-65	85	115	215
AUTOBRAKE 1	2340	160/-170	75/100	-120	410	90	-75	70	-70	80	195	350

Poor Reported Braking Action

BRAKING CONFIGURATION	REF DIST	WT ADJ	ALT ADJ	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	APP SPD ADJ	ONE REV	NO REV
MAX MANUAL	2265	160/-160	75/105	-135	520	190	-125	65	-70	70	355	920
MAX AUTO	2275	160/-160	80/105	-135	520	190	-120	65	-70	80	350	920
AUTOBRAKE 3	2305	160/-160	80/105	-140	520	185	-120	65	-70	80	360	930
AUTOBRAKE 2	2435	170/-170	80/110	-145	535	180	-120	70	-75	85	315	810
AUTOBRAKE 1	2530	175/-180	85/115	-145	550	190	-130	75	-80	80	340	845

Reference distance is for sea level, standard day, no wind or slope, VREF30 approach speed and two engine detent reverse thrust.
For max manual braking and manual speed brakes, increase reference landing distance by 60 m.
For autobrake and manual speed brakes, increase reference landing distance by 50 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

	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	65000 KG LANDING WEIGHT	PER 5000 KG ABOVE/ BELOW 65000 KG	PER 1000 FT STD/ HIGH*	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 5 KTS ABOVE VREF40	ONE REV	NO REV

Dry Runway

MAX MANUAL	890	50/-50	20/25	-35	115	10	-10	20	-20	35	15	30
MAX AUTO	1120	55/-60	25/30	-40	140	0	0	25	-25	55	0	0
AUTOBRAKE 3	1565	90/-100	40/55	-70	235	0	-5	40	-40	85	0	0
AUTOBRAKE 2	1980	125/-135	60/75	-95	325	25	-35	55	-55	90	40	40
AUTOBRAKE 1	2185	150/-155	70/90	-110	380	55	-65	65	-65	85	145	225

Good Reported Braking Action

MAX MANUAL	1220	65/-70	30/40	-55	195	30	-25	30	-30	45	55	120
MAX AUTO	1310	70/-75	35/45	-60	200	25	-25	30	-30	55	60	130
AUTOBRAKE 3	1570	90/-100	40/55	-70	240	10	-5	40	-45	90	5	10
AUTOBRAKE 2	1980	125/-135	60/75	-95	325	25	-35	55	-55	90	40	40
AUTOBRAKE 1	2185	150/-155	70/90	-110	380	55	-65	65	-65	85	145	225

Medium Reported Braking Action

MAX MANUAL	1660	105/-105	50/65	-90	320	75	-60	45	-45	60	150	350
MAX AUTO	1695	110/-110	50/70	-90	325	70	-55	45	-45	70	150	355
AUTOBRAKE 3	1760	110/-115	50/70	-90	330	60	-45	50	-50	85	115	325
AUTOBRAKE 2	2035	130/-140	60/80	-105	370	60	-55	60	-60	90	80	175
AUTOBRAKE 1	2195	150/-155	70/95	-115	400	80	-70	65	-65	85	160	275

Poor Reported Braking Action

MAX MANUAL	2160	150/-150	70/100	-135	510	190	-120	60	-65	70	325	830
MAX AUTO	2165	150/-150	75/100	-135	510	190	-120	60	-65	75	325	830
AUTOBRAKE 3	2185	155/-155	75/100	-135	510	185	-120	60	-65	80	330	840
AUTOBRAKE 2	2300	160/-160	75/105	-140	525	175	-115	65	-70	85	275	730
AUTOBRAKE 1	2390	165/-170	80/110	-145	540	180	-125	70	-75	80	305	745

Reference distance is for sea level, standard day, no wind or slope, VREF40 approach speed and two engine detent reverse thrust.
For max manual braking and manual speed brakes, increase reference landing distance by 55 m.
For autobrake and manual speed brakes, increase reference landing distance by 45 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)							
		REF DIST FOR 60000 KG LANDING WEIGHT	WT ADJ PER 5000 KG ABV/BLW 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	1215	160/-75	25/60	-40	135	15	-10	80
ANTI SKID INOPERATIVE (FLAPS 40)	VREF40	1465	85/-90	40/50	-70	260	40	-35	110
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 15)	VREF15	1000	70/-55	25/30	-35	120	10	-10	80
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 30)	VREF30	965	65/-50	20/25	-35	115	10	-10	85
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 40)	VREF40	925	55/-50	20/25	-35	115	10	-10	90
HYDRAULICS - LOSS OF SYSTEM B (FLAPS 15)	VREF15	1025	55/-55	25/30	-40	135	15	-15	75
HYDRAULICS - MANUAL REVERSION (LOSS OF BOTH SYSTEM A & B)	VREF15	1395	75/-80	35/45	-55	185	30	-30	145
LEADING EDGE FLAPS TRANSIT	VREF15+15	1020	75/-60	25/30	-35	120	10	-10	65
ONE ENGINE INOPERATIVE (FLAPS 15)	VREF15	920	65/-55	20/25	-35	115	10	-10	65
ONE ENGINE INOPERATIVE (FLAPS 30)**	VREF30	880	55/-50	20/25	-30	110	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)							
		REF DIST FOR 60000 KG LANDING WEIGHT	WT ADJ PER 5000 KG ABV/BLW 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	910	70/-55	20/25	-30	115	10	-10	60
JAMMED OR RESTRICTED FLIGHT CONTROLS	VREF15	910	70/-55	20/25	-30	115	10	-10	60
TRAILING EDGE FLAP ASYMMETRY (30 ≤ FLAPS < 40)	VREF30	875	60/-50	20/25	-30	110	10	-10	60
TRAILING EDGE FLAP ASYMMETRY (15 ≤ FLAPS < 30)	VREF15	910	70/-55	20/25	-30	115	10	-10	60
TRAILING EDGE FLAP ASYMMETRY (1 ≤ FLAPS < 15)	VREF40+30	1015	85/-60	25/30	-35	120	10	-10	60
TRAILING EDGE FLAP DISAGREE (30 ≤ FLAPS < 40)	VREF30	875	60/-50	20/25	-30	110	10	-10	60
TRAILING EDGE FLAP DISAGREE (15 ≤ FLAPS < 30)	VREF15	910	70/-55	20/25	-30	115	10	-10	60
TRAILING EDGE FLAP DISAGREE (1 ≤ FLAPS < 15)	VREF40+30	1015	85/-60	25/30	-35	120	10	-10	60
TRAILING EDGE FLAPS UP	VREF40+40	1085	105/-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) REF DIST FOR 60000 KG LANDING WEIGHT	WT ADJ PER 5000 KG ABV/BLW 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	1615	85/-90	45/60	-60	215	30	-30	85
ANTI SKID INOPERATIVE (FLAPS 40)	VREF40	1630	105/-110	45/60	-85	310	60	-50	120
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 15)	VREF15	1445	90/-95	40/55	-60	215	40	-35	125
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 30)	VREF30	1370	85/-90	35/50	-60	210	35	-30	125
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 40)	VREF40	1300	80/-85	35/45	-60	205	35	-30	125
HYDRAULICS - LOSS OF SYSTEM B (FLAPS 15)	VREF15	1295	80/-80	35/45	-55	200	30	-25	95
HYDRAULICS - MANUAL REVERSION (LOSS OF BOTH SYSTEM A & B)	VREF15	1720	100/-110	45/60	-70	245	55	-50	175
LEADING EDGE FLAPS TRANSIT	VREF15+15	1395	80/-85	35/50	-60	205	30	-25	90
ONE ENGINE INOPERATIVE (FLAPS 15)	VREF15	1290	75/-80	30/45	-55	200	30	-25	90
ONE ENGINE INOPERATIVE (FLAPS 30)**	VREF30	1230	70/-75	30/40	-55	195	30	-25	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 CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENT (M): REF DIST FOR 60000 KG LANDING WEIGHT	WT ADJ PER 5000 KG ABV/BLW 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
STABILIZER TRIM INOPERATIVE	VREF15	1240	75/-75	30/45	-55	190	25	-25	85
JAMMED OR RESTRICTED FLIGHT CONTROLS	VREF15	1240	75/-75	30/45	-55	190	25	-25	85
TRAILING EDGE FLAP ASYMMETRY (30 ≤ FLAPS < 40)	VREF30	1190	70/-70	30/40	-55	185	25	-25	85
TRAILING EDGE FLAP ASYMMETRY (15 ≤ FLAPS < 30)	VREF15	1240	75/-75	30/45	-55	190	25	-25	85
TRAILING EDGE FLAP ASYMMETRY (1 ≤ FLAPS < 15)	VREF40+30	1370	75/-80	35/45	-55	200	25	-25	80
TRAILING EDGE FLAP DISAGREE (30 ≤ FLAPS < 40)	VREF30	1190	70/-70	30/40	-55	185	25	-25	85
TRAILING EDGE FLAP DISAGREE (15 ≤ FLAPS < 30)	VREF15	1240	75/-75	30/45	-55	190	25	-25	85
TRAILING EDGE FLAP DISAGREE (1 ≤ FLAPS < 15)	VREF40+30	1370	75/-80	35/45	-55	200	25	-25	80
TRAILING EDGE FLAPS UP	VREF40+40	1465	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) REF DIST FOR 60000 KG LANDING WEIGHT	WT ADJ PER 5000 KG ABV/BLW 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	2275	145/-150	75/100	-100	360	80	-70	115
ANTI SKID INOPERATIVE (FLAPS 40)	VREF40	2055	145/-150	65/85	-125	490	135	-100	140
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 15)	VREF15	1975	145/-150	65/85	-100	350	90	-75	160
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 30)	VREF30	1855	135/-135	60/80	-95	340	85	-70	155
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 40)	VREF40	1745	125/-125	55/75	-90	330	80	-70	155
HYDRAULICS - LOSS OF SYSTEM B (FLAPS 15)	VREF15	1770	125/-125	55/75	-90	325	70	-60	125
HYDRAULICS - MANUAL REVERSION (LOSS OF BOTH SYSTEM A & B)	VREF15	2380	165/-165	75/100	-115	395	120	-100	215
LEADING EDGE FLAPS TRANSIT	VREF15+15	1900	130/-130	60/80	-90	335	70	-60	115
ONE ENGINE INOPERATIVE (FLAPS 15)	VREF15	1835	125/-130	55/70	-95	345	80	-70	130
ONE ENGINE INOPERATIVE (FLAPS 30)**	VREF30	1725	115/-120	50/65	-90	330	80	-65	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 CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENT (M): REF DIST FOR 60000 KG LANDING WEIGHT	WT ADJ PER 5000 KG ABV/BLW 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
STABILIZER TRIM INOPERATIVE	VREF15	1690	115/-120	50/70	-85	315	65	-55	115
JAMMED OR RESTRICTED FLIGHT CONTROLS	VREF15	1690	115/-120	50/70	-85	315	65	-55	115
TRAILING EDGE FLAP ASYMMETRY (30 ≤ FLAPS < 40)	VREF30	1600	110/-110	45/60	-85	310	60	-55	110
TRAILING EDGE FLAP ASYMMETRY (15 ≤ FLAPS < 30)	VREF15	1690	115/-120	50/70	-85	315	65	-55	115
TRAILING EDGE FLAP ASYMMETRY (1 ≤ FLAPS < 15)	VREF40+30	1885	120/-125	60/80	-90	330	70	-60	110
TRAILING EDGE FLAP DISAGREE (30 ≤ FLAPS < 40)	VREF30	1600	110/-110	45/60	-85	310	60	-55	110
TRAILING EDGE FLAP DISAGREE (15 ≤ FLAPS < 30)	VREF15	1690	115/-120	50/70	-85	315	65	-55	115
TRAILING EDGE FLAP DISAGREE (1 ≤ FLAPS < 15)	VREF40+30	1885	120/-125	60/80	-90	330	70	-60	110
TRAILING EDGE FLAPS UP	VREF40+40	2040	130/-135	65/85	-95	345	75	-65	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)							
		REF DIST FOR 60000 KG LANDING WEIGHT	WT ADJ PER 5000 KG ABV/BLW 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	3015	215/-220	110/145	-150	570	190	-145	145
ANTI SKID INOPERATIVE (FLAPS 40)	VREF40	2725	215/-210	90/135	-205	900	480	-235	155
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 15)	VREF15	2555	210/-205	95/130	-145	545	195	-145	190
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 30)	VREF30	2375	190/-185	85/115	-140	530	180	-135	175
HYDRAULICS - LOSS OF SYSTEM A (FLAPS 40)	VREF40	2230	175/-175	75/105	-135	520	175	-130	170
HYDRAULICS - LOSS OF SYSTEM B (FLAPS 15)	VREF15	2300	180/-175	80/110	-135	515	160	-120	150
HYDRAULICS - MANUAL REVERSION (LOSS OF BOTH SYSTEM A & B)	VREF15	3055	235/-230	105/150	-165	600	240	-185	240
LEADING EDGE FLAPS TRANSIT	VREF15+15	2450	185/-185	85/115	-135	520	160	-120	135
ONE ENGINE INOPERATIVE (FLAPS 15)	VREF15	2505	190/-190	80/110	-150	560	205	-150	160
ONE ENGINE INOPERATIVE (FLAPS 30)**	VREF30	2320	170/-175	75/100	-140	540	190	-140	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 CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENT (M)							
		REF DIST FOR 60000 KG LANDING WEIGHT	WT ADJ PER 5000 KG ABV/BLW 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	2195	170/-165	75/100	-130	500	150	-110	135
JAMMED OR RESTRICTED FLIGHT CONTROLS	VREF15	2195	170/-165	75/100	-130	500	150	-110	135
TRAILING EDGE FLAP ASYMMETRY (30 ≤ FLAPS < 40)	VREF30	2060	155/-155	65/95	-125	485	140	-105	130
TRAILING EDGE FLAP ASYMMETRY (15 ≤ FLAPS < 30)	VREF15	2195	170/-165	75/100	-130	500	150	-110	135
TRAILING EDGE FLAP ASYMMETRY (1 ≤ FLAPS < 15)	VREF40+30	2465	180/-180	85/115	-135	520	160	-120	135
TRAILING EDGE FLAP DISAGREE (30 ≤ FLAPS < 40)	VREF30	2060	155/-155	65/95	-125	485	140	-105	130
TRAILING EDGE FLAP DISAGREE (15 ≤ FLAPS < 30)	VREF15	2195	170/-165	75/100	-130	500	150	-110	135
TRAILING EDGE FLAP DISAGREE (1 ≤ FLAPS < 15)	VREF40+30	2465	180/-180	85/115	-135	520	160	-120	135
TRAILING EDGE FLAPS UP	VREF40+40	2680	190/-195	95/130	-145	540	170	-130	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)

WEIGHT (1000 KG)	OAT (°C)	WIND CORRECTED BRAKES ON SPEED (KIAS)* 80			100			120			140			160			180		
		PRESSURE ALTITUDE (1000 FT) 0	5	10	0	5	10	0	5	10	0	5	10	0	5	10	0	5	10
80	0	15.1	17.0	19.3	22.4	25.3	28.9	30.9	35.0	40.2	40.4	45.9	53.0	50.8	57.9	67.3	60.8	69.6	81.2
	10	15.6	17.6	20.0	23.1	26.1	29.8	31.9	36.2	41.5	41.8	47.5	54.8	52.5	59.9	69.5	62.8	71.9	83.9
	15	15.8	17.8	20.2	23.5	26.5	30.3	32.4	36.7	42.1	42.4	48.2	55.6	53.3	60.7	70.5	63.7	72.9	85.1
	20	16.0	18.1	20.5	23.8	26.9	30.7	32.8	37.2	42.7	42.9	48.8	56.3	54.0	61.5	71.4	64.6	73.9	86.2
	30	16.4	18.5	21.1	24.4	27.6	31.5	33.7	38.2	43.8	44.0	50.0	57.7	55.3	63.1	73.2	66.2	75.7	88.4
	40	16.6	18.7	21.3	24.7	27.9	31.9	34.1	38.7	44.4	44.7	50.9	58.8	56.3	64.3	74.8	67.5	77.4	90.5
	50	16.6	18.7	21.3	24.8	28.0	32.1	34.3	39.0	44.9	45.2	51.5	59.7	57.1	65.4	76.3	68.7	79.0	92.9
70	0	13.7	15.4	17.5	20.2	22.8	26.0	27.7	31.3	35.9	36.1	41.0	47.2	45.3	51.6	59.7	54.9	62.7	72.9
	10	14.2	15.9	18.1	20.8	23.5	26.8	28.6	32.4	37.1	37.3	42.3	48.7	46.8	53.3	61.6	56.7	64.8	75.4
	15	14.4	16.2	18.4	21.1	23.9	27.2	29.0	32.8	37.6	37.8	43.0	49.4	47.5	54.0	62.5	57.5	65.7	76.4
	20	14.6	16.4	18.6	21.4	24.2	27.6	29.4	33.3	38.1	38.4	43.5	50.1	48.1	54.8	63.4	58.3	66.5	77.4
	30	14.9	16.8	19.1	22.0	24.8	28.3	30.2	34.1	39.1	39.3	44.6	51.4	49.3	56.1	64.9	59.8	68.2	79.4
	40	15.1	17.0	19.3	22.2	25.1	28.6	30.5	34.6	39.6	39.9	45.3	52.2	50.1	57.1	66.2	60.9	69.6	81.2
	50	15.1	17.0	19.3	22.3	25.2	28.8	30.7	34.8	40.0	40.2	45.8	52.9	50.7	58.0	67.4	61.8	70.9	83.0
60	0	12.3	13.9	15.7	18.0	20.3	23.1	24.4	27.6	31.6	31.7	35.9	41.2	39.6	45.0	51.8	48.1	54.8	63.5
	10	12.7	14.3	16.3	18.5	20.9	23.8	25.2	28.5	32.6	32.7	37.1	42.6	40.9	46.5	53.6	49.7	56.6	65.6
	15	12.9	14.6	16.5	18.8	21.2	24.2	25.6	29.0	33.1	33.2	37.6	43.2	41.5	47.1	54.4	50.4	57.4	66.5
	20	13.1	14.8	16.7	19.1	21.5	24.5	26.0	29.4	33.5	33.6	38.1	43.8	42.0	47.8	55.1	51.1	58.2	67.4
	30	13.4	15.1	17.2	19.6	22.1	25.1	26.6	30.1	34.4	34.5	39.1	44.9	43.1	49.0	56.5	52.3	59.6	69.1
	40	13.6	15.3	17.3	19.8	22.3	25.4	26.9	30.5	34.9	35.0	39.7	45.6	43.8	49.8	57.5	53.2	60.7	70.5
	50	13.5	15.3	17.3	19.8	22.4	25.5	27.0	30.6	35.1	35.2	40.0	46.0	44.2	50.4	58.3	53.9	61.7	71.9
50	0	11.0	12.3	14.0	15.7	17.7	20.2	21.2	23.9	27.3	27.2	30.8	35.3	33.8	38.3	44.1	40.9	46.4	53.6
	10	11.3	12.7	14.4	16.3	18.3	20.8	21.9	24.7	28.2	28.1	31.8	36.5	34.9	39.6	45.5	42.2	48.0	55.4
	15	11.5	12.9	14.7	16.5	18.6	21.1	22.2	25.1	28.6	28.6	32.3	37.0	35.4	40.2	46.2	42.8	48.7	56.2
	20	11.6	13.1	14.9	16.7	18.9	21.4	22.5	25.4	29.0	28.9	32.8	37.5	35.9	40.7	46.8	43.4	49.3	56.9
	30	11.9	13.4	15.2	17.2	19.3	22.0	23.1	26.1	29.7	29.7	33.6	38.4	36.8	41.8	48.0	44.5	50.6	58.4
	40	12.1	13.6	15.4	17.3	19.5	22.2	23.4	26.4	30.1	30.1	34.0	39.0	37.4	42.4	48.8	45.2	51.4	59.4
	50	12.0	13.6	15.4	17.3	19.6	22.3	23.4	26.5	30.3	30.2	34.2	39.3	37.6	42.8	49.3	45.7	52.1	60.3
40	0	9.6	10.8	12.3	13.5	15.2	17.3	17.9	20.2	23.0	22.8	25.8	29.4	28.1	31.8	36.4	33.7	38.2	43.9
	10	10.0	11.2	12.7	14.0	15.8	17.9	18.5	20.9	23.8	23.6	26.6	30.4	29.0	32.8	37.6	34.8	39.5	45.4
	15	10.1	11.4	12.9	14.2	16.0	18.1	18.8	21.2	24.1	23.9	27.0	30.8	29.4	33.3	38.2	35.3	40.0	46.0
	20	10.2	11.5	13.1	14.4	16.2	18.4	19.1	21.5	24.5	24.2	27.4	31.3	29.8	33.8	38.7	35.8	40.6	46.6
	30	10.5	11.8	13.4	14.8	16.6	18.9	19.6	22.1	25.1	24.9	28.1	32.1	30.6	34.6	39.7	36.7	41.6	47.8
	40	10.6	11.9	13.5	14.9	16.8	19.1	19.8	22.3	25.4	25.2	28.4	32.5	31.0	35.1	40.2	37.2	42.2	48.6
	50	10.6	11.9	13.5	14.9	16.8	19.1	19.8	22.3	25.5	25.2	28.6	32.7	31.1	35.3	40.6	37.5	42.6	49.1

***To correct for wind, enter table with the brakes on speed minus one half the headwind or plus 1.5 times the tailwind. If ground speed is used for brakes on speed, ignore wind and enter table with sea level, 15°C.**

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	29.4	30 TO 41	41 & ABOVE
	BRAKE TEMPERATURE MONITOR SYSTEM INDICATION ON CDS								
	UP TO 2.5	2.6	3	3.3	3.8	4.5	4.9	5.0 TO 7.1	7.1 & ABOVE
INFLIGHT GEAR DOWN	NO SPECIAL PROCEDURE REQUIRED	1	4	5	6	7	7.6	CAUTION	FUSE PLUG MELT ZONE
GROUND		6.7	16.0	24.1	34.2	45.9	53.3		

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

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

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

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

Intentionally
Blank

Performance Inflight - QRH — Chapter PI-QRH

Engine Inoperative — Section 32

ENGINE INOP

Initial Max Continuous %N1

Based on .79M, A/C high and anti-ice off

TAT (°C)	PRESSURE ALTITUDE (1000 FT)								
	25	27	29	31	33	35	37	39	41
20	96.8	96.6	96.3	96.1	95.9	95.4	95.0	94.7	93.9
15	97.4	97.2	96.9	96.8	96.6	96.2	95.7	95.5	94.8
10	98.0	97.8	97.5	97.4	97.4	96.9	96.5	96.3	95.7
5	98.3	98.6	98.3	98.1	98.1	97.7	97.3	97.1	96.6
0	97.5	98.7	99.2	99.0	98.9	98.5	98.2	98.0	97.5
-5	96.7	98.0	99.1	99.8	99.7	99.3	98.9	98.7	98.4
-10	96.0	97.2	98.4	99.6	100.5	100.2	99.8	99.6	99.4
-15	95.2	96.4	97.6	98.8	100.1	101.0	100.8	100.6	100.3
-20	94.4	95.6	96.8	98.0	99.3	100.5	101.1	100.8	100.6
-25	93.6	94.9	96.0	97.2	98.5	99.7	100.2	100.0	99.8
-30	92.8	94.1	95.2	96.4	97.7	98.8	99.4	99.2	99.0
-35	92.0	93.2	94.4	95.6	96.8	98.0	98.5	98.3	98.1
-40	91.2	92.4	93.5	94.7	96.0	97.1	97.6	97.4	97.2

%N1 Adjustments for Engine Bleeds

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

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)					GROUND DISTANCE (NM)	AIR DISTANCE (NM)				
HEADWIND COMPONENT (KTS)						TAILWIND COMPONENT (KTS)				
100	80	60	40	20		20	40	60	80	100
298	272	249	230	214	200	190	180	172	164	158
600	547	501	462	429	400	379	361	344	328	315
903	823	753	694	644	600	570	542	517	494	473
1209	1100	1005	926	859	800	759	721	687	657	630
1516	1379	1259	1159	1075	1000	949	902	859	820	786
1825	1659	1513	1393	1290	1200	1139	1082	1031	984	943
2137	1940	1768	1626	1506	1400	1328	1262	1202	1147	1099
2450	2222	2024	1860	1722	1600	1518	1442	1373	1311	1256
2766	2507	2281	2095	1938	1800	1707	1622	1544	1474	1412
3083	2792	2539	2331	2155	2000	1896	1801	1715	1637	1568

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT)									
	10		14		18		22		26	
	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)
200	1.4	0:43	1.2	0:41	1.1	0:39	1.0	0:38	0.9	0:37
400	2.8	1:23	2.6	1:19	2.4	1:14	2.2	1:11	2.1	1:09
600	4.3	2:04	3.9	1:57	3.6	1:50	3.4	1:45	3.2	1:42
800	5.7	2:46	5.2	2:36	4.9	2:26	4.5	2:19	4.4	2:14
1000	7.1	3:28	6.6	3:15	6.1	3:03	5.7	2:53	5.5	2:47
1200	8.5	4:10	7.9	3:55	7.3	3:40	6.8	3:28	6.6	3:21
1400	9.8	4:53	9.1	4:36	8.5	4:18	8.0	4:02	7.7	3:54
1600	11.2	5:36	10.4	5:16	9.7	4:55	9.1	4:38	8.7	4:28
1800	12.5	6:20	11.7	5:58	10.9	5:34	10.2	5:13	9.8	5:02
2000	13.9	7:05	12.9	6:39	12.0	6:13	11.3	5:49	10.8	5:36

Fuel Required Adjustments (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG)								
	40	45	50	55	60	65	70	75	80
1	-0.1	-0.1	-0.1	0.0	0.0	0.1	0.1	0.2	0.3
2	-0.3	-0.2	-0.1	-0.1	0.0	0.2	0.3	0.6	0.8
3	-0.4	-0.3	-0.2	-0.1	0.0	0.3	0.5	0.9	1.2
4	-0.6	-0.4	-0.3	-0.1	0.0	0.3	0.7	1.2	1.6
5	-0.7	-0.5	-0.4	-0.2	0.0	0.4	0.9	1.4	2.0
6	-0.8	-0.6	-0.4	-0.2	0.0	0.5	1.1	1.7	2.4
7	-1.0	-0.8	-0.5	-0.3	0.0	0.6	1.2	2.0	2.8
8	-1.1	-0.9	-0.6	-0.3	0.0	0.6	1.4	2.2	3.2
9	-1.3	-1.0	-0.7	-0.3	0.0	0.7	1.5	2.4	3.5
10	-1.4	-1.1	-0.7	-0.4	0.0	0.7	1.6	2.6	3.8
11	-1.6	-1.2	-0.8	-0.4	0.0	0.8	1.7	2.8	4.1
12	-1.7	-1.3	-0.9	-0.4	0.0	0.8	1.9	3.0	4.4
13	-1.9	-1.4	-0.9	-0.5	0.0	0.9	2.0	3.2	4.7
14	-2.0	-1.5	-1.0	-0.5	0.0	0.9	2.0	3.4	4.9

Includes APU fuel burn.

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	67.0	69.7	73.8	77.8	82.3	87.0	94.9	
	KIAS	191	191	192	193	194	195	196	
	FF/ENG	1650	1620	1600	1580	1570	1570	1680	
45	%N1	64.3	66.9	71.0	75.0	79.4	84.0	89.6	
	KIAS	184	184	184	184	184	185	186	
	FF/ENG	1500	1470	1440	1430	1400	1400	1450	
40	%N1	61.1	64.0	67.8	72.0	76.2	80.7	85.4	94.1
	KIAS	177	177	177	177	177	177	177	177
	FF/ENG	1350	1330	1300	1270	1250	1240	1260	1360

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

ENGINE INOP

ADVISORY INFORMATION

Gear Down Landing Rate of Climb Available

Flaps 15

TAT (°C)	RATE OF CLIMB (FT/MIN)					
	PRESSURE ALTITUDE (FT)					
	-2000	0	2000	4000	6000	8000
52	50	-10				
50	80	20	-80			
48	110	40	-50			
46	140	70	-30	-130		
44	170	100	0	-100		
42	200	130	20	-80	-190	
40	220	160	50	-50	-170	
38	250	190	80	-20	-140	-280
36	270	220	110	0	-120	-250
34	270	250	140	20	-100	-230
32	270	270	160	40	-80	-210
30	280	270	180	60	-60	-190
20	290	280	200	90	-20	-130
10	300	290	200	100	-10	-120
0	310	300	210	100	-10	-120
-20	330	320	230	110	0	-120
-40	350	340	240	120	0	-120

Rate of climb capability shown is valid for 60000 kg, gear down at VREF15+5.
Decrease rate of climb 120 ft/min per 5000 kg greater than 60000 kg.
Increase rate of climb 160 ft/min per 5000 kg less than 60000 kg.

Flaps 30

TAT (°C)	RATE OF CLIMB (FT/MIN)					
	PRESSURE ALTITUDE (FT)					
	-2000	0	2000	4000	6000	8000
52	-250	-310				
50	-220	-290	-390			
48	-190	-260	-370			
46	-170	-240	-340	-450		
44	-140	-210	-320	-420		
42	-110	-180	-290	-400	-520	
40	-90	-160	-270	-370	-490	
38	-60	-130	-240	-350	-470	-610
36	-50	-100	-210	-320	-450	-580
34	-40	-70	-190	-300	-430	-560
32	-40	-60	-170	-290	-410	-540
30	-40	-50	-150	-270	-400	-520
20	-30	-50	-140	-240	-360	-470
10	-30	-40	-130	-240	-360	-470
0	-20	-40	-130	-240	-360	-470
-20	-20	-30	-130	-250	-370	-490
-40	-10	-30	-130	-250	-380	-500

Rate of climb capability shown is valid for 60000 kg, gear down at VREF30+5.
Decrease rate of climb 130 ft/min per 5000 kg greater than 60000 kg.
Increase rate of climb 160 ft/min per 5000 kg less than 60000 kg.

GEAR DOWN

Long Range Cruise Altitude Capability

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

WEIGHT (1000 KG)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
85	15600	12500	9400
80	18400	15500	12600
75	21100	18500	15700
70	23600	21400	18600
65	26100	24400	21800
60	28600	27100	25300
55	30800	29600	28100
50	32900	31900	30700
45	35100	34100	33000
40	37500	36500	35400

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) HEADWIND COMPONENT (KTS)					GROUND DISTANCE (NM)	AIR DISTANCE (NM) TAILWIND COMPONENT (KTS)				
100	80	60	40	20		20	40	60	80	100
324	290	260	236	217	200	188	178	168	160	153
654	583	523	474	435	400	377	357	338	321	307
989	880	787	713	653	600	566	535	507	483	461
1329	1181	1054	953	871	800	754	713	676	643	614
1674	1484	1322	1194	1090	1000	943	891	844	803	766
2024	1791	1593	1436	1310	1200	1131	1069	1013	962	918
2381	2103	1865	1680	1530	1400	1320	1247	1181	1122	1070
2743	2417	2140	1924	1751	1600	1508	1424	1348	1280	1221
3113	2737	2418	2171	1972	1800	1695	1600	1514	1438	1371

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT) 10		14		20		24		28	
	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)
200	2.4	0:49	2.2	0:47	1.9	0:44	1.7	0:42	1.6	0:41
400	4.9	1:36	4.5	1:31	4.0	1:25	3.7	1:20	3.5	1:17
600	7.4	2:25	6.8	2:17	6.1	2:06	5.7	1:59	5.4	1:54
800	9.8	3:14	9.1	3:03	8.1	2:48	7.6	2:38	7.2	2:31
1000	12.1	4:04	11.3	3:50	10.1	3:30	9.5	3:18	9.0	3:08
1200	14.4	4:56	13.5	4:39	12.1	4:14	11.3	3:58	10.7	3:46
1400	16.7	5:49	15.6	5:28	14.0	4:58	13.1	4:40	12.4	4:24
1600	18.9	6:43	17.7	6:18	15.9	5:44	14.9	5:22	14.1	5:03
1800	21.1	7:38	19.7	7:10	17.7	6:30	16.6	6:05	15.7	5:43

Fuel Required Adjustments (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG) 40	50	60	70	80
2	-0.3	-0.2	0.0	0.3	0.7
4	-0.7	-0.3	0.0	0.6	1.3
6	-1.0	-0.5	0.0	0.9	2.0
8	-1.3	-0.7	0.0	1.2	2.6
10	-1.7	-0.8	0.0	1.4	3.2
12	-2.0	-1.0	0.0	1.6	3.7
14	-2.4	-1.2	0.0	1.8	4.2
16	-2.7	-1.3	0.0	2.0	4.6
18	-3.0	-1.5	0.0	2.2	5.0
20	-3.4	-1.7	0.0	2.4	5.3
22	-3.7	-1.8	0.0	2.5	5.6

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	75.7	78.4	82.7	86.9	91.9			
	KIAS	229	229	229	229	229			
	FF/ENG	2240	2220	2220	2230	2250			
80	%N1	74.1	76.9	81.0	85.3	89.9			
	KIAS	224	224	224	224	224			
	FF/ENG	2110	2100	2090	2090	2100			
75	%N1	72.3	75.3	79.2	83.6	88.1			
	KIAS	218	218	218	218	218			
	FF/ENG	1990	1970	1960	1960	1960			
70	%N1	70.6	73.5	77.5	81.8	86.2	91.7		
	KIAS	213	213	213	213	213	213		
	FF/ENG	1870	1850	1840	1830	1830	1860		
65	%N1	68.8	71.7	75.8	80.0	84.4	89.1		
	KIAS	209	209	209	209	209	209		
	FF/ENG	1760	1740	1720	1710	1700	1720		
60	%N1	66.9	69.7	73.9	77.9	82.3	86.9	94.1	
	KIAS	203	203	203	203	203	203	203	
	FF/ENG	1650	1620	1600	1590	1580	1580	1660	
55	%N1	65.0	67.6	71.8	75.8	80.2	84.7	90.2	
	KIAS	197	197	197	197	197	197	197	
	FF/ENG	1530	1510	1490	1470	1450	1450	1490	
50	%N1	62.7	65.5	69.4	73.6	77.8	82.3	87.0	
	KIAS	191	191	191	191	191	191	191	
	FF/ENG	1420	1400	1370	1350	1330	1320	1350	
45	%N1	60.2	63.1	67.0	71.2	75.3	79.8	84.4	91.3
	KIAS	184	184	184	184	184	184	184	184
	FF/ENG	1310	1290	1260	1240	1210	1200	1220	1260
40	%N1	57.7	60.4	64.5	68.5	72.8	77.1	81.5	86.6
	KIAS	177	177	177	177	177	177	177	177
	FF/ENG	1200	1170	1150	1130	1100	1080	1090	1110

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

Intentionally
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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 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)		5	7	9	11	13	15	17	19	21	23
		PRESSURE ALTITUDE (1000 FT)									
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) HEADWIND COMPONENT (KTS)					GROUND DISTANCE (NM)	AIR DISTANCE (NM) TAILWIND COMPONENT (KTS)				
100	80	60	40	20		20	40	60	80	100
172	151	134	120	109	100	93	88	83	78	75
352	308	270	242	219	200	187	175	165	156	148
533	465	408	364	330	300	280	262	246	232	220
716	623	545	486	440	400	373	349	328	309	293
900	783	684	609	551	500	466	436	409	385	365
1086	943	823	733	661	600	559	523	490	462	438
1273	1105	964	856	772	700	652	610	572	538	510
1462	1267	1103	980	883	800	745	696	652	614	581
1653	1431	1245	1104	994	900	838	782	733	690	653
1845	1595	1386	1228	1105	1000	931	868	813	765	724

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT)					
	6		10		14	
	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)
100	1.3	0:27	1.1	0:26	1.0	0:26
200	2.6	0:53	2.4	0:50	2.3	0:48
300	3.9	1:18	3.7	1:15	3.6	1:11
400	5.2	1:44	4.9	1:39	4.8	1:35
500	6.5	2:10	6.1	2:04	6.0	1:58
600	7.8	2:37	7.3	2:29	7.1	2:22
700	9.1	3:03	8.5	2:55	8.3	2:46
800	10.3	3:30	9.7	3:20	9.4	3:10
900	11.6	3:58	10.9	3:46	10.5	3:35
1000	12.8	4:25	12.0	4:12	11.6	3:59

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	93.2			
	KIAS	224			
	FF/ENG	4120			
75	%N1	91.2	94.5		
	KIAS	218	218		
	FF/ENG	3840	3890		
70	%N1	89.2	92.4		
	KIAS	213	213		
	FF/ENG	3580	3610		
65	%N1	87.3	90.3	95.7	
	KIAS	209	209	209	
	FF/ENG	3340	3360	3430	
60	%N1	85.1	88.1	92.7	
	KIAS	203	203	203	
	FF/ENG	3090	3090	3130	
55	%N1	82.8	85.7	90.2	97.0
	KIAS	197	197	197	197
	FF/ENG	2850	2840	2860	2990
50	%N1	80.2	83.2	87.6	92.6
	KIAS	191	191	191	191
	FF/ENG	2610	2600	2610	2650
45	%N1	77.7	80.5	84.9	89.5
	KIAS	184	184	184	184
	FF/ENG	2390	2370	2360	2380
40	%N1	75.0	77.7	82.0	86.4
	KIAS	177	177	177	177
	FF/ENG	2170	2140	2120	2130

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

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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/.78 climb speed schedule, normal engine bleed for packs on or off and anti-ice off. Enter the table with airport pressure altitude and TAT and read %N1. %N1 adjustments are shown for anti-ice operation.

Go-around %N1

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

VREF

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

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.79M to provide a target %N1 setting at the start of driftdown. Once driftdown is established, the Max Continuous %N1 table should be used to determine %N1 for the given conditions.

Max Continuous %N1

Power setting is based on one engine operating with one A/C pack operating and all anti-ice bleeds off. Enter the table with pressure altitude, 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 .78/280/250 descent. Enter with Air Distance as determined from the Ground to Air Miles Conversion table and read Fuel and Time required at the cruise pressure altitude. Adjust the fuel obtained for deviation from the reference weight at checkpoint as required by entering the off reference fuel adjustments table with the fuel required for the reference weight and the actual weight at checkpoint. Read fuel required and time for the actual weight.

Holding

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

Gear Down

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 40

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/MACH)									
	0	5000	10000	15000	20000	25000	30000	35000	37000	41000
	280	280	280	280	280	280	280	.78	.78	.78
60	90.2	90.5	90.4	90.6	90.4	92.1	93.8	95.1	95.2	93.5
55	91.0	91.2	91.3	91.4	90.8	91.5	93.1	94.4	94.5	92.8
50	91.7	92.0	92.1	92.2	91.7	91.5	92.4	93.7	93.8	92.1
45	92.4	92.6	92.8	93.0	92.6	92.4	92.4	93.0	93.1	91.4
40	93.1	93.3	93.6	93.8	93.4	93.2	93.2	92.3	92.4	90.7
35	93.6	94.0	94.3	94.5	94.3	94.0	94.0	93.0	92.4	90.8
30	92.9	94.8	95.0	95.2	95.1	94.8	94.7	93.9	93.3	91.8
25	92.2	94.8	95.7	95.9	95.9	95.5	95.4	94.7	94.1	92.8
20	91.4	94.0	96.5	96.7	96.6	96.2	96.1	95.4	94.9	93.7
15	90.6	93.2	95.9	97.5	97.4	96.9	96.7	96.2	95.7	94.6
10	89.9	92.5	95.1	97.8	98.3	97.7	97.4	96.9	96.5	95.6
5	89.1	91.7	94.3	97.0	99.2	98.6	98.1	97.7	97.3	96.5
0	88.3	90.9	93.5	96.2	98.6	99.6	99.1	98.5	98.2	97.5
-5	87.6	90.1	92.7	95.4	97.8	99.6	100.0	99.2	99.0	98.4
-10	86.8	89.3	91.9	94.6	97.1	98.8	100.3	100.2	99.8	99.4
-15	86.0	88.5	91.0	93.8	96.3	98.0	99.6	101.1	100.8	100.4
-20	85.2	87.6	90.2	93.0	95.5	97.2	98.7	100.8	101.3	101.0
-25	84.3	86.8	89.4	92.2	94.7	96.4	97.9	100.0	100.5	100.1
-30	83.5	86.0	88.5	91.3	93.9	95.6	97.1	99.1	99.6	99.3
-35	82.7	85.1	87.7	90.5	93.1	94.8	96.3	98.3	98.8	98.4
-40	81.8	84.3	86.8	89.6	92.3	93.9	95.4	97.4	97.9	97.6

%N1 Adjustments for Engine Bleeds

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

***Dual bleed sources**

Go-around %N1

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 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

Intentionally
Blank

ADVISORY INFORMATION

Normal Configuration Landing Distances

Flaps 15

BRAKING CONFIGURATION	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	
	65000 KG LANDING WEIGHT	PER 5000 KG ABOVE/ BELOW 65000 KG	PER 1000 FT STD/ HIGH*	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 5 KTS ABOVE VREF15	ONE REV	NO REV

Dry Runway

MAX MANUAL	1010	70/-60	25/30	-35	125	15	-10	25	-25	35	25	50
MAX AUTO	1300	65/-75	30/40	-45	155	0	0	30	-30	60	0	5
AUTOBRAKE 3	1870	105/-120	50/65	-80	260	0	0	55	-55	100	0	0
AUTOBRAKE 2	2385	155/-170	75/95	-105	360	30	-45	70	-70	100	70	70
AUTOBRAKE 1	2640	185/-200	90/115	-125	425	70	-85	80	-80	95	240	335

Good Reported Braking Action

MAX MANUAL	1395	80/-85	40/50	-60	210	35	-30	35	-35	50	75	175
MAX AUTO	1485	85/-90	40/55	-65	215	30	-25	35	-40	55	85	190
AUTOBRAKE 3	1870	105/-120	50/65	-80	265	5	0	55	-55	100	5	15
AUTOBRAKE 2	2385	155/-170	75/95	-105	360	30	-45	70	-70	100	70	70
AUTOBRAKE 1	2640	185/-200	90/115	-125	425	70	-85	80	-80	95	240	335

Medium Reported Braking Action

MAX MANUAL	1930	125/-130	60/80	-95	345	90	-70	55	-55	65	215	520
MAX AUTO	1965	130/-135	60/85	-100	350	85	-65	55	-55	75	215	520
AUTOBRAKE 3	2065	130/-140	60/85	-100	360	65	-45	60	-60	100	150	450
AUTOBRAKE 2	2440	160/-175	75/100	-115	405	65	-65	70	-75	100	115	250
AUTOBRAKE 1	2655	185/-200	90/120	-130	440	90	-90	80	-80	95	255	395

Poor Reported Braking Action

MAX MANUAL	2545	180/-185	85/120	-145	550	215	-140	70	-75	80	465	1245
MAX AUTO	2545	185/-185	90/120	-145	550	220	-145	70	-75	80	465	1245
AUTOBRAKE 3	2560	185/-185	90/120	-145	550	210	-130	70	-75	95	465	1255
AUTOBRAKE 2	2730	190/-200	90/125	-155	565	200	-130	75	-80	100	375	1090
AUTOBRAKE 1	2855	205/-215	100/135	-160	585	205	-145	80	-85	95	440	1080

Reference distance is for sea level, standard day, no wind or slope, VREF15 approach speed and two engine detent reverse thrust.
For max manual braking and manual speed brakes, increase reference landing distance by 60 m.
For autobrake and manual speed brakes, increase reference landing distance by 50 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

	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	65000 KG LANDING WEIGHT	PER 5000 KG ABOVE/ BELOW 65000 KG	PER 1000 FT STD/ HIGH*	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 5 KTS ABOVE VREF30	ONE REV	NO REV

Dry Runway

BRAKING CONFIGURATION	REF DIST	WT ADJ	ALT ADJ	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	APP SPD ADJ	ONE REV	NO REV
MAX MANUAL	960	55/-55	20/30	-35	120	10	-10	20	-20	35	20	40
MAX AUTO	1215	60/-65	30/35	-45	150	0	0	30	-30	55	0	5
AUTOBRAKE 3	1725	95/-110	45/60	-75	250	0	0	50	-50	95	0	0
AUTOBRAKE 2	2190	140/-150	65/90	-100	345	30	-40	65	-65	95	60	60
AUTOBRAKE 1	2415	165/-180	80/105	-120	405	65	-75	70	-70	85	195	290

Good Reported Braking Action

BRAKING CONFIGURATION	REF DIST	WT ADJ	ALT ADJ	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	APP SPD ADJ	ONE REV	NO REV
MAX MANUAL	1330	75/-80	35/45	-60	205	35	-30	35	-35	50	70	155
MAX AUTO	1415	80/-85	40/50	-60	210	30	-25	35	-35	60	75	170
AUTOBRAKE 3	1725	95/-110	45/60	-75	250	5	0	50	-50	95	5	15
AUTOBRAKE 2	2190	140/-150	65/90	-100	345	30	-40	65	-65	95	60	60
AUTOBRAKE 1	2415	165/-180	80/105	-120	405	65	-75	70	-70	85	195	290

Medium Reported Braking Action

BRAKING CONFIGURATION	REF DIST	WT ADJ	ALT ADJ	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	APP SPD ADJ	ONE REV	NO REV
MAX MANUAL	1815	115/-120	55/75	-95	335	85	-65	50	-50	65	190	450
MAX AUTO	1850	120/-125	55/75	-95	340	80	-60	50	-50	75	190	455
AUTOBRAKE 3	1925	120/-125	55/75	-95	345	65	-45	55	-55	95	140	410
AUTOBRAKE 2	2245	140/-155	70/90	-110	390	65	-60	65	-65	95	105	225
AUTOBRAKE 1	2430	165/-180	80/105	-120	420	85	-80	70	-75	85	210	350

Poor Reported Braking Action

BRAKING CONFIGURATION	REF DIST	WT ADJ	ALT ADJ	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	APP SPD ADJ	ONE REV	NO REV
MAX MANUAL	2365	165/-170	80/110	-140	530	205	-135	65	-70	75	400	1045
MAX AUTO	2370	165/-170	80/110	-140	530	205	-135	65	-70	80	400	1050
AUTOBRAKE 3	2385	170/-170	80/110	-140	535	200	-125	65	-70	85	400	1055
AUTOBRAKE 2	2525	175/-180	85/115	-145	550	190	-125	70	-75	90	335	925
AUTOBRAKE 1	2630	185/-190	85/120	-150	565	195	-135	75	-80	85	380	930

Reference distance is for sea level, standard day, no wind or slope, VREF30 approach speed and two engine detent reverse thrust.
For max manual braking and manual speed brakes, increase reference landing distance by 60 m.
For autobrake and manual speed brakes, increase reference landing distance by 50 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

	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	65000 KG LANDING WEIGHT	PER 5000 KG ABOVE/ BELOW 65000 KG	PER 1000 FT STD/ HIGH*	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 5 KTS ABOVE VREF40	ONE REV	NO REV

Dry Runway

MAX MANUAL	915	55/-50	20/25	-35	115	10	-10	20	-20	35	15	35
MAX AUTO	1135	55/-60	25/35	-40	140	0	0	25	-25	55	0	0
AUTOBRAKE 3	1590	85/-100	40/55	-70	235	0	0	45	-45	90	0	0
AUTOBRAKE 2	2030	125/-140	60/80	-95	330	20	-35	60	-60	95	35	35
AUTOBRAKE 1	2260	150/-165	75/95	-115	390	55	-65	65	-65	85	155	220

Good Reported Braking Action

MAX MANUAL	1270	70/-75	35/45	-55	200	35	-30	30	-30	50	65	140
MAX AUTO	1350	75/-80	35/45	-60	205	30	-25	35	-35	60	70	150
AUTOBRAKE 3	1600	85/-100	40/55	-70	240	10	-5	45	-45	95	5	15
AUTOBRAKE 2	2030	125/-140	60/80	-95	330	20	-35	60	-60	95	35	35
AUTOBRAKE 1	2260	150/-165	75/95	-115	390	55	-65	65	-65	85	155	220

Medium Reported Braking Action

MAX MANUAL	1730	105/-115	50/70	-90	330	85	-65	45	-45	65	170	405
MAX AUTO	1750	110/-120	55/70	-90	335	75	-60	45	-50	75	170	405
AUTOBRAKE 3	1800	110/-120	55/70	-95	340	70	-45	50	-50	90	150	390
AUTOBRAKE 2	2090	130/-145	60/85	-105	375	55	-55	60	-60	95	75	190
AUTOBRAKE 1	2275	150/-165	75/95	-115	405	80	-75	65	-65	85	170	275

Poor Reported Braking Action

MAX MANUAL	2245	155/-160	75/100	-140	520	200	-130	60	-65	75	360	930
MAX AUTO	2250	155/-160	75/105	-140	520	200	-130	60	-65	75	360	930
AUTOBRAKE 3	2260	155/-165	75/105	-140	525	195	-125	60	-65	85	360	935
AUTOBRAKE 2	2370	160/-165	75/105	-140	535	185	-120	65	-70	90	290	830
AUTOBRAKE 1	2470	170/-180	80/110	-145	550	190	-130	70	-75	85	335	815

Reference distance is for sea level, standard day, no wind or slope, VREF40 approach speed and two engine detent reverse thrust.
For max manual braking and manual speed brakes, increase reference landing distance by 55 m.
For autobrake and manual speed brakes, increase reference landing distance by 45 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 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	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 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	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: 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	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 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	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 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
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 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	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: 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	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
80	0	15.1	17.0	19.3	22.4	25.3	28.9	30.9	35.0	40.2	40.4	45.9	53.0	50.8	57.9	67.3	60.8	69.6	81.2
	10	15.6	17.6	20.0	23.1	26.1	29.8	31.9	36.2	41.5	41.8	47.5	54.8	52.5	59.9	69.5	62.8	71.9	83.9
	15	15.8	17.8	20.2	23.5	26.5	30.3	32.4	36.7	42.1	42.4	48.2	55.6	53.3	60.7	70.5	63.7	72.9	85.1
	20	16.0	18.1	20.5	23.8	26.9	30.7	32.8	37.2	42.7	42.9	48.8	56.3	54.0	61.5	71.4	64.6	73.9	86.2
	30	16.4	18.5	21.1	24.4	27.6	31.5	33.7	38.2	43.8	44.0	50.0	57.7	55.3	63.1	73.2	66.2	75.7	88.4
	40	16.6	18.7	21.3	24.7	27.9	31.9	34.1	38.7	44.4	44.7	50.9	58.8	56.3	64.3	74.8	67.5	77.4	90.5
	50	16.6	18.7	21.3	24.8	28.0	32.1	34.3	39.0	44.9	45.2	51.5	59.7	57.1	65.4	76.3	68.7	79.0	92.9
70	0	13.7	15.4	17.5	20.2	22.8	26.0	27.7	31.3	35.9	36.1	41.0	47.2	45.3	51.6	59.7	54.9	62.7	72.9
	10	14.2	15.9	18.1	20.8	23.5	26.8	28.6	32.4	37.1	37.3	42.3	48.7	46.8	53.3	61.6	56.7	64.8	75.4
	15	14.4	16.2	18.4	21.1	23.9	27.2	29.0	32.8	37.6	37.8	43.0	49.4	47.5	54.0	62.5	57.5	65.7	76.4
	20	14.6	16.4	18.6	21.4	24.2	27.6	29.4	33.3	38.1	38.4	43.5	50.1	48.1	54.8	63.4	58.3	66.5	77.4
	30	14.9	16.8	19.1	22.0	24.8	28.3	30.2	34.1	39.1	39.3	44.6	51.4	49.3	56.1	64.9	59.8	68.2	79.4
	40	15.1	17.0	19.3	22.2	25.1	28.6	30.5	34.6	39.6	39.9	45.3	52.2	50.1	57.1	66.2	60.9	69.6	81.2
	50	15.1	17.0	19.3	22.3	25.2	28.8	30.7	34.8	40.0	40.2	45.8	52.9	50.7	58.0	67.4	61.8	70.9	83.0
60	0	12.3	13.9	15.7	18.0	20.3	23.1	24.4	27.6	31.6	31.7	35.9	41.2	39.6	45.0	51.8	48.1	54.8	63.5
	10	12.7	14.3	16.3	18.5	20.9	23.8	25.2	28.5	32.6	32.7	37.1	42.6	40.9	46.5	53.6	49.7	56.6	65.6
	15	12.9	14.6	16.5	18.8	21.2	24.2	25.6	29.0	33.1	33.2	37.6	43.2	41.5	47.1	54.4	50.4	57.4	66.5
	20	13.1	14.8	16.7	19.1	21.5	24.5	26.0	29.4	33.5	33.6	38.1	43.8	42.0	47.8	55.1	51.1	58.2	67.4
	30	13.4	15.1	17.2	19.6	22.1	25.1	26.6	30.1	34.4	34.5	39.1	44.9	43.1	49.0	56.5	52.3	59.6	69.1
	40	13.6	15.3	17.3	19.8	22.3	25.4	26.9	30.5	34.9	35.0	39.7	45.6	43.8	49.8	57.5	53.2	60.7	70.5
	50	13.5	15.3	17.3	19.8	22.4	25.5	27.0	30.6	35.1	35.2	40.0	46.0	44.2	50.4	58.3	53.9	61.7	71.9
50	0	11.0	12.3	14.0	15.7	17.7	20.2	21.2	23.9	27.3	27.2	30.8	35.3	33.8	38.3	44.1	40.9	46.4	53.6
	10	11.3	12.7	14.4	16.3	18.3	20.8	21.9	24.7	28.2	28.1	31.8	36.5	34.9	39.6	45.5	42.2	48.0	55.4
	15	11.5	12.9	14.7	16.5	18.6	21.1	22.2	25.1	28.6	28.6	32.3	37.0	35.4	40.2	46.2	42.8	48.7	56.2
	20	11.6	13.1	14.9	16.7	18.9	21.4	22.5	25.4	29.0	28.9	32.8	37.5	35.9	40.7	46.8	43.4	49.3	56.9
	30	11.9	13.4	15.2	17.2	19.3	22.0	23.1	26.1	29.7	29.7	33.6	38.4	36.8	41.8	48.0	44.5	50.6	58.4
	40	12.1	13.6	15.4	17.3	19.5	22.2	23.4	26.4	30.1	30.1	34.0	39.0	37.4	42.4	48.8	45.2	51.4	59.4
	50	12.0	13.6	15.4	17.3	19.6	22.3	23.4	26.5	30.3	30.2	34.2	39.3	37.6	42.8	49.3	45.7	52.1	60.3
40	0	9.6	10.8	12.3	13.5	15.2	17.3	17.9	20.2	23.0	22.8	25.8	29.4	28.1	31.8	36.4	33.7	38.2	43.9
	10	10.0	11.2	12.7	14.0	15.8	17.9	18.5	20.9	23.8	23.6	26.6	30.4	29.0	32.8	37.6	34.8	39.5	45.4
	15	10.1	11.4	12.9	14.2	16.0	18.1	18.8	21.2	24.1	23.9	27.0	30.8	29.4	33.3	38.2	35.3	40.0	46.0
	20	10.2	11.5	13.1	14.4	16.2	18.4	19.1	21.5	24.5	24.2	27.4	31.3	29.8	33.8	38.7	35.8	40.6	46.6
	30	10.5	11.8	13.4	14.8	16.6	18.9	19.6	22.1	25.1	24.9	28.1	32.1	30.6	34.6	39.7	36.7	41.6	47.8
	40	10.6	11.9	13.5	14.9	16.8	19.1	19.8	22.3	25.4	25.2	28.4	32.5	31.0	35.1	40.2	37.2	42.2	48.6
	50	10.6	11.9	13.5	14.9	16.8	19.1	19.8	22.3	25.5	25.2	28.6	32.7	31.1	35.3	40.6	37.5	42.6	49.1

***To correct for wind, enter table with the brakes on speed minus one half the headwind or plus 1.5 times the tailwind. If ground speed is used for brakes on speed, ignore wind and enter table with sea level, 15°C.**

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	29.4	30 TO 41	41 & ABOVE
	BRAKE TEMPERATURE MONITOR SYSTEM INDICATION ON CDS								
	UP TO 2.5	2.6	3	3.3	3.8	4.5	4.9	5.0 TO 7.1	7.1 & ABOVE
INFLIGHT GEAR DOWN	NO SPECIAL PROCEDURE REQUIRED	1	4	5	6	7	7.6	CAUTION	FUSE PLUG MELT ZONE
GROUND		6.7	16.0	24.1	34.2	45.9	53.3		

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

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

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

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

Intentionally
Blank

ENGINE INOP

Initial Max Continuous %N1

Based on .79M, A/C high and anti-ice off

TAT (°C)	PRESSURE ALTITUDE (1000 FT)								
	25	27	29	31	33	35	37	39	41
20	96.8	96.6	96.3	96.1	95.9	95.4	95.0	94.7	93.9
15	97.4	97.2	96.9	96.8	96.6	96.2	95.7	95.5	94.8
10	98.0	97.8	97.5	97.4	97.4	96.9	96.5	96.3	95.7
5	98.3	98.6	98.3	98.1	98.1	97.7	97.3	97.1	96.6
0	97.5	98.7	99.2	99.0	98.9	98.5	98.2	98.0	97.5
-5	96.7	98.0	99.1	99.8	99.7	99.3	98.9	98.7	98.4
-10	96.0	97.2	98.4	99.6	100.5	100.2	99.8	99.6	99.4
-15	95.2	96.4	97.6	98.8	100.1	101.0	100.8	100.6	100.3
-20	94.4	95.6	96.8	98.0	99.3	100.5	101.1	100.8	100.6
-25	93.6	94.9	96.0	97.2	98.5	99.7	100.2	100.0	99.8
-30	92.8	94.1	95.2	96.4	97.7	98.8	99.4	99.2	99.0
-35	92.0	93.2	94.4	95.6	96.8	98.0	98.5	98.3	98.1
-40	91.2	92.4	93.5	94.7	96.0	97.1	97.6	97.4	97.2

%N1 Adjustments for Engine Bleeds

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

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)					GROUND DISTANCE (NM)	AIR DISTANCE (NM) TAILWIND COMPONENT (KTS)				
100	80	60	40	20		20	40	60	80	100
298	272	249	230	214	200	190	180	172	164	158
600	547	501	462	429	400	379	361	344	328	315
903	823	753	694	644	600	570	542	517	494	473
1209	1100	1005	926	859	800	759	721	687	657	630
1516	1379	1259	1159	1075	1000	949	902	859	820	786
1825	1659	1513	1393	1290	1200	1139	1082	1031	984	943
2137	1940	1768	1626	1506	1400	1328	1262	1202	1147	1099
2450	2222	2024	1860	1722	1600	1518	1442	1373	1311	1256
2766	2507	2281	2095	1938	1800	1707	1622	1544	1474	1412
3083	2792	2539	2331	2155	2000	1896	1801	1715	1637	1568

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT) 10		14		18		22		26	
	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)
200	1.4	0:43	1.2	0:41	1.1	0:39	1.0	0:38	0.9	0:37
400	2.8	1:23	2.6	1:19	2.4	1:14	2.2	1:11	2.1	1:09
600	4.3	2:04	3.9	1:57	3.6	1:50	3.4	1:45	3.2	1:42
800	5.7	2:46	5.2	2:36	4.9	2:26	4.5	2:19	4.4	2:14
1000	7.1	3:28	6.6	3:15	6.1	3:03	5.7	2:53	5.5	2:47
1200	8.5	4:10	7.9	3:55	7.3	3:40	6.8	3:28	6.6	3:21
1400	9.8	4:53	9.1	4:36	8.5	4:18	8.0	4:02	7.7	3:54
1600	11.2	5:36	10.4	5:16	9.7	4:55	9.1	4:38	8.7	4:28
1800	12.5	6:20	11.7	5:58	10.9	5:34	10.2	5:13	9.8	5:02
2000	13.9	7:05	12.9	6:39	12.0	6:13	11.3	5:49	10.8	5:36

Fuel Required Adjustments (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG) 40	45	50	55	60	65	70	75	80
1	-0.1	-0.1	-0.1	0.0	0.0	0.1	0.1	0.2	0.3
2	-0.3	-0.2	-0.1	-0.1	0.0	0.2	0.3	0.6	0.8
3	-0.4	-0.3	-0.2	-0.1	0.0	0.3	0.5	0.9	1.2
4	-0.6	-0.4	-0.3	-0.1	0.0	0.3	0.7	1.2	1.6
5	-0.7	-0.5	-0.4	-0.2	0.0	0.4	0.9	1.4	2.0
6	-0.8	-0.6	-0.4	-0.2	0.0	0.5	1.1	1.7	2.4
7	-1.0	-0.8	-0.5	-0.3	0.0	0.6	1.2	2.0	2.8
8	-1.1	-0.9	-0.6	-0.3	0.0	0.6	1.4	2.2	3.2
9	-1.3	-1.0	-0.7	-0.3	0.0	0.7	1.5	2.4	3.5
10	-1.4	-1.1	-0.7	-0.4	0.0	0.7	1.6	2.6	3.8
11	-1.6	-1.2	-0.8	-0.4	0.0	0.8	1.7	2.8	4.1
12	-1.7	-1.3	-0.9	-0.4	0.0	0.8	1.9	3.0	4.4
13	-1.9	-1.4	-0.9	-0.5	0.0	0.9	2.0	3.2	4.7
14	-2.0	-1.5	-1.0	-0.5	0.0	0.9	2.0	3.4	4.9

Includes APU fuel burn.

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.

ENGINE INOP

ADVISORY INFORMATION

Gear Down Landing Rate of Climb Available

Flaps 15

TAT (°C)	RATE OF CLIMB (FT/MIN)					
	PRESSURE ALTITUDE (FT)					
	-2000	0	2000	4000	6000	8000
52	-80	-140				
50	-50	-110	-220			
48	-20	-90	-190			
46	10	-60	-160	-270		
44	40	-30	-140	-250		
42	70	0	-110	-220	-340	
40	100	30	-80	-190	-310	
38	120	60	-50	-160	-290	-430
36	140	90	-30	-140	-260	-400
34	140	120	0	-120	-240	-380
32	140	130	20	-100	-220	-360
30	140	130	40	-80	-210	-340
20	150	140	60	-50	-160	-280
10	170	150	60	-50	-160	-280
0	170	160	70	-50	-160	-280
-20	190	170	80	-40	-160	-280
-40	200	180	80	-40	-170	-290

Rate of climb capability shown is valid for 60000 kg, gear down at VREF15+5.
Decrease rate of climb 120 ft/min per 10000 lb greater than 60000 kg.
Increase rate of climb 180 ft/min per 5000 less than 60000 kg.

Flaps 30

TAT (°C)	RATE OF CLIMB (FT/MIN)					
	PRESSURE ALTITUDE (FT)					
	-2000	0	2000	4000	6000	8000
52	-260	-320				
50	-230	-300	-400			
48	-200	-270	-380			
46	-180	-250	-350	-460		
44	-150	-220	-330	-430		
42	-120	-190	-300	-410	-530	
40	-100	-170	-280	-390	-500	
38	-70	-140	-250	-360	-480	-620
36	-60	-110	-220	-340	-460	-600
34	-50	-80	-200	-320	-440	-570
32	-50	-70	-180	-300	-420	-550
30	-50	-60	-160	-280	-410	-540
20	-40	-60	-150	-260	-370	-490
10	-40	-50	-140	-260	-370	-480
0	-30	-50	-140	-260	-370	-490
-20	-30	-40	-140	-260	-380	-500
-40	-20	-40	-140	-270	-400	-520

Rate of climb capability shown is valid for 60000 kg, gear down at VREF30+5.
Decrease rate of climb 130 ft/min per 5000 kg greater than 60000 kg.
Increase rate of climb 160 ft/min per 5000 kg less than 60000 kg.

GEAR DOWN

Long Range Cruise Altitude Capability

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

WEIGHT (1000 KG)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
85	15600	12500	9400
80	18400	15500	12600
75	21100	18500	15700
70	23600	21400	18600
65	26100	24400	21800
60	28600	27100	25300
55	30800	29600	28100
50	32900	31900	30700
45	35100	34100	33000
40	37500	36500	35400

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
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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 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.

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Performance Inflight - QRH — Chapter PI-QRH
Text — Section 45

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/.78 climb speed schedule, normal engine bleed for packs on or off and anti-ice off. Enter the table with airport pressure altitude and TAT and read %N1. %N1 adjustments are shown for anti-ice operation.

Go-around %N1

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

VREF

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

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.79M to provide a target %N1 setting at the start of driftdown. Once driftdown is established, the Max Continuous %N1 table should be used to determine %N1 for the given conditions.

Max Continuous %N1

Power setting is based on one engine operating with one A/C pack operating and all anti-ice bleeds off. Enter the table with pressure altitude, 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 .78/280/250 descent. Enter with Air Distance as determined from the Ground to Air Miles Conversion table and read Fuel and Time required at the cruise pressure altitude. Adjust the fuel obtained for deviation from the reference weight at checkpoint as required by entering the off reference fuel adjustments table with the fuel required for the reference weight and the actual weight at checkpoint. Read fuel required and time for the actual weight.

Holding

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

Gear Down

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/MACH)									
	0	5000	10000	15000	20000	25000	30000	35000	37000	41000
	280	280	280	280	280	280	280	.78	.78	.78
60	90.2	90.5	90.4	90.6	90.4	92.1	93.8	95.1	95.2	93.5
55	91.0	91.2	91.3	91.4	90.8	91.5	93.1	94.4	94.5	92.8
50	91.7	92.0	92.1	92.2	91.7	91.5	92.4	93.7	93.8	92.1
45	92.4	92.6	92.8	93.0	92.6	92.4	92.4	93.0	93.1	91.4
40	93.1	93.3	93.6	93.8	93.4	93.2	93.2	92.3	92.4	90.7
35	93.6	94.0	94.3	94.5	94.3	94.0	94.0	93.0	92.4	90.8
30	92.9	94.8	95.0	95.2	95.1	94.8	94.7	93.9	93.3	91.8
25	92.2	94.8	95.7	95.9	95.9	95.5	95.4	94.7	94.1	92.8
20	91.4	94.0	96.5	96.7	96.6	96.2	96.1	95.4	94.9	93.7
15	90.6	93.2	95.9	97.5	97.4	96.9	96.7	96.2	95.7	94.6
10	89.9	92.5	95.1	97.8	98.3	97.7	97.4	96.9	96.5	95.6
5	89.1	91.7	94.3	97.0	99.2	98.6	98.1	97.7	97.3	96.5
0	88.3	90.9	93.5	96.2	98.6	99.6	99.1	98.5	98.2	97.5
-5	87.6	90.1	92.7	95.4	97.8	99.6	100.0	99.2	99.0	98.4
-10	86.8	89.3	91.9	94.6	97.1	98.8	100.3	100.2	99.8	99.4
-15	86.0	88.5	91.0	93.8	96.3	98.0	99.6	101.1	100.8	100.4
-20	85.2	87.6	90.2	93.0	95.5	97.2	98.7	100.8	101.3	101.0
-25	84.3	86.8	89.4	92.2	94.7	96.4	97.9	100.0	100.5	100.1
-30	83.5	86.0	88.5	91.3	93.9	95.6	97.1	99.1	99.6	99.3
-35	82.7	85.1	87.7	90.5	93.1	94.8	96.3	98.3	98.8	98.4
-40	81.8	84.3	86.8	89.6	92.3	93.9	95.4	97.4	97.9	97.6

%N1 Adjustments for Engine Bleeds

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

***Dual bleed sources**

Go-around %N1

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

BRAKING CONFIGURATION	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	
	145000 LB LANDING WEIGHT	PER 10000 LB ABOVE/ BELOW 145000 LB	PER 1000 FT STD/ HIGH*	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 5 KTS ABOVE VREF15	ONE REV	NO REV
Dry Runway												
MAX MANUAL	3340	210/-180	80/100	-120	410	40	-40	70	-70	120	70	160
MAX AUTO	4300	200/-220	100/130	-150	510	0	0	100	-100	200	0	10
AUTOBRAKE 3	6190	320/-360	170/220	-250	850	0	0	170	-170	330	0	0
AUTOBRAKE 2	7910	460/-510	250/320	-350	1180	90	-150	230	-230	330	240	240
AUTOBRAKE 1	8760	550/-590	300/380	-410	1390	230	-270	260	-260	310	790	1090
Good Reported Braking Action												
MAX MANUAL	4610	230/-250	120/160	-200	680	110	-100	120	-120	160	250	570
MAX AUTO	4910	250/-270	130/170	-210	710	100	-80	120	-120	190	280	620
AUTOBRAKE 3	6200	320/-360	170/220	-260	860	20	-10	170	-170	330	10	50
AUTOBRAKE 2	7910	460/-510	250/320	-350	1180	90	-150	230	-230	330	240	240
AUTOBRAKE 1	8760	550/-590	300/380	-410	1390	230	-270	260	-260	310	790	1090
Medium Reported Braking Action												
MAX MANUAL	6400	370/-390	200/270	-320	1140	290	-230	170	-180	210	700	1700
MAX AUTO	6510	380/-400	200/270	-320	1140	270	-210	180	-180	240	710	1710
AUTOBRAKE 3	6850	380/-410	200/280	-330	1180	210	-140	190	-200	330	490	1480
AUTOBRAKE 2	8090	470/-520	250/330	-380	1330	210	-210	230	-240	330	380	820
AUTOBRAKE 1	8800	560/-600	300/390	-420	1440	300	-290	260	-260	310	840	1300
Poor Reported Braking Action												
MAX MANUAL	8440	540/-550	290/390	-480	1800	710	-470	230	-250	260	1520	4090
MAX AUTO	8440	540/-550	290/400	-480	1800	720	-470	230	-250	270	1520	4090
AUTOBRAKE 3	8490	550/-560	290/400	-480	1800	690	-430	230	-250	310	1530	4110
AUTOBRAKE 2	9050	570/-590	300/410	-500	1860	650	-430	250	-270	320	1240	3570
AUTOBRAKE 1	9470	610/-640	320/440	-520	1920	670	-480	270	-280	310	1450	3550

Reference distance is for sea level, standard day, no wind or slope, VREF15 approach speed and two engine detent reverse thrust.
For max manual braking and manual speed brakes, increase reference landing distance by 200 ft.
For autobrake and manual speed brakes, 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

	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	145000 LB LANDING WEIGHT	PER 10000 LB ABOVE/ BELOW 145000 LB	PER 1000 FT STD/ HIGH*	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 5 KTS ABOVE VREF30	ONE REV	NO REV
Dry Runway												
MAX MANUAL	3180	170/-160	70/90	-120	400	40	-40	70	-70	120	70	140
MAX AUTO	4010	180/-200	90/120	-150	490	0	0	90	-90	190	0	10
AUTOBRAKE 3	5700	290/-330	150/200	-240	810	0	0	160	-160	310	0	0
AUTOBRAKE 2	7250	410/-450	220/290	-330	1120	90	-130	210	-210	300	200	200
AUTOBRAKE 1	8020	490/-530	260/340	-390	1330	210	-240	240	-240	290	640	950
Good Reported Braking Action												
MAX MANUAL	4390	220/-230	120/150	-190	670	110	-90	110	-110	160	230	510
MAX AUTO	4680	230/-250	120/160	-200	690	100	-90	120	-120	190	250	560
AUTOBRAKE 3	5720	290/-330	150/200	-240	830	20	-10	160	-160	310	10	50
AUTOBRAKE 2	7250	410/-450	220/290	-330	1120	90	-130	210	-210	300	200	200
AUTOBRAKE 1	8020	490/-530	260/340	-390	1330	210	-240	240	-240	290	640	950
Medium Reported Braking Action												
MAX MANUAL	6020	340/-360	180/250	-310	1110	280	-220	160	-160	210	620	1480
MAX AUTO	6130	350/-370	190/250	-310	1110	260	-200	160	-170	240	620	1490
AUTOBRAKE 3	6380	350/-380	190/250	-320	1140	210	-140	170	-180	310	460	1340
AUTOBRAKE 2	7440	420/-460	220/300	-360	1270	210	-200	210	-220	300	340	730
AUTOBRAKE 1	8060	490/-530	260/340	-400	1380	280	-270	240	-240	290	690	1140
Poor Reported Braking Action												
MAX MANUAL	7850	490/-500	260/360	-460	1740	670	-440	210	-230	250	1310	3430
MAX AUTO	7870	500/-500	260/360	-460	1750	680	-440	210	-230	260	1310	3440
AUTOBRAKE 3	7920	500/-510	260/360	-470	1750	650	-420	210	-230	290	1320	3460
AUTOBRAKE 2	8370	520/-530	270/370	-480	1800	620	-410	230	-250	300	1090	3030
AUTOBRAKE 1	8720	540/-570	290/390	-500	1850	640	-450	240	-260	280	1240	3050

Reference distance is for sea level, standard day, no wind or slope, VREF30 approach speed and two engine detent reverse thrust.
For max manual braking and manual speed brakes, increase reference landing distance by 190 ft.
For autobrake and manual speed brakes, increase reference landing distance by 160 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

BRAKING CONFIGURATION	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	
	145000 LB LANDING WEIGHT	PER 10000 LB ABOVE/ BELOW 145000 LB	PER 1000 FT STD/ HIGH*	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 5 KTS ABOVE VREF40	ONE REV	NO REV
Dry Runway												
MAX MANUAL	3040	160/-150	60/90	-110	380	40	-30	60	-60	120	60	120
MAX AUTO	3750	160/-180	80/110	-140	460	0	0	90	-90	180	0	10
AUTOBRAKE 3	5260	260/-300	140/180	-230	780	0	0	140	-140	300	0	0
AUTOBRAKE 2	6730	370/-420	200/260	-320	1080	60	-110	190	-190	310	110	110
AUTOBRAKE 1	7490	450/-490	240/310	-370	1280	180	-220	220	-220	280	520	720
Good Reported Braking Action												
MAX MANUAL	4200	200/-220	110/150	-190	660	110	-90	100	-100	170	210	460
MAX AUTO	4460	220/-240	120/150	-200	680	100	-80	110	-110	190	220	500
AUTOBRAKE 3	5290	260/-300	140/180	-230	790	30	-10	140	-140	310	10	50
AUTOBRAKE 2	6730	370/-420	200/260	-320	1080	60	-110	190	-190	310	110	110
AUTOBRAKE 1	7490	450/-490	240/310	-370	1280	180	-220	220	-220	280	520	720
Medium Reported Braking Action												
MAX MANUAL	5720	320/-340	170/230	-300	1080	270	-210	150	-160	210	560	1320
MAX AUTO	5810	330/-350	170/230	-300	1090	250	-200	150	-160	240	560	1320
AUTOBRAKE 3	5970	330/-360	170/240	-310	1110	230	-150	160	-170	300	490	1280
AUTOBRAKE 2	6930	380/-430	200/270	-350	1230	180	-180	190	-200	300	250	630
AUTOBRAKE 1	7540	450/-490	240/320	-380	1330	260	-240	220	-220	280	560	910
Poor Reported Braking Action												
MAX MANUAL	7440	460/-470	240/330	-450	1710	650	-420	200	-210	250	1180	3050
MAX AUTO	7470	460/-480	240/340	-450	1710	660	-430	200	-220	250	1180	3060
AUTOBRAKE 3	7500	470/-480	250/340	-450	1720	640	-410	200	-220	280	1190	3070
AUTOBRAKE 2	7860	480/-500	250/350	-470	1760	610	-390	210	-230	300	960	2730
AUTOBRAKE 1	8200	500/-540	260/360	-480	1800	620	-430	220	-240	280	1100	2670

Reference distance is for sea level, standard day, no wind or slope, VREF40 approach speed and two engine detent reverse thrust.
For max manual braking and manual speed brakes, increase reference landing distance by 180 ft.
For autobrake and manual speed brakes, increase reference landing distance by 150 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 DISTANCE AND ADJUSTMENT (FT)							
		REFERENCE DISTANCE	WT ADJ PER	ALT ADJ	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		APP SPD ADJ
LANDING CONFIGURATION	VREF	FOR 130000 LB LANDING WEIGHT	10000 LB ABOVE/ BELOW 130000 LB	PER 1000 FT STD/HIGH*	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	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 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		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	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 DISTANCE AND ADJUSTMENT (FT)							
LANDING CONFIGURATION	VREF	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 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	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	29.4	30 TO 41	41 & ABOVE
	BRAKE TEMPERATURE MONITOR SYSTEM INDICATION ON CDS								
	UP TO 2.5	2.6	3	3.3	3.8	4.5	4.9	5.0 TO 7.1	7.1 & ABOVE
INFLIGHT GEAR DOWN	NO SPECIAL PROCEDURE REQUIRED	1	4	5	6	7	7.6	CAUTION	FUSE PLUG MELT ZONE
GROUND		6.7	16.0	24.1	34.2	45.9	53.3		

Observe maximum quick turnaround limit.

Table shows energy per brake added by a single stop with all brakes operating. Energy is assumed to be equally distributed among the operating brakes. Total energy is the sum of residual energy plus energy added.

Add 1.0 million foot pounds per brake for each taxi mile.

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

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

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

Intentionally
Blank

ENGINE INOP

Initial Max Continuous %N1

Based on .79M, A/C high and anti-ice off

TAT (°C)	PRESSURE ALTITUDE (1000 FT)								
	25	27	29	31	33	35	37	39	41
20	96.8	96.6	96.3	96.1	95.9	95.4	95.0	94.7	93.9
15	97.4	97.2	96.9	96.8	96.6	96.2	95.7	95.5	94.8
10	98.0	97.8	97.5	97.4	97.4	96.9	96.5	96.3	95.7
5	98.3	98.6	98.3	98.1	98.1	97.7	97.3	97.1	96.6
0	97.5	98.7	99.2	99.0	98.9	98.5	98.2	98.0	97.5
-5	96.7	98.0	99.1	99.8	99.7	99.3	98.9	98.7	98.4
-10	96.0	97.2	98.4	99.6	100.5	100.2	99.8	99.6	99.4
-15	95.2	96.4	97.6	98.8	100.1	101.0	100.8	100.6	100.3
-20	94.4	95.6	96.8	98.0	99.3	100.5	101.1	100.8	100.6
-25	93.6	94.9	96.0	97.2	98.5	99.7	100.2	100.0	99.8
-30	92.8	94.1	95.2	96.4	97.7	98.8	99.4	99.2	99.0
-35	92.0	93.2	94.4	95.6	96.8	98.0	98.5	98.3	98.1
-40	91.2	92.4	93.5	94.7	96.0	97.1	97.6	97.4	97.2

%N1 Adjustments for Engine Bleeds

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

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)					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	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.

ENGINE INOP

ADVISORY INFORMATION

Gear Down Landing Rate of Climb Available

Flaps 15

TAT (°C)	RATE OF CLIMB (FT/MIN)					
	PRESSURE ALTITUDE (FT)					
	-2000	0	2000	4000	6000	8000
52	-50	-120				
50	-20	-90	-190			
48	10	-60	-160			
46	40	-30	-140	-240		
44	70	0	-110	-220		
42	90	20	-80	-190	-310	
40	120	50	-60	-170	-280	
38	150	80	-30	-140	-260	-400
36	160	110	0	-110	-240	-370
34	170	150	30	-90	-210	-350
32	170	160	50	-70	-190	-330
30	170	160	70	-60	-180	-310
20	180	170	80	-30	-140	-260
10	190	180	90	-20	-140	-250
0	200	190	100	-20	-140	-250
-20	210	200	100	-20	-140	-260
-40	230	210	110	-10	-140	-270

Rate of climb capability shown is valid for 130000 lb, gear down at VREF15+5.
Decrease rate of climb 120 ft/min per 10000 lb greater than 130000 lb.
Increase rate of climb 150 ft/min per 10000 lb less than 130000 lb.

Flaps 30

TAT (°C)	RATE OF CLIMB (FT/MIN)					
	PRESSURE ALTITUDE (FT)					
	-2000	0	2000	4000	6000	8000
52	-230	-300				
50	-200	-270	-380			
48	-180	-250	-350			
46	-150	-220	-330	-430		
44	-120	-190	-300	-410		
42	-100	-170	-280	-380	-500	
40	-70	-140	-250	-360	-480	
38	-50	-110	-220	-330	-450	-590
36	-30	-80	-190	-310	-430	-570
34	-30	-50	-170	-290	-410	-550
32	-30	-40	-150	-270	-390	-530
30	-20	-40	-130	-260	-380	-510
20	-20	-30	-120	-230	-340	-460
10	-10	-20	-120	-230	-340	-460
0	0	-20	-110	-230	-350	-460
-20	0	-20	-110	-230	-360	-480
-40	0	-20	-120	-240	-370	-490

Rate of climb capability shown is valid for 130000 lb, gear down at VREF30+5.
Decrease rate of climb 120 ft/min per 10000 lb greater than 130000 lb.
Increase rate of climb 150 ft/min per 10000 lb less than 130000 lb.

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

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.

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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/.78 climb speed schedule, normal engine bleed for packs on or off and anti-ice off. Enter the table with airport pressure altitude and TAT and read %N1. %N1 adjustments are shown for anti-ice operation.

Go-around %N1

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

VREF

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

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.79M to provide a target %N1 setting at the start of driftdown. Once driftdown is established, the Max Continuous %N1 table should be used to determine %N1 for the given conditions.

Max Continuous %N1

Power setting is based on one engine operating with one A/C pack operating and all anti-ice bleeds off. Enter the table with pressure altitude, 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 .78/280/250 descent. Enter with Air Distance as determined from the Ground to Air Miles Conversion table and read Fuel and Time required at the cruise pressure altitude. Adjust the fuel obtained for deviation from the reference weight at checkpoint as required by entering the off reference fuel adjustments table with the fuel required for the reference weight and the actual weight at checkpoint. Read fuel required and time for the actual weight.

Holding

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

Gear Down

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 or Stall Recovery

All recoveries from approach to stall should be done as if an actual stall has occurred.

Immediately do the following at the first indication of stall (buffet or stick shaker).

Note: Do not use flight director commands during the recovery.

Pilot Flying	Pilot Monitoring

• Initiate the recovery:
  • Hold the control column firmly.
  • Disconnect autopilot and autothrottle.
  • Smoothly apply nose down elevator to reduce the angle of attack until buffet or stick shaker stops. Nose down stabilizer trim may be needed.*
	• Monitor altitude and airspeed.
	• Verify all required actions have been done and call out any omissions.
	• Call out any trend toward terrain contact.

• Continue the recovery:
  • Roll in the shortest direction to wings level if needed.**
  • Advance thrust levers as needed.
  • Retract the speedbrakes.
  • Do not change gear or flap configuration, except
    • During liftoff, if flaps are up, call for flaps 1.
	• Monitor altitude and airspeed.
	• Verify all required actions have been done and call out any omissions.
	• Call out any trend toward terrain contact.
	• Set the FLAP lever as directed.

• Complete the recovery:
  • Check airspeed and adjust thrust as needed.
  • Establish pitch attitude.
  • Return to the desired flight path.
• Re-engage the autopilot and autothrottle if desired.
	• Monitor altitude and airspeed.
	• Verify all required actions have been done and call out any omissions.
	• Call out any trend toward terrain contact.

WARNING: *If the control column does not provide the needed response, stabilizer trim may be necessary. Excessive use of pitch trim may aggravate the condition, or may result in loss of control or in high structural loads.

WARNING: ** Excessive use of pitch trim or rudder may aggravate the condition, or may result in loss of control or in high structural loads.

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>

Ground Proximity Warning System (GPWS) Response

GPWS 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
- AIRSPEED LOW (airplanes with AIRSPEED LOW aural)
- CAUTION TERRAIN

YK691 - YQ296
- CAUTION OBSTACLE

Pilot Flying	Pilot Monitoring
Correct the flight path, airplane configuration, or airspeed.	

The below glideslope deviation alert may be cancelled or inhibited for:

- localizer or backcourse approach
- circling approach from an ILS
- when conditions require a deliberate approach below glideslope
- unreliable glideslope signal.

Note: If a terrain caution occurs when flying under daylight VMC, and positive visual verification is made that no obstacle or terrain hazard exists, the alert may be regarded as cautionary and the approach may be continued.

Note: Some aural alerts repeat.

GPWS Warning

Accomplish the following maneuver for any of these conditions:

- Activation of “PULL UP” or “TERRAIN TERRAIN PULL UP” warning.

YK691 - YQ296

- Activation of the “PULL UP” or “OBSTACLE OBSTACLE PULL UP” warning.
- Other situations resulting in unacceptable flight toward terrain.

Pilot Flying	Pilot Monitoring
Disconnect autopilot. Disconnect autothrottle. Aggressively apply maximum* thrust. Simultaneously roll wings level and rotate to an initial pitch attitude of 20°. Retract speedbrakes. If terrain remains a threat, continue rotation up to the pitch limit indicator (if available) or stick shaker or initial buffet.	Assure maximum* thrust. Verify all required actions have been completed and call out any omissions.
Do not change gear or flap configuration until terrain separation is assured. Monitor radio altimeter for sustained or increasing terrain separation. When clear of terrain, slowly decrease pitch attitude and accelerate.	Monitor vertical speed and altitude (radio altitude for terrain clearance and barometric altitude for a minimum safe altitude.) Call out any trend toward terrain contact.

Note: Aft control column force increases as the airspeed decreases. In all cases, the pitch attitude that results in intermittent stick shaker or initial buffet is the upper pitch attitude limit. Flight at intermittent stick shaker may be required to obtain a positive terrain separation. Smooth, steady control will avoid a pitch attitude overshoot and stall.

Note: Do not use flight director commands.

Note: *Maximum thrust can be obtained by advancing the thrust levers 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.

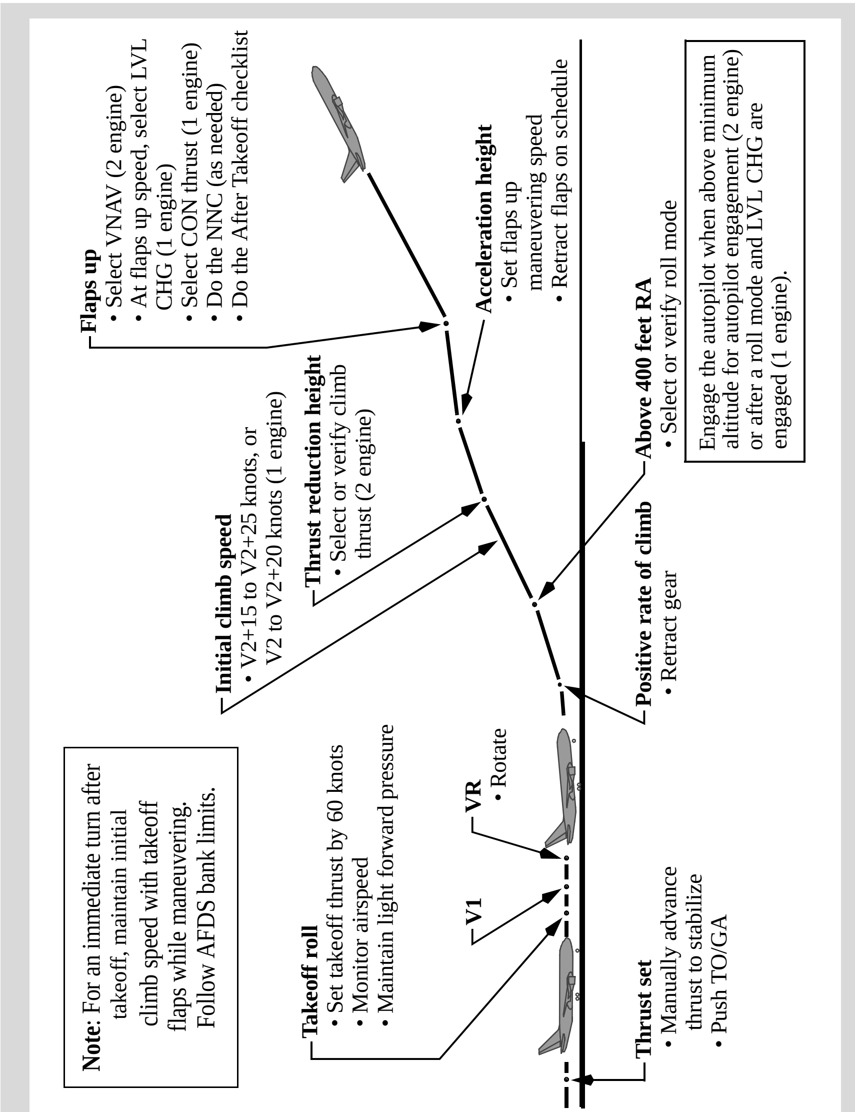
Note: Aft control column force increases as the airspeed decreases. In all cases, the pitch attitude that results in intermittent stick shaker or initial buffet is the upper pitch attitude limit. Flight at intermittent stick shaker may be required to obtain a positive terrain separation. Smooth, steady 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.

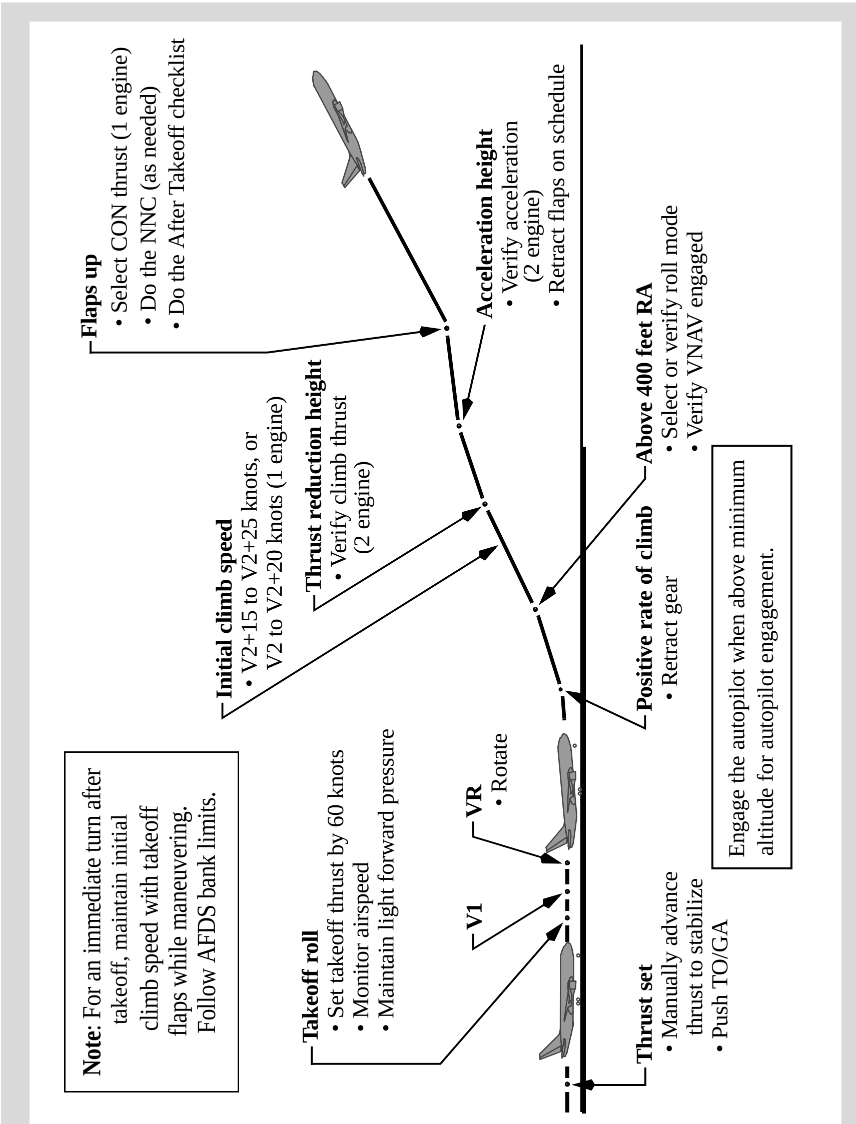
Note: ** If TO/GA is not available, disconnect autopilot and autothrottle and fly manually.

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.**

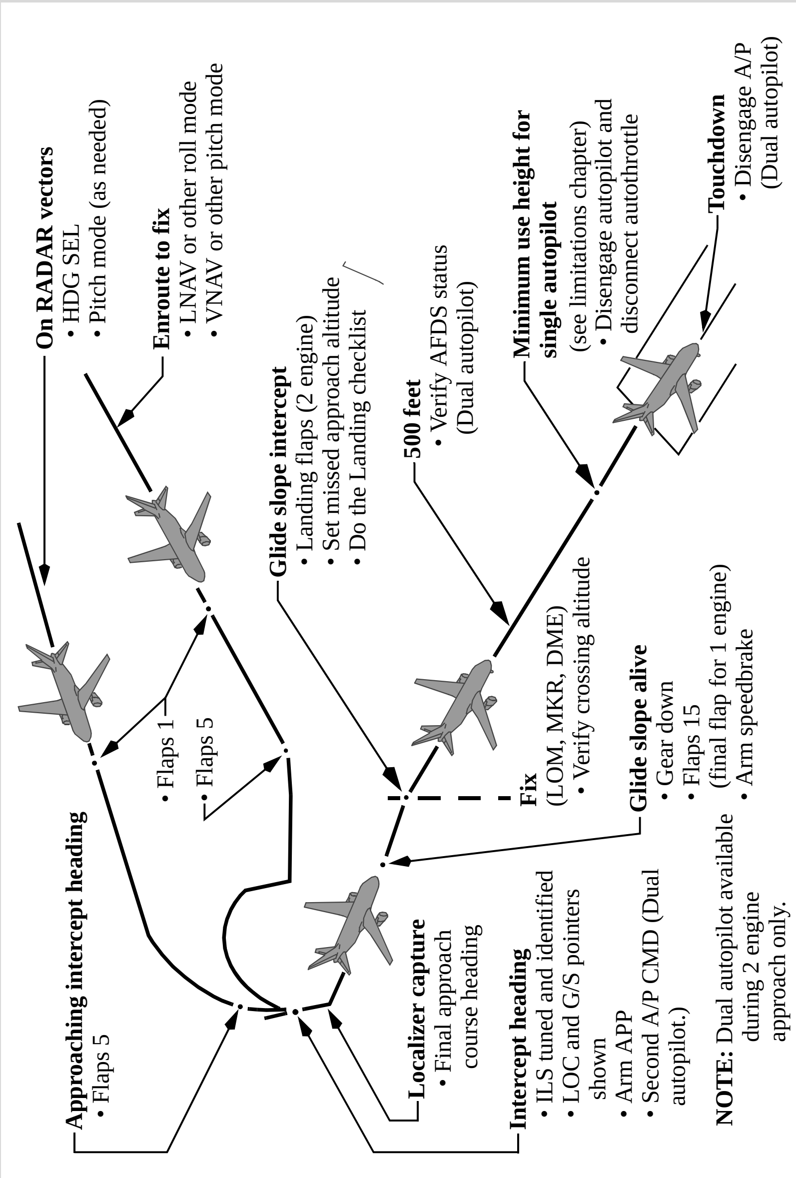
Takeoff
YJ813



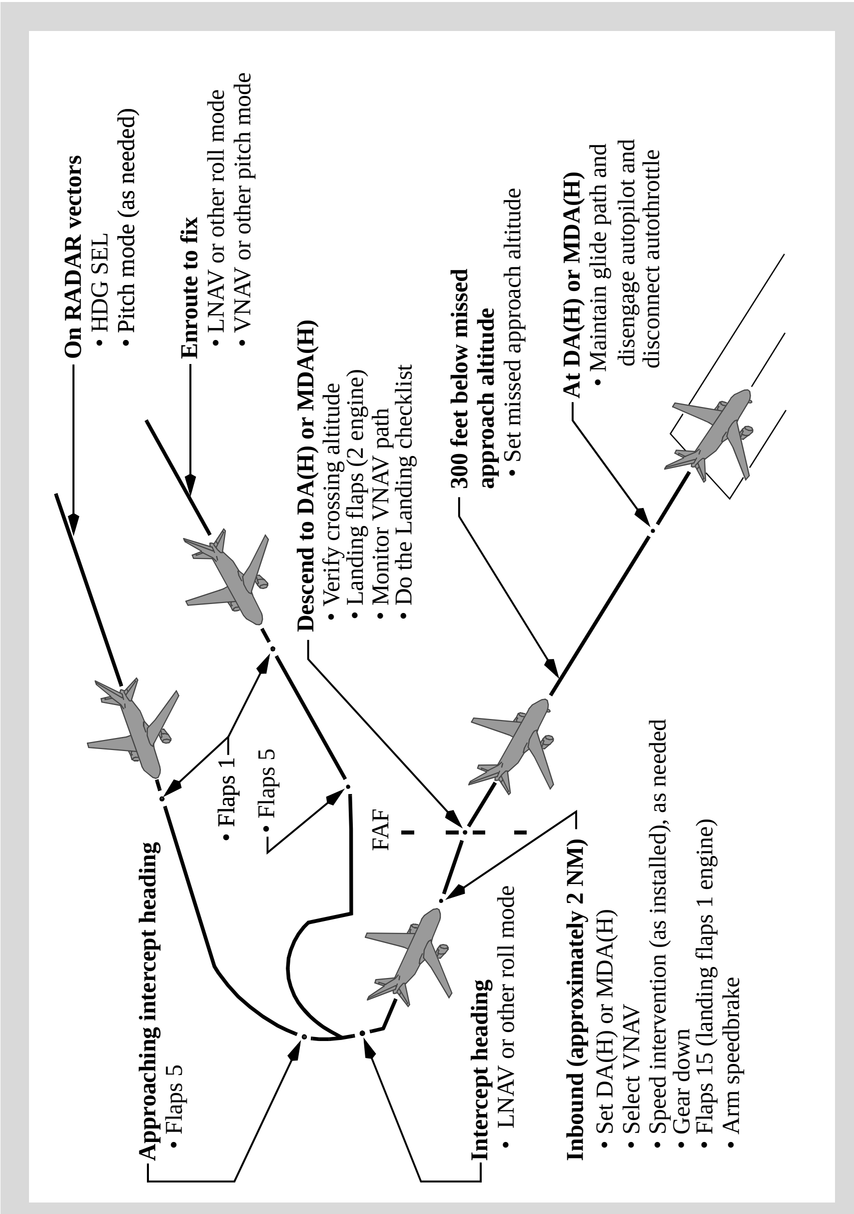
Takeoff
YD332, YD333, YJ816 - YQ296



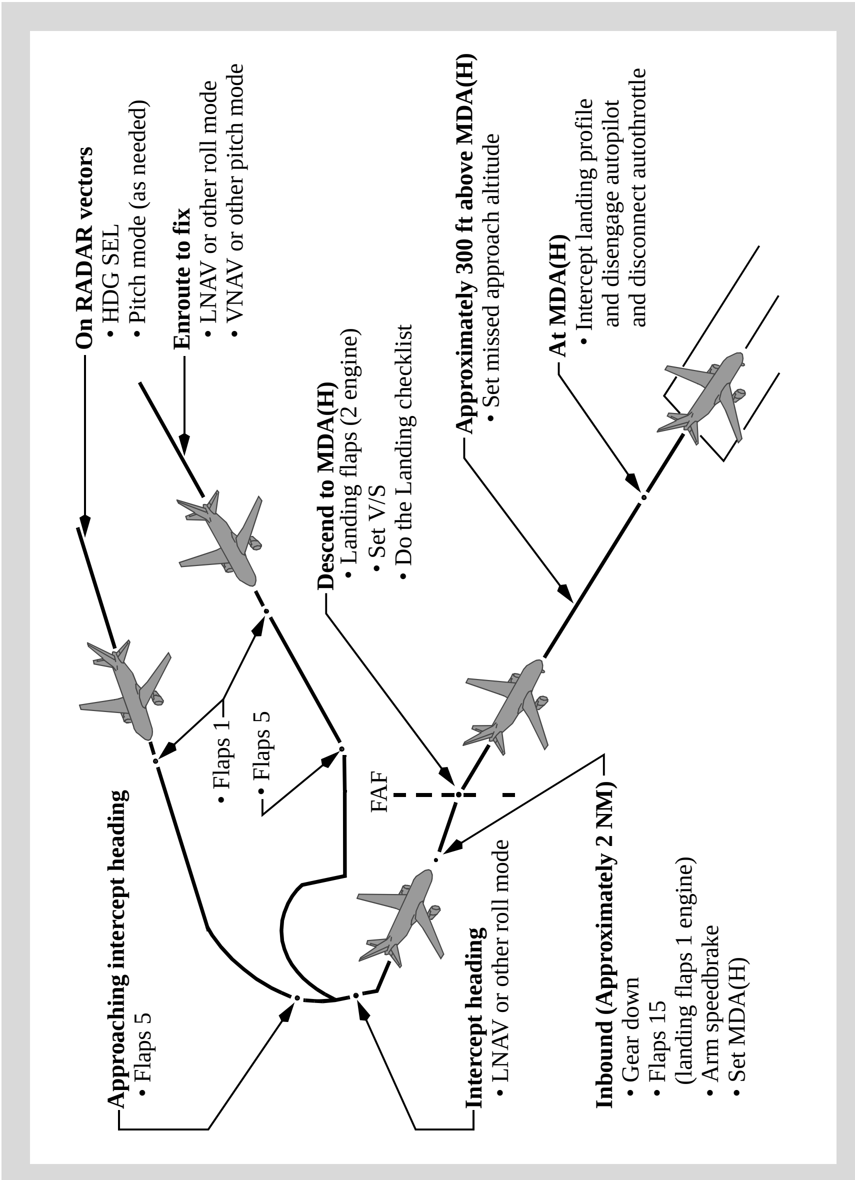
ILS Approach - Fail Passive



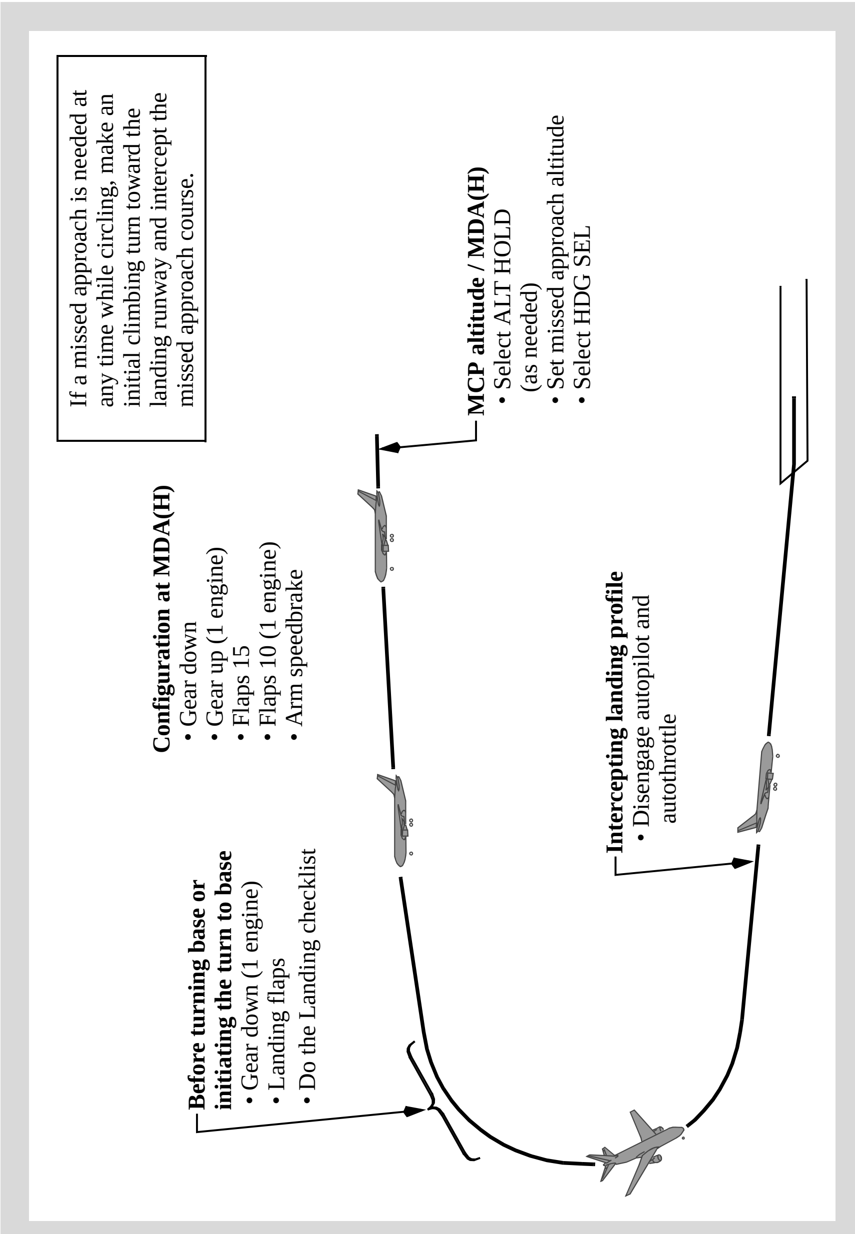
Instrument Approach Using VNAV



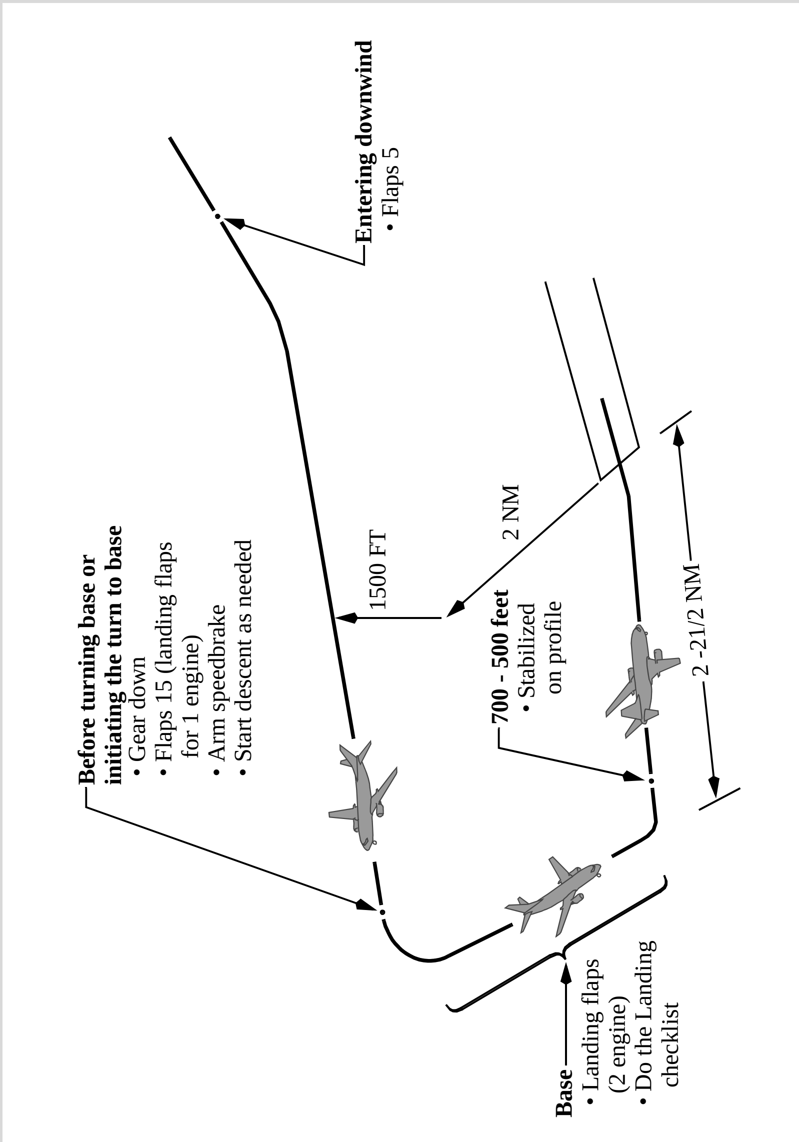
Instrument Approach Using V/S



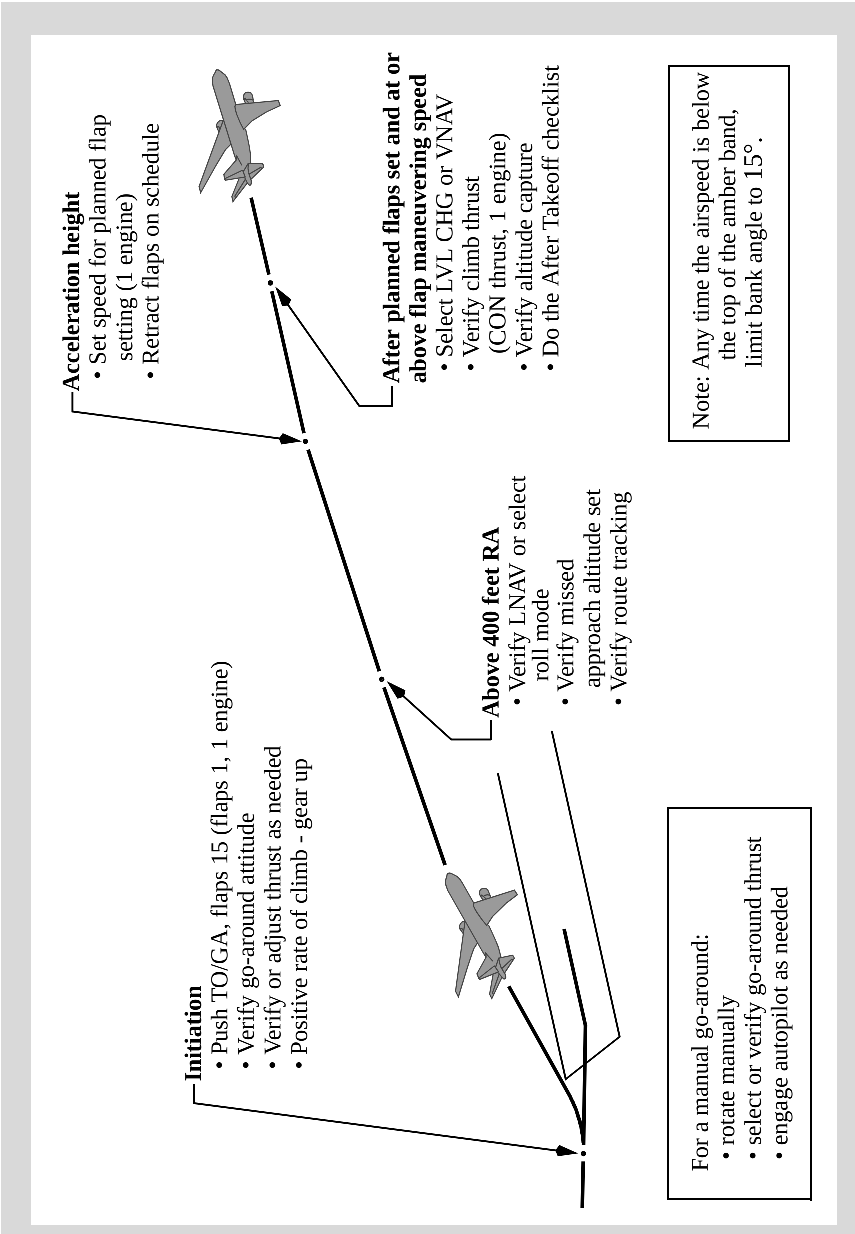
Circling Approach



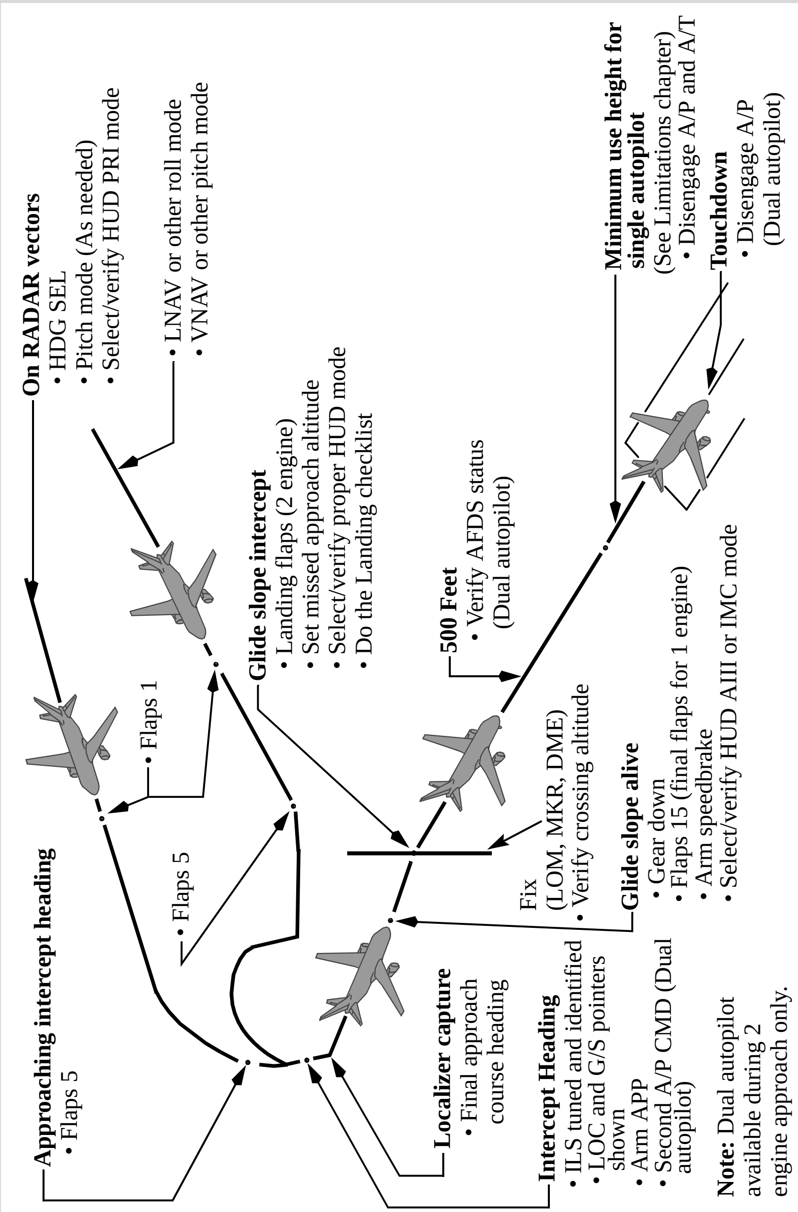
Visual Traffic Pattern



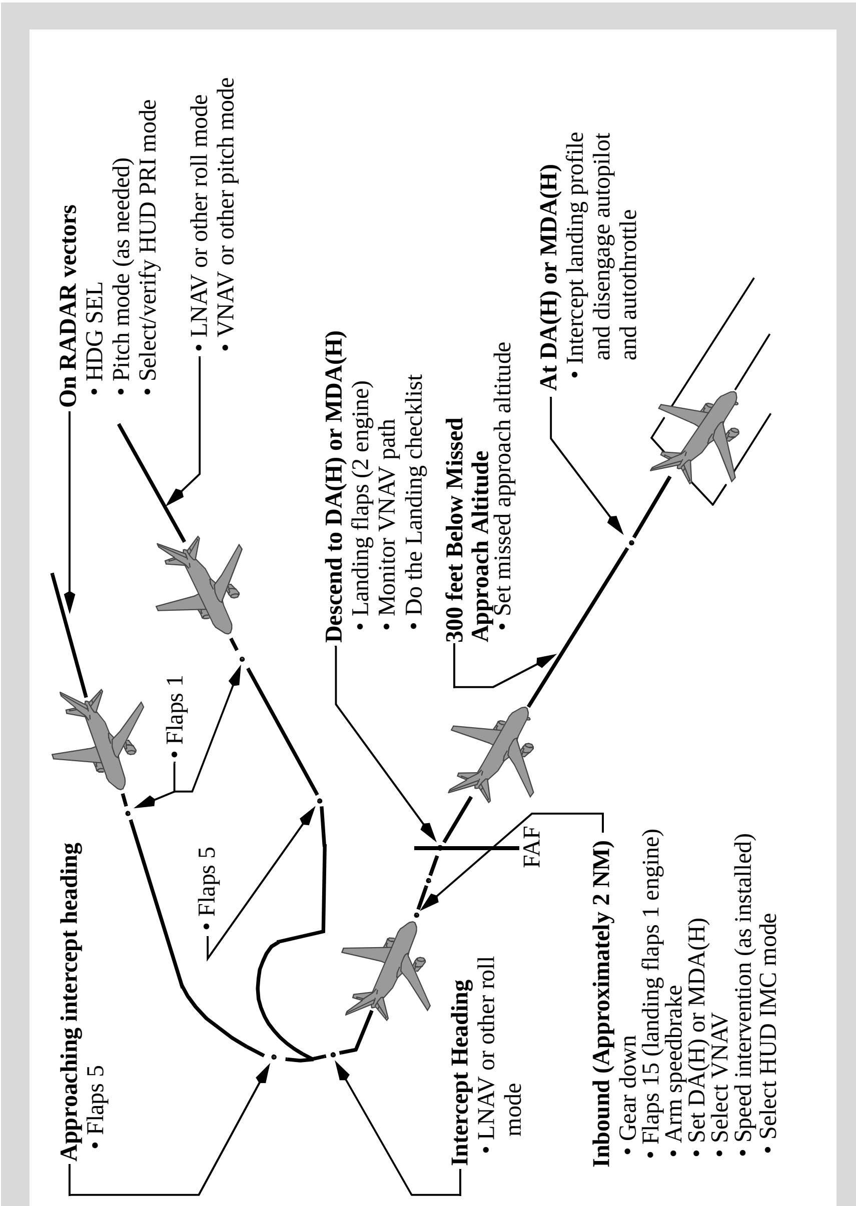
Go–Around and Missed Approach



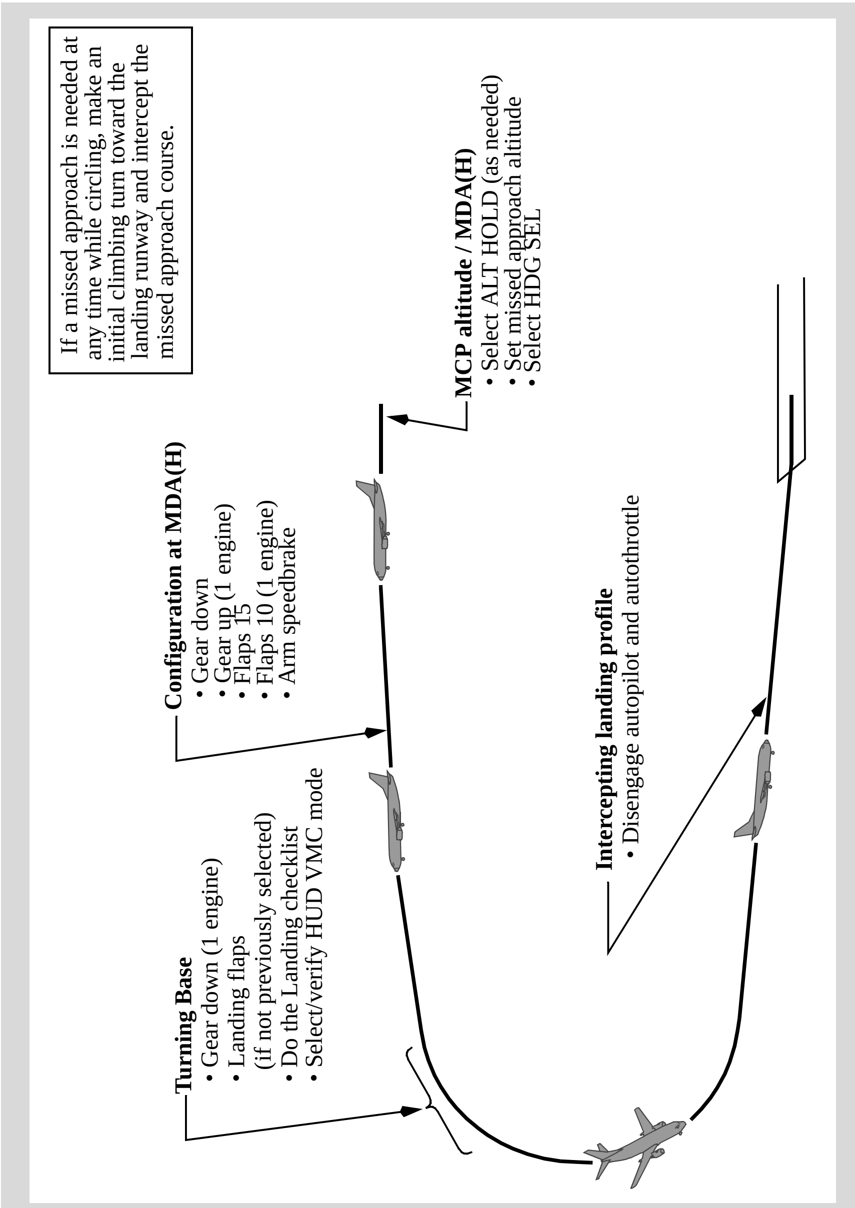
ILS Approach Using HUD
YD332, YD333



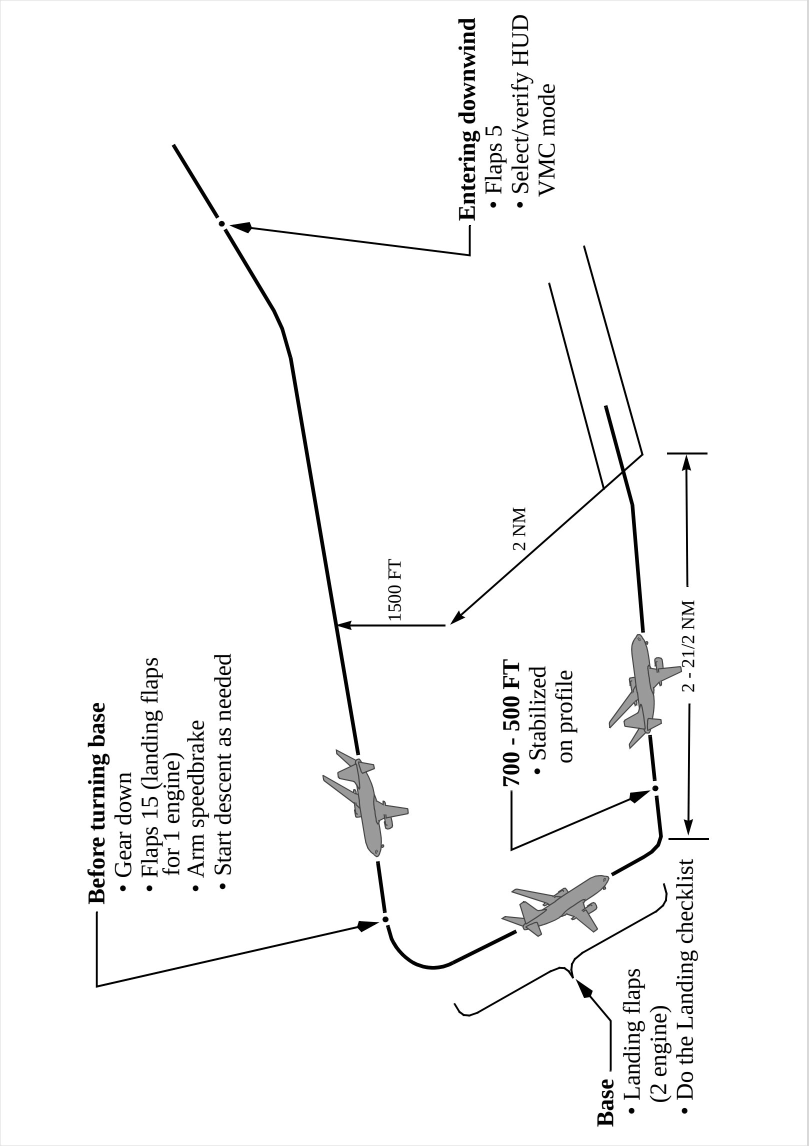
Instrument Approach Using VNAV and HUD
YD332, YD333



Circling Approach Using HUD
YD332, YD333



Visual Traffic Pattern Using HUD
YD332, YD333



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 table information is used to distinguish data peculiar to one or more, but not all of the airplanes. Where data applies to all airplanes listed, no reference is made to individual 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.

Airplane number is supplied by the operator. Registry number is supplied by the national regulatory agency. A blank denotes a Registry number that was not supplied or available at the time of publication. Handwritten Registry number entries are allowed to be made until the next scheduled block revision. Registry numbers need to be provided in ample lead time to meet the required printing and distribution deadlines. Serial and tabulation number are supplied by Boeing.

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
332	B-2865	30679	YD332
333	B-2863	30673	YD333
042	B-5575	33554	YJ813
045	B-5577	33557	YJ816
048	B-5578	33560	YJ819
561	B-5367	30733	YK171
941	B-5571	35643	YK691
001	B-5562	37934	YQ294
002	B-5573	37932	YQ295
003		37935	YQ296

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Revision Transmittal Letter

To: All holders of Okay Airways Company Limited 737 Flight Crew Operations Manual, Boeing Document Number D6-27370-8GQ-OKY.

Subject: Flight Crew Operations Manual Revision.

This revision reflects the most current information available to The Boeing Company 45 days before the subject revision date. The following revision highlights explain changes in this revision. General information below explains the use of revision bars to identify new or revised information.

Revision Record

No.	Revision Date	Date Filed	No.	Revision Date	Date Filed
0	September 24, 2007		1	January 25, 2008	
2	May 15, 2008		3	September 18, 2008	
4	March 27, 2009		5	September 25, 2009	
6	March 25, 2010		7	September 23, 2010	
8	October 26, 2010		9	March 18, 2011	
10	April 28, 2011				

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 1 - Airplane General, Emer. Equip., Doors, Windows

AIRSTAIR

1.1 - Added actions for airplanes equipped with forward airstairs.

Section 2 - Air Systems

ZONE TEMP

2.20 - Added missing word.

Chapter PI-QRH - Performance Inflight - QRH

Section 40 - Table of Contents

PI-QRH.TOC.40.1 - 737-800W CFM56-7B27 KG FAA CATC/N moved from Section 50 to 40.

Section 40 - General

General

PI-QRH.40.1 - 737-800W CFM56-7B27 KG FAA CATC/N moved from Section 50 to 40.

Section 50 - Table of Contents

PI-QRH.TOC.50.1 - 737-800W CFM56-7B27B1 LB FAA CATC/N moved from Section 40 to 50.

Section 50 - General

General

PI-QRH.50.1 - 737-800W CFM56-7B27B1 LB FAA CATC/N moved from Section 40 to 50.

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Checklist Instructions — Chapter CI

QRH List of Effective Pages — Section LEP

Page	Date
Quick Reference Handbook	
Quick Action Index	
* QA.Index.1-2	April 28, 2011
Lights (tab)	
* Lights.Index.1-8	April 28, 2011
Unannunciated (tab)	
* Unann.Index.1-2	April 28, 2011
Alphabetical (tab)	
* Alpha.Index.1-12	April 28, 2011
Normal Checklists (tab)	
* NC.1-4	April 28, 2011
0 Miscellaneous (tab)	
0.TOC.1-2	May 15, 2008
0.1	September 25, 2009
0.2-3	May 15, 2008
0.4	September 18, 2008
0.5	March 18, 2011
0.6	May 15, 2008
0.7	September 18, 2008
0.8	May 15, 2008
1 Airplane General, Emergency Equipment, Doors, Windows (tab)	
* 1.TOC.1-2	April 28, 2011
* 1.1-22	April 28, 2011

Page	Date
2 Air Systems (tab)	
2.TOC.1-2	March 18, 2011
2.1	March 18, 2011
2.2	March 25, 2010
2.3-4	March 18, 2011
* 2.5	April 28, 2011
2.6-11	March 27, 2009
2.12-19	March 18, 2011
* 2.20	April 28, 2011
3 Anti-Ice, Rain (tab)	
3.TOC.1-2	May 15, 2008
3.1	March 27, 2009
3.2	March 18, 2011
3.3	May 15, 2008
* 3.4	April 28, 2011
3.5-6	May 15, 2008
3.7-8	March 25, 2010
3.9-10	May 15, 2008
4 Automatic Flight (tab)	
4.TOC.1-2	May 15, 2008
4.1-2	May 15, 2008
5 Communications (tab)	
5.TOC.1-2	October 26, 2010
* 5.1	April 28, 2011
5.2	October 26, 2010

* = Revised, Added, or Deleted

* = Revised, Added, or Deleted

Page	Date
9 Flight Controls (cont)	
* 9.17	April 28, 2011
9.18-19	May 15, 2008
9.20-23	March 25, 2010
* 9.24	April 28, 2011
9.25-26	March 25, 2010
9.27	September 23, 2010
9.28	March 25, 2010
* 9.29	April 28, 2011
9.30-31	October 26, 2010
9.32-33	March 25, 2010
9.34	October 26, 2010
9.35	September 23, 2010
* 9.36	April 28, 2011
9.37-39	September 23, 2010
* 9.40	April 28, 2011
9.41-42	September 23, 2010
10 Flight Instruments, Displays (tab)	
10.TOC.1-2	May 15, 2008
10.1	May 15, 2008
10.2	March 25, 2010
10.3	September 23, 2010
10.4-5	May 15, 2008
10.6	March 27, 2009
10.7-8	May 15, 2008

Page	Date
11 Flight Management, Navigation (tab)	
11.TOC.1-2	March 18, 2011
* 11.1-2	April 28, 2011
11.3	September 23, 2010
* 11.4-5	April 28, 2011
11.6	September 23, 2010
11.7-10	October 26, 2010
11.11-12	March 18, 2011
12 Fuel (tab)	
* 12.TOC.1-2	April 28, 2011
* 12.1-9	April 28, 2011
12.10-18	March 18, 2011
13 Hydraulics (tab)	
13.TOC.1-2	September 23, 2010
13.1	May 15, 2008
13.2	September 25, 2009
13.3	September 18, 2008
* 13.4	April 28, 2011
13.5-7	March 25, 2010
13.8	October 26, 2010
* 13.9	April 28, 2011
13.10-13	March 25, 2010
13.14	October 26, 2010
13.15	September 23, 2010
* 13.16	April 28, 2011
13.17-18	September 23, 2010
14 Landing Gear (tab)	
14.TOC.1-2	March 18, 2011
14.1	September 23, 2010
* 14.2	April 28, 2011
14.3	May 15, 2008

* = Revised, Added, or Deleted

* = Revised, Added, or Deleted

Page	Date
Performance - Inflight (cont)	
* PI-QRH.54.1-6	April 28, 2011
* PI-QRH.55.1-6	April 28, 2011
Maneuvers (tab)	
* Man.TOC.0.1-2	April 28, 2011
MAN.05.1-2	May 15, 2008
MAN.1.1-2	March 18, 2011
MAN.1.3	September 25, 2009
MAN.1.4-5	March 18, 2011
MAN.1.6	September 23, 2010
MAN.1.7-12	September 18, 2008
* MAN.2.1-12	April 28, 2011
Checklist Instructions (tab)	
CI.TOC.0.1-2	March 18, 2011
* CI.ModID.1-2	April 28, 2011
* CI.RR.1-4	April 28, 2011
* CI.RR.5-6	Deleted
* CI.LEP.1-6	April 28, 2011
CI.1.1	May 15, 2008
CI.1.2	March 27, 2009
CI.2.1	March 27, 2009
CI.2.2-3	March 25, 2010
CI.2.4	September 23, 2010
CI.2.5-6	March 25, 2010
CI.2.7	March 18, 2011
CI.2.8	May 15, 2008
Evacuation	
Back Cover.1	May 15, 2008
Back Cover.2	March 18, 2011

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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.
- 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 caution 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 caution light will extinguish when MASTER CAUTION is reset. In these situations, the amber caution light alerts the flight crew that normal system operation will be affected if another element fails. If an amber caution 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 captains'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.

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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 indication shows fully open to depressurize the airplane		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

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