767
Quick Reference Handbook

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PREFLIGHT

Oxygen. . . . . Tested, 100%

Flight instruments . . . . Heading___, Altimeter___

Parking brake . . . . .Set

Fuel control switches . . . . CUTOFF

BEFORE START

Flight deck door . . . . Closed and locked

Passenger signs . . . . ___

Windows . . . . Locked

MCP . . . . .V2___, HDG___, ALT___

Takeoff speeds . . . . V1___, VR___, V2___

CDU preflight. . . . . Completed

Trim . . . . ___ Units, 0, 0

Taxi and takeoff briefing . . . . Completed

Red anti collision light . . . . .ON

BEFORE TAXI

Anti-ice. . . . . ___

L and R Isolation switches. . . . . .Off

Recall . . . . Checked

Autobrake . . . . .RTO

Flight controls. . . . . Checked

Ground equipment . . . . Clear

BEFORE TAKEOFF

Flaps . . . . ___

AFTER TAKEOFF

Landing gear . . . . UP and OFF

Flaps . . . . UP

DESCENT

Pressurization. . . . . LDG ALT ___

Recall . . . . Checked

Autobrake . . . . ___

Landing data . . . . .VREF___, Minimums___

Approach briefing. . . . . Completed

APPROACH

Altimeters . . . . ___

LANDING

Speedbrake . . . . ARMED

Landing gear . . . . .Down

Flaps . . . . ___

SHUTDOWN

Hydraulic panel . . . . .Set

Fuel pumps . . . . .Off

Flaps . . . . .UP

Parking brake . . . . ___

Fuel control switches . . . . CUTOFF

Weather radar . . . . .Off

SECURE

IRSs . . . . .OFF

Emergency lights . . . . .OFF

Window heat . . . . .Off

Packs . . . . .OFF

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Non-Normal Checklists — Chapter NNC

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Ditching Preparation

Condition: Airplane ditching and evacuation are needed.

1 Transmit a distress signal.

2 Advise the cabin to prepare for ditching.

3 Do **not** use autobrakes.

4 Do **not** arm speedbrake lever.

5 Use flaps 30 and VREF 30 for landing.

6 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization. LDG ALT ____

Recall . . . . Checked

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

Landing data **. . . . . VREF 30, Minimums____**

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ____

When below 5,000 feet

GND PROX GEAR OVRD switch . . . . OVRD

GND PROX TERR OVRD switch . . . . OVRD

PACK control selectors (both). . . . . OFF

▼ Continued on next page ▼

▼ Ditching Preparation continued ▼

Cabin altitude MODE SELECT . . . . .MAN

CABIN ALTITUDE
MANUAL control . . . . Hold in DESCEND until outflow valve is fully closed

PASS SIGNS selectors . . . . .ON

Do **not** accomplish the following checklists:

PACK OFF

CABIN AUTOMATIC INOPERATIVE

When on final approach

Advise crew of imminent touchdown.

Passenger cabin . . . . **Secure**

Maintain airspeed at VREF 30 to touchdown. Flare airplane to achieve minimum rate of descent at touchdown.

Landing Checklist

Speedbrake . . . . **DOWN**

Landing gear . . . . **UP**

Flaps **30**

■ ■ ■ ■

Tail Strike

Condition: The tail hits the runway.

Caution! Do not pressurize the airplane due to possible structural damage.

1 Cabin altitude MODE SELECT . . . . MAN

2 CABIN ALTITUDE
MANUAL control . . . . Hold in CLIMB until outflow valve is fully open

3 Level off at the lowest safe altitude.

4 Plan to land at the nearest suitable airport.

5 Do **not** accomplish the following checklist:

CABIN AUTOMATIC INOPERATIVE

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ACCESS DOORS

ACCESS DOOR(S)

Messages: ACCESS DOORS
E/E ACCESS DOOR
FWD ACCESS DOOR

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

1 Choose one:

◆Pressurization is **normal**:

The door is in a safe configuration as long as cabin pressurization is normal.

■ ■ ■ ■

◆Pressurization is **not normal**:

►►**Go to step 2**

2 PASS SIGNS selectors . . . . ON

3 LDG ALT selector . . . . Set 9,500 feet

4 Choose one:

◆Occurrence is on **takeoff or initial climb**:

Do **not** exceed 10,000 feet.

■ ■ ■ ■

◆Occurrence is in **climb, cruise, or descent**:

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

■ ■ ■ ■

DO NOT USE FOR FLIGHT

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 DOORS

CARGO DOOR(S)

Messages: CARGO DOORS, BULK CARGO DOOR, AFT CARGO DOOR, FWD CARGO DOOR

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

1 Choose one:

◆ FWD CARGO DOOR message is **shown**:

▶▶**Go to step 3**

◆ FWD CARGO DOOR message is **not shown**:

▶▶**Go to step 2**

▼ **Continued on next page** ▼

▼ **CARGO DOOR(S) continued** ▼

2 Choose one:

◆Pressurization is **normal**:

The aft and bulk cargo doors are in a safe configuration as long as cabin pressurization is normal.

■ ■ ■ ■

◆Pressurization is **not normal**:

►►**Go to step 3**

3 PASS SIGNS selectors . . . . ON

4 LDG ALT selector . . . . Set 9,500 feet

5 Choose one:

◆Occurrence is on **takeoff or initial climb**:

Do not exceed 10,000 feet.

■ ■ ■ ■

◆Occurrence is in **climb, cruise, or descent**:

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

■ ■ ■ ■

EMER DOORS

EMERGENCY DOOR(S)

[Option-Overwing Emergency Exit Doors installed]

Messages: EMER DOORS

L AFT EMER DOOR   R AFT EMER DOOR

L FWD EMER DOOR   R FWD EMER DOOR

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

1 Choose one:

◆Pressurization is **normal**:

The emergency door is in a safe configuration as long as cabin pressurization is normal.

■ ■ ■ ■

◆Pressurization is **not normal**:

►►**Go to step 2**

2 PASS SIGNS selectors .ON

3 LDG ALT selector . . . . .Set 9,500 feet

4 Choose one:

◆Occurrence is on **takeoff or initial climb**:

Do not exceed 10,000 feet.

■ ■ ■ ■

◆Occurrence is in **climb, cruise, or descent**:

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

■ ■ ■ ■

EMER DOORS

EMERGENCY DOOR(S)

[Option-Emergency Doors type 1 aft of wing installed]

Messages: EMER DOORS
L EMER DOOR R EMER DOOR

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

1 Choose one:

◆Pressurization is **normal**:

The emergency door is in a safe configuration as long as cabin pressurization is normal.

■ ■ ■ ■

◆Pressurization is **not normal**:

▶▶**Go to step 2**

2 PASS SIGNS selectors . . . . ON

3 LDG ALT selector . . . . Set 9,500 feet

4 Choose one:

◆Occurrence is on **takeoff or initial climb**:

Do not exceed 10,000 feet.

■ ■ ■ ■

◆Occurrence is in **climb, cruise, or descent**:

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

■ ■ ■ ■

UNARMED

EMERGENCY LIGHTS

Messages: EMER LIGHTS

Condition: The emergency lights switch is not ARMED.

■ ■ ■ ■

ENTRY DOORS

ENTRY DOOR(S)

Messages:

L ENTRY DOORS	R ENTRY DOORS
L AFT ENTRY DOOR	R AFT ENTRY DOOR
L CTR ENT DOOR	R CTR ENT DOOR
L FWD ENT DOOR	R FWD ENT DOOR

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

1 Choose one:

◆ Pressurization is **normal**:

The door is in a safe configuration as long as cabin pressurization is normal.

■ ■ ■ ■

◆ Pressurization is **not normal**:

▶▶ **Go to step 2**

2 PASS SIGNS selectors . . . . ON

3 LDG ALT selector . . . . Set 9,500 feet

▼ **Continued on next page** ▼

▼ **ENTRY DOOR(S) continued** ▼

4 Choose one:

◆ Occurrence is on **takeoff or initial climb**:

Do not exceed 10,000 feet.

■ ■ ■ ■

◆ Occurrence is in **climb, cruise, or descent**:

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

■ ■ ■ ■

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 deadbolt.

■ ■ ■ ■

ON

PASSENGER OXYGEN ON

Messages: PASS OXYGEN ON

Condition: The passenger oxygen system is on.

■ ■ ■ ■

Window Damage

Condition: A flight deck window has one or more of these:
- An electrical arc
- A delamination
- A crack
- Is shattered

1 Choose one:

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

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

Do **not** accomplish the following checklist:

WINDOW (HEAT)

▶▶**Go to step 2**

◆ Window is **not** arcing, shattered, or cracked:

▶▶**Go to step 2**

▼ **Continued on next page** ▼

▼ Window Damage continued ▼

2 Choose one:

◆Damaged window is **deformed or** an air leak is **observed**:

▶▶**Go to step 3**

◆Damaged window is **not** deformed and an air leak is **not** observed:

■ ■ ■ ■

3 Plan to land at the nearest suitable airport.

4 Choose one:

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

Descend to lowest safe altitude or 10,000 feet, whichever is higher. This minimizes forces on the window.

▶▶**Go to step 5**

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

▶▶**Go to step 5**

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

■ ■ ■ ■

Window Open

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

1 Maintain the maneuvering speed for 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** pressurization is **normal**:

Continue normal operation.

■ ■ ■ ■

◆ Window does **not lock or** 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 ALT

CABIN ALTITUDE or Rapid Depressurization

CABIN ALTITUDE

Messages: CABIN ALTITUDE

Condition: A cabin altitude exceedance occurs.

1 Don the oxygen masks.

2 Establish crew communications.

3 Check the cabin altitude and rate.

4 **If** the cabin altitude is uncontrollable:

PASS OXY switch . . . . Push and hold for 1 second

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

To descend:

Move the thrust levers to idle

Extend the speedbrakes

If structural integrity is in doubt, limit airspeed and avoid high maneuvering loads.

Descend at VMO/MMO

■ ■ ■ ■

VALVE

APU BLEED VALVE

Messages: APU BLEED VAL

Condition: The APU bleed valve is not in the commanded position.

■ ■ ■ ■

DUCT LEAK

BLEED DUCT LEAK

Messages: L BLD DUCT LEAK   R BLD DUCT LEAK

Condition: A bleed air leak occurs in the wing area.

1 ENG bleed air switch (affected side) . . . . .Off

2 ISLN switch (affected side) . . . . .Off

3 WING ANTI–ICE switch . . . . .Off

This prevents possible asymmetrical ice buildup on the wings.

4 Avoid icing conditions.

Caution! Flight beyond six hours with a DUCT LEAK light illuminated may result in structural damage.

5 Do **not** accomplish the following checklists:

ENGINE BLEED OFF

PACK OFF

■ ■ ■ ■

VALVE

BLEED ISOLATION VALVE

Messages: C BLD ISLN VAL
L BLD ISLN VAL
R BLD ISLN VAL

Condition: The isolation valve is not in the commanded position.

■ ■ ■ ■

DUCT LEAK

BODY DUCT LEAK

Messages: BODY DUCT LEAK

Condition: A bleed air leak occurs in the body area.

1 C ISLN switch. . . . . Off

2 APU bleed air switch . . . . Off

3 Choose one:

◆DUCT LEAK light **extinguishes**:

▶▶**Go to step 4**

◆DUCT LEAK light **stays illuminated**:

▶▶**Go to step 5**

4 Choose one:

◆Duct pressure on **both** sides is **at or above** 10 PSI:

▶▶**Go to step 8**

◆Duct pressure on **either** side is **below** 10 PSI:

▶▶**Go to step 5**

5 L **or** R ENG bleed air switch (either) . . . . Off

6 WING ANTI–ICE switch . . . . Off

This prevents possible asymmetrical ice buildup on the wings.

▼ **Continued on next page** ▼

▼ BODY DUCT LEAK continued ▼

7 Avoid icing conditions.

Caution! Flight beyond six hours may result in structural damage.

8 Do **not** accomplish the following checklists:

ENGINE BLEED OFF

PACK OFF

■ ■ ■ ■

AUTO INOP

CABIN AUTOMATIC INOPERATIVE

Messages: CABIN AUTO INOP

Condition: One of these occurs:
- The automatic pressurization control is failed
- The cabin altitude mode selector is in manual

1 CABIN ALTITUDE MODE SELECT . . . . MAN

2 CABIN ALTITUDE MANUAL control . . . . CLIMB or DESCEND as needed to control desired cabin rate and altitude

Note: Recommended cabin rate is approximately 500 FPM for climbs and descents.

Recommended cabin altitude in cruise is:

FLIGHT LEVEL	CABIN ALTITUDE
Up to 230	Landing Field Elevation
260	2000
300	4000
350	6000
400 and above	8000

3 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization . . . . LDG ALT ____

Recall . . . . Checked

▼ Continued on next page ▼

▼ CABIN AUTOMATIC INOPERATIVE continued ▼

Autobrake . . . . ____

Landing data . . . . VREF____, Minimums___________

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ______

When at pattern altitude

CABIN ALTITUDE MANUAL control . . . Hold in CLIMB until outflow valve is fully open

Landing Checklist

Speedbrake . . . . ARMED

Landing gear . . . . Down

Flaps . . . . ____

■ ■ ■ ■

INOP

CABIN TEMPERATURE

Messages: AFT CABIN TEMP FWD CABIN TEMP
MID CABIN TEMP

Condition: One or more of these occur:
- A fault in the zone temperature controller
- The compartment temperature control is off
- The trim air switch is off

1 CAB COMPT TEMP control (affected compartment) . . . . OFF

2 **If** affected compartment temperature continues to be too warm or too cold:

TRIM AIR switch. . . . . .Off

This schedules the operating pack(s) to a programmed temperature.

Do **not** accomplish the following checklist:

TRIM AIR

■ ■ ■ ■

OVHT

CARGO OVERHEAT

Messages: AFT CARGO OVHT BULK CARGO OVHT
FWD CARGO OVHT

Condition: A cargo compartment overheat occurs.

1 Choose one:

◆ Cargo heat is **not needed**:

CARGO HEAT switch . . . . Off

■ ■ ■ ■

◆ Cargo heat is **needed**:

■ ■ ■ ■

OFF

ENGINE BLEED OFF

Messages: L ENG BLEED OFF R ENG BLEED OFF

Condition: The engine bleed valve closed because of a system fault.

1 **If** wing anti–ice needed:

PACK control selector (affected side) . . . . OFF

ISLN switch (affected side) . . . . On

When wing anti–ice no longer needed:

L and R ISLN switches . . . . Off

2 Thrust reverser on the affected side may be inoperative.

3 Do **not** accomplish the following checklist:

PACK OFF

■ ■ ■ ■

OVHT

ENGINE BLEED OVERHEAT

Messages: L ENG BLD OVHT R ENG BLD OVHT

Condition: An engine bleed air overheat occurs.

1 ENG bleed air switch (affected side) . . . . Off

2 **After** thrust is reduced for cruise:

ENG bleed air switch (affected side) . . . . On

3 Choose one:

◆OVHT light **extinguishes**:

■ ■ ■ ■

◆OVHT light **stays illuminated or illuminates again**:

▶▶**Go to step 4**

4 ENG bleed air switch (affected side) . . . . Off

5 **If** wing anti–ice needed:

PACK control selector (affected side) . . . . OFF

ISLN switch (affected side) . . . . On

When wing anti–ice no longer needed:

L and R ISLN switches . . . . Off

6 Thrust reverser on the affected side is inoperative.

7 Do **not** accomplish the following checklists:

ENGINE BLEED OFF

PACK OFF

■ ■ ■ ■

BLEED

ENGINE HPSOV

Messages: L ENG HPSOV R ENG HPSOV

Condition: The high pressure shutoff valve failed to close.

1 ENG bleed air switch (affected side) . . . . .Off

2 **If** wing anti–ice needed:

PACK control selector (affected side) . . . . OFF

ISLN switch (affected side) . . . . .On

When wing anti–ice no longer needed:

L and R ISLN switches . . . . .Off

3 Do **not** accomplish the following checklists:

ENGINE BLEED OFF

PACK OFF

■ ■ ■ ■

BLEED

ENGINE PRV

Messages: L ENG PRV R ENG PRV

Condition: The pressure regulating valve failed to close.

1 ENG bleed air switch (affected side) . . . . Off

2 **If** wing anti–ice needed:

PACK control selector
(affected side) . . . . OFF

ISLN switch (affected side) . . . . On

When wing anti–ice no longer needed:

L and R ISLN switches . . . . Off

3 Do **not** accomplish the following checklists:

ENGINE BLEED OFF

PACK OFF

■ ■ ■ ■

NO COOLING

EQUIPMENT COOLING

Messages: FWD EQPT COOLING

Condition: The differential pressure for reverse flow cooling is insufficient.

1 Avionics and electronic equipment and displays, not powered by standby buses, are subject to imminent failure.

2 Avionics and electrical equipment on standby buses are reliable for 90 minutes. Continued flight beyond 90 minutes can result in loss of essential avionics and electrical equipment.

■ ■ ■ ■

OVHT

EQUIPMENT OVERHEAT

Messages: FWD EQPT OVHT

Condition: One or more of these occur:
- Airflow is insufficient
- An overheat is sensed

1 EQUIP COOLING selector. . . . . STBY

2 **Wait** 5 minutes.

3 Choose one:

◆OVHT light **extinguishes**:

■ ■ ■ ■

◆OVHT light **stays illuminated**:

EQUIP COOLING selector . . . . .OVRD

■ ■ ■ ■

VALVE

EQUIPMENT VALVE

Messages: FWD EQPT VAL

Condition: An equipment cooling valve is not in the commanded position.

1 EQUIP COOLING selector. . . . . STBY

2 **Wait** 30 seconds.

3 Choose one:

◆VALVE light **extinguishes:**

■ ■ ■ ■

◆VALVE light **stays illuminated**:

Pressurization **cannot** be ensured.

■ ■ ■ ■

INOP

FLIGHT DECK TEMPERATURE

Messages: FLT DECK TEMP

Condition: One or more of these occur:
- A fault in the zone temperature controller
- The trim air switch is off

1 FLT DK COMPT TEMP control . . . . Use MAN to position trim air valve as needed

2 **If** affected compartment temperature continues to be too warm or too cold:

TRIM AIR switch. . . . . Off

This schedules the operating pack(s) to a programmed temperature.

Do **not** accomplish the following checklist:

TRIM AIR

■ ■ ■ ■

PACK OFF

PACK OFF

Messages: L PACK OFF R PACK OFF

Condition: A pack valve is closed.

1 Choose one:

◆A **single** PACK OFF light is **illuminated**:

Continue normal operation.

■ ■ ■ ■

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

▶▶**Go to step 2**

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

3 To descend:

Move the thrust levers to idle.

Extend the speedbrakes.

If structural integrity is in doubt, limit airspeed and avoid high maneuvering loads.

Descend at VMO/MMO.

4 Consider an alternate engine bleed air source, or if below 17,000 feet the APU bleed air source, if dual PACK OFF condition is a result of engine bleed air loss not caused by a duct leak or engine start valve failure.

5 **Wait** until level off.

▼ Continued on next page ▼

▼ **PACK OFF continued** ▼

6 Choose one:

◆**Either or both** PACK OFF lights **extinguish:**

■ ■ ■ ■

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

►►**Go to step 7**

7 Maintain airspeed at or less than 290 knots.

8 Choose one:

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

►►**Go to step 9**

◆Airplane altitude is above 10,000 feet:

Don the oxygen masks.

Establish crew communications.

►►**Go to step 9**

9 CABIN ALTITUDE MODE SELECT . . . . MAN

10 CABIN ALTITUDE MANUAL control . . . . Hold in CLIMB until outflow valve is fully open

11 SHOULDER HEATERS and FOOT HEATERS switches (all). . . . . OFF

12 Minimize flight deck lighting intensity.

13 Open the flight deck door.

▼ **Continued on next page** ▼

▼ PACK OFF continued ▼

14 Install flight deck sunvisors during daylight operations.

15 Instruct flight attendants to:

Select all galley equipment off.

Select in flight entertainment main power off.

Reduce cabin lighting to minimum needed.

Close cabin window shades during daylight operations.

Select main cabin door heaters off.

16 Plan to land at nearest suitable airport.

17 Do **not** accomplish the following checklist:

CABIN AUTOMATIC INOPERATIVE

■ ■ ■ ■

Intentionally
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INOP

PACK TEMPERATURE

Messages: L PACK TEMP R PACK TEMP

Condition: One or more of these occur:
- A pack controller fault
- A pack overheat

1 PACK control selector (affected side). . . . . STBY N

2 Choose one:

◆INOP light **extinguishes**:

▶▶**Go to step 3**

◆INOP light **stays illuminated**:

Wait 5 minutes.

PACK RESET switch . . . . Push

▶▶**Go to step 3**

3 **If** the compartment temperature becomes unacceptably warm or cool with STBY N selected:

PACK control selector
(affected side) . . . . STBY C or STBY W as needed

▼ Continued on next page ▼

▼ **PACK TEMPERATURE continued** ▼

4 Choose one:

◆INOP light **stays extinguished**:

■ ■ ■ ■

◆INOP light **stays illuminated or illuminates again**:

PACK control selector (affected side) . OFF

Do **not** accomplish the following checklist:

PACK OFF

■ ■ ■ ■

INOP

RECIRCULATION FAN

Messages: L RECIR FAN   R RECIR FAN

Condition: The recirculation fan is inoperative.

■ ■ ■ ■

DUCT LEAK

STRUT DUCT LEAK

Messages: L STRUT DCT LEAK R STRUT DCT LEAK

Condition: A bleed air leak occurs in the strut area.

1 ENG bleed air switch (affected side) . . . . Off

2 WING ANTI–ICE switch . . . . Off

This prevents possible asymmetrical ice buildup on the wings.

3 Avoid icing conditions.

4 Thrust reverser on the affected side is inoperative.

5 Do **not** accomplish the following checklist:

ENGINE BLEED OFF

■ ■ ■ ■

OFF

TRIM AIR

Messages: TRIM AIR

Condition: The trim air switch is OFF.

■ ■ ■ ■

Non-Normal Checklists — Chapter NNC

Anti-Ice, Rain — Section 3

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AOA PROBE

L AOA | R AOA

Messages: L AOA PROBE R AOA PROBE

Condition: The AOA probe heat is failed.

1 Flight in icing conditions may result in some erroneous flight instrument indications.

■ ■ ■ ■

AUXILIARY PITOT

L AUX PITOT | R AUX PITOT

Messages: L AUX PITOT R AUX PITOT

Condition: The auxiliary pitot probe heat is failed.

1 Flight in icing conditions may result in some erroneous flight instrument indications.

■ ■ ■ ■

CAPT PITOT

CAPTAIN PITOT

Messages: CAPT PITOT

Condition: The captain’s pitot probe heat is failed.

1 Flight in icing conditions may result in some erroneous flight instrument indications.

■ ■ ■ ■

VALVE

ENGINE ANTI-ICE

Messages: L ENG ANTI-ICE R ENG ANTI-ICE

Condition: The engine anti-ice valve is not in the commanded position.

1 Choose one:

◆Engine anti-ice switch is **ON**:

▶▶**Go to step 2**

◆Engine anti-ice switch is **off**:

▶▶**Go to step 5**

2 ENG bleed air switch (affected side) . . . . Off

3 ENGINE ANTI–ICE switch (affected side) . . . . Off, then ON

4 Choose one:

◆VALVE light **extinguishes**:

ENG bleed air switch (affected side). . . ON

■ ■ ■ ■

◆VALVE light **stays illuminated**:

Avoid icing conditions.

Leave the ENGINE ANTI-ICE switch ON.

ENG bleed air switch (affected side). . . ON

■ ■ ■ ■

5 ENGINE ANTI–ICE switch (affected engine) . . . ON

▼ **Continued on next page** ▼

▼ ENGINE ANTI-ICE continued ▼

6 **If** total air temperature (TAT) is above 10 degrees C:

Avoid high thrust settings.

■ ■ ■ ■

F O PITOT

FIRST/OFFICER PITOT

Messages: F/O PITOT

Condition: The first officer's pitot probe heat is failed.

1 Flight in icing conditions may result in some erroneous flight instrument indications.

■ ■ ■ ■

PROBE HEAT

Messages: PROBE HEAT

Condition: Two or more probe heats are failed.

1 Flight in icing conditions may result in some erroneous flight instrument indications.

■ ■ ■ ■

TAT

TAT PROBE

Messages: TAT PROBE

Condition: The TAT probe heat is failed.

1 Flight in icing conditions may result in some erroneous flight instrument indications.

■ ■ ■ ■

INOP

WINDOW (HEAT)

Messages: L FWD WINDOW R FWD WINDOW
L SIDE WINDOW R SIDE WINDOW
WINDOW HEAT

Condition: One or more window heats are off.

Objective: To attempt to reset the system.

1 WINDOW HEAT switch. . . . . Off 10 seconds, then ON

2 Choose one:

◆INOP light **extinguishes**:

■ ■ ■ ■

◆INOP light **stays illuminated**:

WINDOW HEAT switch . . . . Off

■ ■ ■ ■

Intentionally
Blank

VALVE

WING ANTI–ICE

Messages: L WING ANTI-ICE R WING ANTI-ICE

Condition: The wing anti–ice valve is not in the commanded position.

1 Choose one:

◆Wing anti-ice switch is **ON**:

WING ANTI–ICE switch. . . . . Off

Avoid icing conditions.

■ ■ ■ ■

◆Wing anti-ice switch is **OFF**:

▶▶**Go to step 2**

2 WING ANTI-ICE switch . . . . ON

3 **Checklist Complete Except Deferred Items**

▼ Continued on next page ▼

▼ **WING ANTI–ICE continued** ▼

Deferred Items

Descent Checklist

Pressurization . . . . LDG ALT ____

Recall . . . . Checked

Autobrake . . . . ____

Landing data . . . . VREF____, Minimums____________

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ______

Landing Checklist

Speedbrake . . . . ARMED

Landing gear . . . . Down

Flaps . . . . ____

After landing

ENG bleed air switch (affected side) . . . . Off

ISLN switch (affected side) . . . . Off

This prevents possible structural damage due to overheat.

■ ■ ■ ■

Intentionally
Blank

Non-Normal Checklists — Chapter NNC
Automatic Flight — Section 4

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Intentionally
Blank

AUTO PILOT

AUTOPILOT

Message: AUTOPILOT

Condition: One or more of these occur:
- The autopilot operates in a degraded mode other than the selected mode
- The engaged roll mode fails
- The engaged pitch mode fails

1 Autopilot disengage switch . . . . .Push

■ ■ ■ ■

A/P DISC

AUTOPILOT DISCONNECT

Message: AUTOPILOT DISC

Condition: All autopilots are disconnected.

■ ■ ■ ■

A/T DISC

AUTOTHROTTLE DISCONNECT

Message: AUTOTHROT DISC

Condition: The autothrottle is disconnected.

■ ■ ■ ■

Intentionally
Blank

Non-Normal Checklists — Chapter NNC

Communications — Section 5

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Intentionally
Blank

Radio Transmit Continuous (Stuck Microphone Switch)

Condition: A radio transmits continuously without crew input.

Objective: To identify and isolate the stuck microphone.

1 INT microphone selector switches (all) . . . . On

This deselects radios and stops radio transmissions.

2 The microphone/interphone with the stuck switch continuously transmits on interphone.

3 The associated audio control panel should remain on interphone. All other audio control panels may be used normally.

■ ■ ■ ■

Intentionally
Blank

Non-Normal Checklists — Chapter NNC

Electrical — Section 6

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Intentionally
Blank

AC BUS OFF

BUS OFF

BUS OFF

Messages: L AC BUS OFF R AC BUS OFF

Condition: The AC bus is not powered.

Objective: To attempt to restore electrical power.

Attempt only one reset

1 GEN CONT switch (affected side) . . . . OFF, then ON

2 Choose one:

◆ APU is **available**:

► ► **Go to step 3**

◆ APU is **not** available:

► ► **Go to step 5**

3 APU selector . . . . START, then ON

4 **When** the APU is running:

Attempt only one reset

L BUS TIE switch . . . . OFF, then AUTO

Attempt only one reset

R BUS TIE switch . . . . OFF, then AUTO

▼ **Continued on next page** ▼

▼ **AC BUS OFF continued** ▼

5 **If** both AC BUS OFF lights were illuminated **and** AC power is restored:

Activate the FMC route, if needed.

Enter the FMC performance data, if needed.

If an IRS ALIGN light is illuminated:

Action is **not** reversible. Do this step only for the affected IRS(s)

⚠ IRS MODE selector . . . . ATT

Enter heading on IRS control panel or POS INIT page of FMC.

6 Choose one:

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

■ ■ ■ ■

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

►► **Go to step 9**

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

►► **Go to step 8**

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

►► **Go to step 7**

▼ **Continued on next page** ▼

▼ AC BUS OFF continued ▼

7 Plan to land at the nearest suitable airport.

Left AC Bus Off

Inoperative Items

Some pitot heat probes inop

Flight in icing conditions may result in some erroneous flight instrument indications.

Left and Center flight directors inop

Flap indicator inop

All autopilots inop

■ ■ ■ ■

8 Plan to land at the nearest suitable airport.

Right AC Bus Off

Inoperative Items

Some pitot heat probes inop

Flight in icing conditions may result in some erroneous flight instrument indications.

Right flight director inop

Right autopilot inop

■ ■ ■ ■

9 Plan to land at the nearest suitable airport.

▼ Continued on next page ▼

▼ **AC BUS OFF continued** ▼

10 Choose one:

◆ Electronic engine control ALTN lights are **not** illuminated:

▶▶ **Go to step 11**

◆ Electronic engine control ALTN lights are **illuminated**:

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

L ELEC ENG CONT switch . . . . ALTN

R ELEC ENG CONT switch . . . . ALTN

Do **not** accomplish the following checklist:

ENGINE EEC MODE

▶▶ **Go to step 11**

11 Choose one:

◆ An engine is **inoperative**:

AFT and FWD FUEL XFEED switches . . . On

▶▶ **Go to step 12**

◆ **Both** engines are **running**:

▶▶ **Go to step 12**

12 EQUIP COOLING selector . . . . OVRD

▼ **Continued on next page** ▼

▼ AC BUS OFF continued ▼

13 FLT DK temperature control . . . . MAN

Both AC Buses Off

Inoperative Items

Some pitot heat probes inop
Flight in icing conditions may result in some erroneous flight instrument indications.

All flight directors inop

All autopilots inop

Automatic speedbrake system inop
Manual speedbrake extension after landing is needed.

Anti-skid for outboard wheels inop

Master caution system inop

14 Do not use autobrakes.

15 Do not arm the speedbrake for landing.

16 **Checklist Complete Except Deferred Items**

▼ Continued on next page ▼

▼ **AC BUS OFF continued** ▼

Deferred Items

Descent Checklist

Pressurization . . . . LDG ALT___

Recall . . . . Checked

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

Landing data . . . . .VREF___, Minimums___

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ___

Landing Checklist

Speedbrake **. . . . . DOWN**

Landing gear . . . . Down

Flaps . . . . ___

■ ■ ■ ■

OFF

APU GENERATOR OFF

Messages: APU GEN OFF

Condition: The generator control breaker is open.

Attempt only one reset

1 ⚠ APU GEN switch. . . . . Off, then ON

■ ■ ■ ■

OFF

BATTERY OFF

Messages: BATTERY OFF

Condition: The battery switch is OFF.

■ ■ ■ ■

ISLN

BUS ISOLATED

Messages: L BUS ISOLATED R BUS ISOLATED

Condition: The bus tie breaker is open.

■ ■ ■ ■

DRIVE

GENERATOR DRIVE

Messages: L GEN DRIVE R GEN DRIVE

Condition: A generator drive malfunction occurs.

Action is **not** reversible.

1 GEN DRIVE DISC switch
(affected side). . . . . .Confirm . . . Push

2 Choose one:

◆APU is **available**:

APU selector . . . . .START, then ON

▶▶**Go to step 3**

◆APU is **not available**:

Plan to land at the nearest suitable airport.

▶▶**Go to step 3**

3 Do **not** accomplish the following checklist:

GENERATOR OFF

■ ■ ■ ■

OFF

GENERATOR OFF

Messages:	L GEN OFF	R GEN OFF
Condition:	The generator control breaker is open.	

Attempt only one reset

1 GEN CONT switch (affected side). . Off, then ON

2 Choose one:

◆GEN CONT OFF light **extinguishes**:

Continue normal operation.

■ ■ ■ ■

◆GEN CONT OFF light **stays illuminated**:

►►**Go to step 3**

3 Choose one:

◆APU is **available**:

APU selector . . . . START, then ON

■ ■ ■ ■

◆APU is **not available**:

Plan to land at the nearest suitable airport.

■ ■ ■ ■

DISCH

MAIN BATTERY DISCHARGE

Messages: MAIN BAT DISCH

Condition: A main battery discharge occurs.

■ ■ ■ ■

OFF

STANDBY BUS OFF

Messages: STANDBY BUS OFF

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

1 STBY POWER selector . . . . BAT

2 Choose one:

◆Standby power bus OFF light **stays illuminated and** right BUS OFF light is **not** illuminated:

▶▶**Go to step 4**

◆Standby power bus OFF light is **not** illuminated **or** right BUS OFF light **stays illuminated**:

▶▶**Go to step 3**

▼ **Continued on next page** ▼

▼ STANDBY BUS OFF continued ▼

3 The battery will provide standby bus power for approximately 30 minutes.

■ ■ ■ ■

4 STBY POWER selector . . . . AUTO

■ ■ ■ ■

OFF

UTILITY BUS OFF

Messages: L UTIL BUS OFF R UTIL BUS OFF

Condition: The galley and utility buses are not energized.

1 Choose one:

◆Two generator sources are **available**:

UTILITY BUS switch . . . . Off, then ON

■ ■ ■ ■

◆Two generator sources are **not available**:

■ ■ ■ ■

Intentionally
Blank

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Aborted Engine Start

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

1 FUEL CONTROL switch (affected side) . . . CUTOFF

2 Choose one:

◆ENG START selector in **GND**:

Motor the engine for 30 seconds.

ENG START selector (affected side). . . . . AUTO

■ ■ ■ ■

◆ENG START selector in **AUTO**:

►►**Go to step 3**

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

ENG START selector (affected side) . . . . . .GND

Motor the engine for 30 seconds.

ENG START selector (affected side) . . . . AUTO

■ ■ ■ ■

Dual Engine Failure

Condition: One of these occurs on both engines:
- Engine flameout
- No response to thrust lever movement

1 ENG START selectors (both) . . . . FLT

2 Thrust levers (both) . . . . Idle

3 FUEL CONTROL switches (both) . . . . CUTOFF, then RUN

4 **If** engine appears stalled **or** EGT approaches the Standby Engine Indicator placard limit:

Repeat above step as needed.

Note: SEI maximum EGT limit is inflight start EGT limit.

5 RAM AIR TURB switch . . . . Push

6 Maintain airspeed as indicated below.

CF6-80C:

Above 30,000 feet use 240 knots.

30,000 feet or below use 220 knots minimum.

PW4000:

Above 35,000 feet use 240 knots.

Above 20,000 to 35,000 feet use 250 knots minimum.

▼ Continued on next page ▼

Dual Engine Failure continued

20,000 feet and below use 200 knots minimum.

Note: OVSPD light and associated aural warning will indicate Vmo/Mmo exceedances.

Note: Cabin altitude warning may occur during descent.

7 Choose one:

◆ APU is **not available**:

▶▶ **Go to step 9**

◆ APU is **available**:

▶▶ **Go to step 8**

Do **not** wait for successful engine start(s) prior to starting the APU

8 ⚠ APU selector . . . . START, then ON

9 Choose one:

◆ **Either or both** engines **started**:

▶▶ **Go to step 12**

◆ **Both** engines remain **failed**:

▶▶ **Go to step 10**

10 Thrust levers (both) . . . . Idle

Continued on next page

▼ **Dual Engine Failure continued** ▼

11 FUEL CONTROL
switches (both) . . . . . CUTOFF for approximately 30 seconds, then RUN for approximately 30 seconds. Repeat until engine start is achieved

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

12 Activate the FMC route.

13 Enter the FMC performance data.

14 Choose one:

◆ **All** ALIGN lights are **not** illuminated:

▶▶ **Go to step 17**

◆ **Any** ALIGN light is **illuminated**:

▶▶ **Go to step 15**

Action is **not** reversible. Do this step only for the affected IRS(s)

15 ⚠ IRS MODE selector (affected IRS) . . . . ATT

16 Enter heading on IRS control panel or POS INIT page of FMC.

Note: Cabin altitude warning may occur during descent.

▼ **Continued on next page** ▼

▼ Dual Engine Failure continued ▼

17 Choose one:

◆ **Both** engines are **started**:

■ ■ ■ ■

◆ **An** engine **stays failed**:

► ►**Go to the Engine Failure or Shutdown checklist on page 7.11**

■ ■ ■ ■

Engine Limit or Surge or Stall

Condition: One or more of these occur:
- Engine indications are unusual
- Engine indications are rapidly approaching or exceeding limits
- Unusual engine noises are heard
- There is no response to thrust lever movement

1 A/T ARM switch . . . . OFF

2 Thrust lever (affected side) Confirm . . Retard until indications remain within normal limits or the thrust lever is at idle

3 Choose one:

◆ Indications are **abnormal or** EGT continues to **increase**:

After shutdown, a restart may be attempted if there is N1 rotation and no abnormal airframe vibration.

►►**Go to the Engine Failure or Shutdown checklist on page 7.11**

■ ■ ■ ■

◆ Indications **stabilized and** EGT **stabilized or decreasing**:

►►**Go to step 4**

▼ Continued on next page ▼

▼ Engine Limit or Surge or Stall continued ▼

4 Thrust lever . . . . .Advance slowly and check that RPM and EGT follow thrust lever movement

5 Choose one:

◆Engine acceleration is **normal**:

Operate engine normally or at a reduced thrust level which is surge and stall free.

■ ■ ■ ■

◆Engine acceleration is **not normal**:

►►**Go to step 6**

6 Choose one:

◆EGT is **normal**:

►►**Go to step 7**

◆EGT is **not normal**:

After shutdown, a restart may be attempted if there is N1 rotation and no abnormal airframe vibration.

►►**Go to the Engine Failure or Shutdown checklist on page 7.11**

■ ■ ■ ■

7 ENG bleed air switch . . . . Off

▼ Continued on next page ▼

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

8 Choose one:

◆Engine **responds**:

►►**Go to step 9**

◆Engine does **not respond**:

Continue engine operation at idle.

►►**Go to step 9**

9 ENG bleed air switch . . . . On

■ ■ ■ ■

FAULT

APU FAULT

Messages: APU FAULT

Condition: An APU automatic shutdown occurs.

1 APU selector .OFF, then ON

2 Choose one:

◆FAULT light **stays illuminated**:

■ ■ ■ ■

◆FAULT light **extinguishes**:

►►**Go to step 3**

3 Descend to and maintain 35,000 feet or below.

4 APU selector . . . . .START, then ON

■ ■ ■ ■

FAULT

APU FUEL VALVE

Messages: APU FUEL VAL

Condition: The APU fuel valve is not in the commanded position.

1 APU selector . . . . OFF

2 Do **not** start the APU.

■ ■ ■ ■

ENGINE CONTROL(S)

Messages: ENGINE CONTROLS R ENG CONTROL
L ENG CONTROL

Condition: An EEC system fault occurs.

■ ■ ■ ■

ENGINE CONTROL

Messages: L ENG CONTROL R ENG CONTROL

Condition: An EEC system fault occurs.

■ ■ ■ ■

ALTN

ENGINE EEC MODE

Messages: L ENG EEC MODE R ENG EEC MODE

Condition: An EEC operates in the alternate control mode.

Objective: To ensure both engines operate in the alternate mode.

1 A/T ARM switch . . . . OFF

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

This prevents exceeding thrust limits.

3 L ELEC ENG CONT switch. . . . . ALTN

4 R ELEC ENG CONT switch . . . . ALTN

5 Observe thrust limits.

■ ■ ■ ■

Engine Failure or Shutdown

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

1 A/T ARM switch . . . . OFF

2 Thrust lever (affected side) . Confirm . . . . Idle

3 **If** engine conditions allow, operate at idle for two minutes to allow engine to cool and stabilize.

4 FUEL CONTROL switch
(affected side) . . . . Confirm . . . CUTOFF

5 Choose one:

◆APU is **not available**:

▶▶**Go to step 7**

◆APU is **available**:

▶▶**Go to step 6**

6 APU selector . . . . START, then ON

7 GND PROX FLAP OVRD switch . . . . OVRD

8 Transponder mode selector . . . . TA ONLY

9 Plan to land at the nearest suitable airport.

▼ Continued on next page ▼

▼ Engine Failure or Shutdown continued ▼

10 **If** wing anti–ice required:

PACK control selector (affected side) . . . . OFF

ISLN switch (affected side) . . . . On

When wing anti–ice no longer required:

L and R ISLN switches . . . . Off

11 Use flaps 20 and VREF 20 for landing.

12 Use flaps 5 for go-around.

13 Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter.

14 Do **not** accomplish the following checklists:

ENGINE SHUTDOWN

PACK OFF

15 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization . . . . LDG ALT ____

Recall . . . . Checked

Autobrake . . . . ____

Landing data . . . . **VREF 20, Minimums____**

Approach briefing . . . . Completed

▼ Continued on next page ▼

Approach Checklist

Altimeters . . . . ____

Landing Checklist

Speedbrake . . . . ARMED

Landing gear . . . . Down

Flaps. **20**

■ ■ ■ ■

ENGINE FUEL FILTER

Messages:	L ENG FUEL FILT R ENG FUEL FILT
Condition:	Fuel contamination can cause fuel to bypass the fuel filter.

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

■ ■ ■ ■

ENG VALVE

ENGINE FUEL VALVE

Messages: L ENG FUEL VAL   R ENG FUEL VAL

Condition: The engine fuel valve is not in the commanded position.

1 Choose one:

◆FUEL CONTROL switch is **not** in CUTOFF:

■ ■ ■ ■

◆FUEL CONTROL switch is in **CUTOFF**:

The engine may continue to run for approximately 1 minute.

►►**Go to step 2**

2 Choose one:

◆In **flight**:

■ ■ ■ ■

◆On the **ground**:

Do **not** attempt engine start.

■ ■ ■ ■

Engine In–flight Start

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

1 Check altitude and airspeed. Starts are not assured outside the EICAS envelope.

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

3 Choose one:

◆X-BLD is **shown**:

▶▶**Go to step 7**

◆X-BLD is **not shown**:

▶▶**Go to step 4**

4 ENG START selector (affected side) . . . . .FLT

▼ **Continued on next page** ▼

▼ Engine In–flight Start continued ▼

5 CF6-80 engines:

FUEL CONTROL switch . . . . RUN

Choose one:

◆EGT does **not increase** in 45 seconds **or** another abort start condition as listed in normal procedures **occurs**:

FUEL CONTROL switch
(affected side) . Confirm . . CUTOFF

►►**Go to step 19**

◆EGT **increases** in 45 seconds **and** another abort start condition as listed in normal procedures does **not occur**:

►►**Go to step 13**

6 PW4000 engines:

FUEL CONTROL switch . . . . RUN

▼ Continued on next page ▼

Choose one:

◆ EGT does **not increase** in 30 seconds **or** another abort start condition as listed in normal procedures **occurs**:

FUEL CONTROL switch (affected side) . Confirm. . CUTOFF

▶▶**Go to step 19**

◆ EGT **increases** in 30 seconds **and** another abort start condition as listed in normal procedures does **not occur**:

▶▶**Go to step 13**

7 PACK control selector (affected side) . . . . OFF

8 ISLN switch (affected side) . . . . On

9 Ignition selector . . . . BOTH

10 ENG START selector (affected side) . . . . GND

▼ Continued on next page ▼

▼ Engine In–flight Start continued ▼

11 CF6-80 engines:

When N2 exceeds minimum fuel on command bug:

FUEL CONTROL switch. . . . . Select RUN when N2 exceed the minimum fuel on command bug

Choose one:

◆EGT does **not increase** in 45 seconds **or** another abort start condition as listed in normal procedures **occurs**:

FUEL CONTROL switch (affected side) . Confirm. . CUTOFF

ENG START selector (affected side) . . . . AUTO

▶▶Go to step 19

◆EGT **increases** in 45 seconds **and** another abort start condition as listed in normal procedures does **not occur**:

▶▶Go to step 13

12 PW4000 engines:

When N2 exceeds minimum fuel on command bug:

FUEL CONTROL switch . . . . RUN

▼ Continued on next page ▼

▼ **Engine In−flight Start continued** ▼

Choose one:

◆EGT does **not increase** in 30 seconds **or** another abort start condition as listed in normal procedures **occurs**:

FUEL CONTROL switch
(affected side) . Confirm. . CUTOFF

ENG START selector
(affected side) . . . . AUTO

►►**Go to step 19**

◆EGT **increases** in 30 seconds **and** another abort start condition as listed in normal procedures does **not occur**:

►►**Go to step 13**

13 Choose one:

◆Engine does **not start**:

FUEL CONTROL switch
(affected side). . . Confirm . . . . . CUTOFF

ENG START selector
(affected side). . . . . AUTO

►►**Go to step 19**

◆Engine **starts**:

►►**Go to step 14**

14 ENG START selector (affected side) . . . . . . AUTO

15 PACK control selectors (both). . . . . AUTO

▼ **Continued on next page** ▼

▼ **Engine In–flight Start continued** ▼

16 L and R ISLN switches. Off

17 Transponder mode selector . . . . .TA/RA

18 GND PROX FLAP OVRD switch . . . . Off

■ ■ ■ ■

19 Plan to land at the nearest suitable airport.

20 **If** wing anti–ice needed:

PACK control selector (affected side) . . . . OFF

ISLN switch (affected side) . . . . On

When wing anti–ice no longer needed:

L and R ISLN switches . . . . Off

21 Use flaps 20 and VREF 20 for landing.

22 Use flaps 5 for go-around.

23 Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter.

24 Do **not** accomplish the following checklists:

ENGINE SHUTDOWN

PACK OFF

25 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization . . . . LDG ALT ____

▼ **Continued on next page** ▼

▼ **Engine In–flight Start continued** ▼

Recall . . . . Checked

Autobrake . . . . ____

Landing data . . . . **VREF 20, Minimums**____

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ____

Landing Checklist

Speedbrake . . . . ARMED

Landing gear . . . . Down

Flaps. **20**

■ ■ ■ ■

ALTN

ENGINE LIMIT PROTECTION

Messages: L ENG LIM PROT   R ENG LIM PROT

Condition: The EEC operates in the alternate mode and command N1 is more than the limit.

1 Thrust lever (affected side) . . . . . Retard until N1 remains within limits

■ ■ ■ ■

ENGINE LOW IDLE

Messages: L ENG LOW IDLE R ENG LOW IDLE

Condition: The engine is below approach idle.

1 Thrust lever (affected side) . . . . Advance until the message blanks

■ ■ ■ ■

ENGINE OIL PRESSURE

L ENG OIL PRESS | R ENG OIL PRESS

Messages: L ENG OIL PRESS R ENG OIL PRESS

Condition: The oil pressure is low.

1 Choose one:

◆Oil pressure indication **at or below red line limit**:

▶▶**Go to the Engine Failure or Shutdown checklist on page 7.11**

■ ■ ■ ■

◆Oil pressure indication **normal**:

Operate engine normally.

■ ■ ■ ■

Engine Oil Temperature [GE:CF6-80C]

Condition: The oil temperature is high.

1 A/T ARM switch . . . . OFF

2 Thrust lever
(affected side) . . . . . Confirm . Retard slowly until the temperature decreases

3 **If** the temperature is in the amber band for 15 minutes **or** reaches the red line limit:

▶▶**Go to the Engine Failure or Shutdown checklist on page 7.11**

■ ■ ■ ■

Engine Oil Temperature [PW4000]

Condition: The oil temperature is high.

1 A/T ARM switch . . . . OFF

2 Thrust lever
(affected side) . . . . . . Confirm. . . Retard slowly until the temperature decreases

3 **If** temperature is in the amber band for 20 minutes **or** reaches red line limit:

▶▶**Go to the Engine Failure or Shutdown checklist on page 7.11**

■ ■ ■ ■

ENGINE RPM LIMIT

Messages: L ENG RPM LIM R ENG RPM LIM

Condition: Engine thrust is at the N1 or N2 red line limit.

■ ■ ■ ■

ENGINE SHUTDOWN

Messages: L ENG SHUTDOWN R ENG SHUTDOWN

Condition: The engine was shutdown by the fuel control switch or the engine fire switch.

■ ■ ■ ■

VALVE

ENGINE STARTER

Messages: L ENG STARTER R ENG STARTER

Condition: The start valve is not open.

1 ENG START selector (affected side) . . . . AUTO

This prevents bleed air from entering starter if valve subsequently opens.

2 Choose one:

◆On the **ground**:

■ ■ ■ ■

◆In **flight**:

Increase airspeed until X–BLD no longer displayed.

■ ■ ■ ■

SPAR VALVE

FUEL SPAR VALVE

Messages: L FUEL SPAR VAL R FUEL SPAR VAL

Condition: The spar fuel valve is not in the commanded position.

1 Choose one:

◆In **flight**:

■ ■ ■ ■

◆On the **ground**:

Do **not** attempt engine start.

■ ■ ■ ■

IDLE DISAGREE

Messages: IDLE DISAGREE

Condition: One engine is at approach idle and the other engine is at minimum idle.

1 Choose one:

◆On the **ground**:

■ ■ ■ ■

◆In **flight**:

Thrust lever (lower thrust side) . . . . Advance until message disappears

■ ■ ■ ■

OIL FILTER

[Option - GE Engines or PW Engines without dual oil filters.]

Messages:	L OIL FILTER	R OIL FILTER
Condition:	Oil filter contamination can cause oil to bypass the oil filter.	

1 A/T ARM switch . . . . OFF

2 Thrust lever (affected side) . . . . . Confirm . Retard slowly until the message disappears **or** the thrust lever is at idle

3 Choose one:

◆OIL FILTER message **not displayed**:

Continue operating at reduced thrust.

■ ■ ■ ■

◆OIL FILTER message **remains displayed**:

►►**Go to the Engine Failure or Shutdown checklist on page 7.11**

■ ■ ■ ■

OIL FILTER

[Option - PW Engines with dual Oil Filters]

Messages:	L OIL FILTER	R OIL FILTER
Condition:	Oil filter contamination can cause oil to bypass the oil filter.	

■ ■ ■ ■

REV ISLN

REVERSER ISOLATION VALVE

Messages: L REV ISLN VAL R REV ISLN VAL

Condition: A fault occurs in the thrust reverser system.

1 Additional system failures may cause inflight deployment.

2 Expect normal reverser operation after landing.

■ ■ ■ ■

REVERSER UNLOCKED

Condition: The REV indication shows with reverse thrust not intentionally commanded.

1 Reverse thrust lever . . . . Verify in the full down position

2 Choose one:

◆With **no yaw, loss of airspeed, or buffet**:

Operate engine normally.

■ ■ ■ ■

◆With **yaw, loss of airspeed, or buffet**:

►►**Go to step 3**

3 Flaps. . . . . Retract

4 A/T ARM switch . . . . OFF

5 Thrust lever (affected side) . . . . Confirm . . . . Idle

6 FUEL CONTROL switch (affected side) . . . . Confirm . . . CUTOFF

7 Choose one:

◆APU is **not available**:

►►**Go to step 9**

◆APU is **available**:

►►**Go to step 8**

8 APU selector . . . . START, then ON

9 GND PROX FLAP OVRD switch . . . . OVRD

▼ Continued on next page ▼

▼ **REVERSER UNLOCKED continued** ▼

10 Transponder mode selector . . . . TA ONLY

11 Plan to land at the nearest suitable airport.

12 **If** wing anti–ice needed:

PACK control selector (affected side) . . . . OFF

ISLN switch (affected side) . . . . On

When wing anti–ice no longer needed:

L and R ISLN switches . . . . Off

13 Use trailing edge flaps 20 and VREF 30 + 30 for landing.

14 Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter.

15 Do **not** accomplish the following checklists:

ENGINE SHUTDOWN

PACK OFF

16 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization . . . . LDG ALT ____

Recall . . . . Checked

Autobrake . . . . ____

Landing data **. . . . . VREF 30+30, Minimums____**

▼ **Continued on next page** ▼

▼ **REVERSER UNLOCKED continued** ▼

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ____

Alternate Flap Extension

L and R ENG START selectors . . . . CONT

ALTN FLAPS selector . . . . Set to agree with flap lever

⚠ Do **not** extend leading edge slats

TE ALTN FLAPS arm switch . . . . ALTN

ALTN FLAPS selector . . . . . . Set to extend or retract trailing edge flaps as needed

Note: Flap indicator may not move until flaps 5 or greater is selected.

Landing Checklist

Speedbrake . . . . ARMED

Landing gear . . . . Down

Flaps. **20**

■ ■ ■ ■

VALVE

STARTER CUTOUT

Messages: L STARTER CUTOUT R STARTER CUTOUT

Condition: The start valve is not closed.

1 ENG START selector (affected side). . . . . AUTO

2 Choose one:

◆VALVE light **extinguishes**:

■ ■ ■ ■

◆VALVE light **stays illuminated**:

►►**Go to step 3**

3 ENG bleed air switch (affected side) . . . . Off

4 ISLN switch (affected side) . . . . Off

5 Choose one:

◆Ground air source **not** in use:

►►**Go to step 7**

◆Ground air source **in use**:

►►**Go to step 6**

6 Disconnect the ground air source.

7 WING ANTI–ICE switch . . . . Off

This prevents possible asymmetrical ice buildup on the wings.

8 Avoid icing conditions.

▼ **Continued on next page** ▼

▼ **STARTER CUTOUT continued** ▼

9 Do **not** accomplish the following checklists:

ENGINE BLEED OFF

PACK OFF

■ ■ ■ ■

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

Caution! Exit volcanic ash as quickly as possible. Consider a 180 degree turn.

1 Don the oxygen masks and smoke goggles (if needed).

2 Establish crew communications (if needed).

3 A/T ARM switch . . . . OFF

If conditions allow, run the engines at idle

4 Thrust levers (both). . . . . Idle

5 ENG START selectors (both). . . . . FLT

6 RECIRC FAN switches (both) . . . . .Off

7 ENGINE ANTI–ICE switches (both) . . . . .ON

8 WING ANTI–ICE switch . . . . .ON

9 Choose one:

◆APU is **not available**:

▶▶**Go to step 11**

◆APU is **available**:

▶▶**Go to step 10**

10 APU selector . . . . .START, then ON

▼ **Continued on next page** ▼

▼ **Volcanic Ash continued** ▼

11 Engines may accelerate to idle very slowly, especially at high altitude.

Note: Volcanic ash can cause non–normal system reactions such as:

- engine malfunctions, increasing EGT, engine stall or flameout
- decrease or loss of airspeed indications
- equipment overheat or smoke indications
- cargo fire indications

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

13 Choose one:

◆ Engines **flamed out or stalled, or** EGT **rapidly approaching or exceeding limit**:

►► **Go to the Dual Engine Failure checklist on page 7.2**

■ ■ ■ ■

◆ Engines **not** flamed out or stalled **and** EGT **stabilized or decreasing**:

►► **Go to step 14**

14 Plan to land at the nearest suitable airport.

15 Do **not** accomplish the following checklist:

RECIRCULATION FAN

■ ■ ■ ■

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APU FIRE

Messages: 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 Choose one:

◆ APU fire warning light **stays illuminated**:

Plan to land at the nearest suitable airport.

►► **Go to step 3**

◆ APU fire warning light **extinguishes**:

►► **Go to step 3**

3 Do **not** accomplish the following checklists:

APU BOTTLE

APU FAULT

■ ■ ■ ■

ENGINE FIRE or Engine Severe Damage or Separation

Messages: L ENGINE FIRE R ENGINE FIRE

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

1 A/T ARM switch . . . . OFF

2 Thrust lever (affected side) . Confirm . . . . Idle

3 FUEL CONTROL switch
(affected side) . . . . Confirm . . . CUTOFF

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

5 **If** the engine fire warning light is illuminated:

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

If after 30 seconds the engine fire warning light stays illuminated:

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

▼ Continued on next page ▼

▼ ENGINE FIRE or Severe Damage or Separation continued ▼

6 **If** high airframe vibration occurs and continues after engine shutdown:

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

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

7 Choose one:

◆APU is **not available**:

▶▶**Go to step 9**

◆APU is **available**:

▶▶**Go to step 8**

8 APU selector . . . . START, then ON

9 GND PROX FLAP OVRD switch . . . . OVRD

10 Transponder mode selector . . . . TA ONLY

11 Plan to land at the nearest suitable airport.

12 **If** wing anti–ice required:

PACK control selector (affected side) . . . . OFF

ISLN switch (affected side) . . . . On

When wing anti–ice no longer required:

L and R ISLN switches . . . . Off

▼ Continued on next page ▼

▼ ENGINE FIRE or Severe Damage or Separation continued ▼

13 Use flaps 20 and VREF 20 for landing.

14 Use flaps 5 for go-around.

15 Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter.

16 Do **not** accomplish the following checklists:

ENGINE BOTTLE

ENGINE SHUTDOWN

PACK OFF

17 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization . . . . LDG ALT ____

Recall . . . . Checked

Autobrake . . . . ____

Landing data . . . . **VREF 20, Minimums____**

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ____

Landing Checklist

Speedbrake . . . . ARMED

▼ Continued on next page ▼

▼ ENGINE FIRE or Severe Damage or Separation continued ▼

Landing gear . . . . Down

Flaps. **20**

■ ■ ■ ■

Engine Tailpipe Fire

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

1 FUEL CONTROL switch (affected side) . . . 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 control selectors (both). . . . . OFF

5 L and R ISLN switches. On

6 Choose one:

◆Affected ENG START selector is in **GND**:

▶▶**Go to step 9**

◆Affected ENG START selector is **not** in GND:

▶▶**Go to step 7**

7 **Wait** for N2 to decrease to 30%.

8 ENG START selector (affected side). . . . . .GND

9 Advise the tower.

▼ **Continued on next page** ▼

▼ **Engine Tailpipe Fire continued** ▼

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

ENG START selector
(affected engine) . . . . AUTO

■ ■ ■ ■

Smoke, Fire or Fumes

Condition: Smoke, fire or fumes is identified.

1 Diversion may be needed.

2 Don oxygen masks, as needed.

3 Don smoke goggles, as needed.

4 Establish crew and cabin communications.

5 Advise cabin crew that main cabin lighting will be turned off.

6 UTILITY BUS switches (both) . . . . Off

7 APU bleed air switch . . . . Off

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

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

9 Choose one:

◆Source of the smoke, fire or fumes is both **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 10**

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

▶▶**Go to step 11**

▼ **Continued on next page** ▼

▼ Smoke, Fire or Fumes continued ▼

10 Choose one:

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

Continue flight at the Captain's discretion.

Restore unpowered items at the Captain's discretion.

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

■ ■ ■ ■

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

►► **Go to step 11**

11 EQUIP COOLING selector. . . . . STBY

12 Initiate a diversion to the nearest suitable airport while continuing the checklist.

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

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

15 L and R ISLN switches. . . . . Off

16 R PACK control selector . . . . OFF

17 **Wait** 2 minutes unless the smoke or fumes are increasing.

▼ Continued on next page ▼

▼ **Smoke, Fire or Fumes continued** ▼

18 Choose one:

◆Smoke or fumes do **not continue** or are **not increasing**:

►►**Go to step 25**

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

►►**Go to step 19**

19 R PACK control selector . . . . AUTO

20 L PACK control selector . . . . OFF

21 **Wait** 2 minutes unless the smoke or fumes are increasing.

22 Choose one:

◆Smoke or fumes do **not continue** or are **not increasing**:

►►**Go to step 25**

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

►►**Go to step 23**

23 L PACK control selector . . . . AUTO

24 Consider an immediate landing.

25 Do **not** accomplish the following checklists:

UTILITY BUS OFF

PACK OFF

RECIRCULATION FAN

▼ **Continued on next page** ▼

▼ Smoke, Fire or Fumes continued ▼

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

■ ■ ■ ■

APU BTL DISCH

APU BOTTLE

Messages:	APU BTL
Condition:	The fire bottle pressure is low.

■ ■ ■ ■

DISCH

CARGO BOTTLE

Messages:	CARGO BTL 1	CARGO BTL 2
Condition:	A fire bottle pressure is low.	

■ ■ ■ ■

CARGO FIRE

FWD AFT

Messages: FWD CARGO FIRE AFT CARGO FIRE

Condition: Smoke is detected in the cargo compartment.

1 CARGO FIRE ARM switch
(FWD or AFT). . . . . Confirm . . . . . . ARMED

2 CARGO FIRE BTL DISCH switch . . . Push and hold for 1 second

3 EQUIP COOLING selector. . . . . .OVRD

4 Choose one:

◆**Forward** cargo fire:

FWD CARGO HEAT switch . . . . .Off

▶▶**Go to step 5**

◆**Aft** cargo fire:

AFT and BULK
CARGO HEAT switches . . . . .Off

AFT CARGO HEAT switch. . . . . .Off

▶▶**Go to step 5**

5 FLT DK COMPT TEMP control . . . . Full cool

▼ **Continued on next page** ▼

▼ CARGO FIRE continued ▼

6 Choose one:

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

LDG ALT selector . . . . Set 7,500 feet

CABIN ALTITUDE
AUTO RATE control . . . . MAX

►►**Go to step 7**

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

►►**Go to step 7**

7 PACK control selector (either) . . . . OFF

8 Choose one:

◆Airplane altitude **above** 35,000 feet:

Descend to 35,000 feet or below.

►►**Go to step 9**

◆Airplane altitude **at or below** 35,000 feet:

►►**Go to step 9**

9 Plan to land at the nearest suitable airport.

10 Do **not** accomplish the following checklists:

CARGO BOTTLE

PACK OFF

RECIRCULATION FAN

11 **Checklist Complete Except Deferred Items**

▼ Continued on next page ▼

▼ **CARGO FIRE continued** ▼

Deferred Items

Prior to descent for landing

LDG ALT selector . . . . Set landing field elevation

Descent Checklist

Pressurization . . . . LDG 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

Speedbrake . . . . ARMED

Landing gear . . . . Down

Flaps . . . . ___

■ ■ ■ ■

ENGINE BOTTLE

ENG BTL 1 DISCH	ENG BTL 2 DISCH

Messages:	ENG BTL 1	ENG BTL 2
Condition:	The fire bottle pressure is low.	

■ ■ ■ ■

ENGINE OVERHEAT

L ENG OVHT   R ENG OVHT

Messages: L ENG OVHT   R ENG OVHT

Condition: An engine overheat is detected.

1 ENG bleed air switch (affected side) . . . . Off

2 A/T ARM switch . . . . OFF

3 Thrust lever
(affected side) . . . Confirm . . . Retard slowly until
ENG OVHT light extinguishes
or thrust lever is at idle

4 Choose one:

◆ENG OVHT light **extinguishes**:

▶▶**Go to step 5**

◆ENG OVHT light **stays illuminated**:

▶▶**Go to the Engine Failure or Shutdown checklist on page 7.11**

■ ■ ■ ■

5 Operate engine at reduced thrust level for the remainder of flight.

6 **If** wing anti–ice needed:

PACK control selector (affected side) . . . . OFF

ISLN switch (affected side) . . . . On

▼ **Continued on next page** ▼

When wing anti–ice no longer needed:

L and R ISLN switches . . . . Off

7 Do **not** accomplish the following checklists:

ENGINE BLEED OFF

PACK OFF

■ ■ ■ ■

SMOKE

EQUIPMENT SMOKE

Messages: FWD EQPT SMOKE

Condition: Smoke is sensed in the forward equipment cooling ducts.

1 EQUIP COOLING selector. . . . . OVRD

2 The SMOKE light will extinguish when smoke clears.

3 **Wait** 1 minute.

4 Choose one:

◆NO COOLING light is **not** illuminated:

■ ■ ■ ■

◆NO COOLING light is **illuminated**:

EQUIP COOLING selector . . . . STBY

■ ■ ■ ■

FAIL
P-RESET

FIRE/OVERHEAT SYSTEM

Messages: FIRE/OVHT SYS

Condition: One or more of these occur:
- Engine fire and overheat detection is inoperative
- APU fire detection is inoperative
- Cargo fire detection is inoperative

1 FIRE/OVHT TEST SYS FAIL switch . . . . Push

■ ■ ■ ■

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.

Warning! Do not turn an operating pack OFF. Selecting packs OFF will result in increased smoke concentrations.

3 Close the flight deck door.

4 EQUIP COOLING selector . . . . OVRD

5 LDG ALT selector . . . . Set 9,500 feet

6 CABIN ALTITUDE AUTO RATE control. . . . . MAX

▼ **Continued on next page** ▼

▼ **Smoke or Fumes Removal continued** ▼

7 Choose one:

◆Smoke or fumes is **not persistent**:

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

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

▶▶**Go to step 8**

8 Descend to 9,500 feet or below as soon as conditions permit.

9 **When** at 9,500 feet:

Cabin altitude MODE SELECT . . . . MAN

CABIN ALTITUDE MANUAL control . . . . Hold to CLIMB until outflow valve fully open

Do not accomplish the following checklist:

CABIN AUTOMATIC INOPERATIVE

10 **When** smoke has dissipated:

EQUIP COOLING selector . . . . STBY

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

■ ■ ■ ■

WHL WELL FIRE

WHEEL WELL FIRE

Messages: WHEEL WELL FIRE

Condition: Fire is detected in a main wheel well.

Maximum 270K/.82M

1 Landing gear lever. .DN

This attempts to extinguish the fire.

2 Plan to land at the nearest suitable airport.

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

3 Flight with gear down increases fuel consumption and decreases climb performance. Refer to Gear Down performance tables in Performance Inflight chapter for flight planning.

4 Choose one:

◆Landing gear retraction is **not needed** for airplane performance:

■ ■ ■ ■

◆Landing gear retraction is **needed** for airplane performance:

►►**Go to step 5**

5 **When** WHL WELL FIRE light extinguishes:

Wait 20 minutes. This attempts to ensure the fire remains extinguished.

Landing gear lever . . . . UP, then OFF

■ ■ ■ ■

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AIL LOCK

AILERON LOCKOUT

Messages: AILERON LOCKOUT

Condition: An aileron lockout actuator is not in the commanded position.

1 Choose one:

◆At **high** airspeed:

Avoid large or abrupt control wheel inputs.

■ ■ ■ ■

◆At **low** airspeed:

Roll rates may be reduced.

■ ■ ■ ■

All Flaps and Slats Up Landing

Condition: The leading edge slats and trailing edge flaps fail to extend.

1 Accomplish this checklist **only** when directed by the LEADING EDGE SLAT ASYMMETRY checklist.

2 Do **not** slow below VREF 30 + 80 until established on final approach.

3 Limit bank angle to 15 degrees below VREF 30 + 80.

Note: Tail clearance is reduced on landing.

4 ENG START selectors (both). . . . . CONT

5 Use VREF 30 + 50 for landing.

6 Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter.

7 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization . . . . LDG ALT ___

Recall . . . . Checked

Autobrake . . . . ___

Landing data **. . . . .VREF 30 + 50, Minimums___**

Approach briefing . . . . Completed

▼ Continued on next page ▼

▼ All Flaps and Slats Up Landing continued ▼

Approach Checklist

Altimeters . . . . ___

Landing Checklist

Speedbrake . . . . ARMED

Landing gear . . . . Down

Flaps. . . . . **.UP**

■ ■ ■ ■

AUTO SPDBRK

AUTO SPEEDBRAKE

Messages: AUTO SPEEDBRAKE

Condition: An automatic speedbrake fault occurs.

1 Do **not** arm the speedbrake lever.

2 Manually extend speedbrakes after landing.

3 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization . . . . LDG ALT ____

Recall . . . . Checked

Autobrake . . . . ____

Landing data . . . . VREF____, Minimums____

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ____

Landing Checklist

Speedbrake . . . . **DOWN**

Landing gear . . . . Down

Flaps . . . . ____

■ ■ ■ ■

TRAILING EDGE

FLAP LOAD RELIEF

Messages: FLAP LD RELIEF

Condition: The flap load relief system is failed.

1 Check flap position and maintain the appropriate speed.

■ ■ ■ ■

OFF

FLIGHT CONTROL VALVES

OFF

Messages: FLT CONT VALS

Condition: Two or more flight control shutoff valves are closed.

1 L, C, and R TAIL and WING FLT CONTROL SHUTOFF switches must be ON for flight.

■ ■ ■ ■

Jammed or Restricted Flight Controls

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

1 Overpower the jammed or restricted system. Use maximum force, including a combined effort of both pilots, if needed.

2 **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.

3 Choose one:

◆Faulty system can be **overpowered**:

Continue to overpower the jammed or restricted system as needed.

■ ■ ■ ■

◆Faulty system **cannot** be overpowered:

Use operative flight controls, trim, and thrust as needed for airplane control.

■ ■ ■ ■

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LEADING EDGE

LEADING EDGE SLAT ASYMMETRY

Messages: LE SLAT ASYM

Condition: The leading edge slats are not symmetrically extended.

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

1 GND PROX FLAP OVRD switch . . . . OVRD

2 Choose one:

◆Indicated flap position is **greater than** 20:

Use current flaps and VREF 30 + 20 for landing.

▶▶**Go to step 12**

◆Indicated flap position is **20 or less**:

▶▶**Go to step 3**

3 Use trailing edge flaps 20 and VREF 30 + 30 for landing.

4 ENG START selectors (both). . . . . CONT

5 FLAP lever . . . . Extend or retract trailing edge flaps as needed

▼ Continued on next page ▼

▼ LEADING EDGE SLAT ASYMMETRY continued ▼

6 Choose one:

◆TE FLAP DISAGREE message is **not** shown:

►►**Go to step 12**

◆TE FLAP DISAGREE message is **shown**:

►►**Go to step 7**

7 ALTN FLAPS selector . . . . Position to agree with FLAP lever

Do **not** arm the **LE** ALTN FLAPS switch

8 ⚠ TE ALTN FLAPS arm switch . . . . ALTN

9 ALTN FLAPS selector . . . . Extend or retract trailing edge flaps as needed

Note: Flap position indicator may not move until flaps 5 or greater is selected.

Note: Autothrottle may disconnect during alternate flap extension.

10 Choose one:

◆TE FLAP DISAGREE message is **not** shown:

►►**Go to step 12**

◆TE FLAP DISAGREE message is **shown**:

►►**Go to step 11**

▼ Continued on next page ▼

▼ **LEADING EDGE SLAT ASYMMETRY continued** ▼

11 Choose one:

◆Indicated flap position is **less than** 5:

Do **not** accomplish the following checklist:

TRAILING EDGE FLAP DISAGREE

►►**Go to the All Flaps and Slats Up Landing checklist on page 9.2**

■ ■ ■ ■

◆Indicated flap position is **at or greater than 5 and less than 20**:

Use current flaps and VREF 30 + 40 for landing.

►►**Go to step 12**

◆Indicated flap position is **20**:

Use current flaps and VREF 30 + 30 for landing.

►►**Go to step 12**

12 Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter.

13 **Checklist Complete Except Deferred Items**

▼ **Continued on next page** ▼

▼ **LEADING EDGE SLAT ASYMMETRY continued** ▼

Deferred Items

Descent Checklist

Pressurization . . . . LDG ALT ____

Recall . . . . Checked

Autobrake . . . . ____

Landing data . . . . VREF____, Minimums____
VREF 30 + 20, or VREF 30 + 30, or VREF 30 + 40 as directed

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ____

Landing Checklist

Speedbrake . . . . ARMED

Landing gear . . . . Down

Flaps **. . . . . As directed**

■ ■ ■ ■

LEADING EDGE

LEADING EDGE SLAT DISAGREE

Messages: LE SLAT DISAGREE

Condition: The leading edge slats are not in the commanded position.

1 GND PROX FLAP OVRD switch . . . . .OVRD

2 Choose one:

◆Indicated flap position **greater than** 20:

Use current flaps and VREF 20 for landing.

►►**Go to step 16**

◆Indicated flap position **20 or less**:

►►**Go to step 3**

3 Use flaps 20 and VREF 20 for landing.

4 Choose one:

◆FLAP lever position **greater than** 20:

ALTN FLAPS selector. 20

►►**Go to step 6**

◆FLAP lever position **20 or less**:

►►**Go to step 5**

5 ALTN FLAPS selector . . . . Position to agree with FLAP lever

6 LE ALTN FLAPS arm switch. . . . . ALTN

▼ **Continued on next page** ▼

▼ **LEADING EDGE SLAT DISAGREE continued** ▼

7 **After** selecting ALTN:

▶▶**Go to step 8**

8 Choose one:

◆LEADING EDGE light is **illuminated**:

LE ALTN FLAPS arm switch . . . . Off

▶▶**Go to the LEADING EDGE SLAT ASYMMETRY checklist on page 9.8**

■ ■ ■ ■

◆LEADING EDGE light is **not illuminated**:

▶▶**Go to step 9**

9 ALTN FLAPS selector . . . Extend or retract leading edge slats as needed

10 FLAP lever . . . . Extend or retract trailing edge flaps as needed

11 Choose one:

◆TE FLAP DISAGREE message is **not shown**:

▶▶**Go to step 16**

◆TE FLAP DISAGREE message is **shown**:

▶▶**Go to step 12**

12 Do **not** accomplish the following checklist:

TRAILING EDGE FLAP DISAGREE

▼ **Continued on next page** ▼

▼ LEADING EDGE SLAT DISAGREE continued ▼

13 ALTN FLAPS selector . . . . Position to agree with FLAP lever

14 TE ALTN FLAPS arm switch . . . . ALTN

15 ALTN FLAPS selector . . . . Extend or retract trailing edge flaps as needed

16 Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter.

17 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization . . . . LDG ALT ____

Recall . . . . Checked

Autobrake . . . . ____

Landing data . . . . **VREF 20, Minimums____**

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ____

Landing Checklist

Speedbrake . . . . ARMED

Landing gear . . . . Down

Flaps . . . . **As directed**

■ ■ ■ ■

RUDDER RATIO

RUDDER RATIO

Messages: RUDDER RATIO

Condition: The rudder ratio system is failed.

1 Above 160 knots, avoid large or abrupt rudder inputs.

2 Choose one:

◆ Left hydraulic system pressure is **not normal**:

■ ■ ■ ■

◆ Left hydraulic system pressure is **normal**:

▶▶**Go to step 3**

3 Crosswind limit is 15 knots.

4 Do **not** autoland.

■ ■ ■ ■

SPEED BRAKES

SPEEDBRAKES EXTENDED

Messages: SPEEDBRAKES EXT

Condition: The speedbrakes are extended and one or more of these occur:
- The radio altitude is between 15 and 800 feet
- The flap lever is in a landing setting

■ ■ ■ ■

SPOILERS

SPOILERS [Advisory]

Messages: SPOILERS

Condition: One or more spoiler pairs are failed.

1 Roll rate may be reduced inflight.

2 Speedbrake effectiveness may be reduced in flight and during landing.

■ ■ ■ ■

STAB TRIM

STABILIZER TRIM

Messages: STAB TRIM

Condition: The stabilizer trim operates at a decreased rate.

1 **If** a normal stabilizer trim rate is desired:

ALTN STAB TRIM switches (both) . . . . Push and hold when trim is desired

■ ■ ■ ■

OFF

TAIL HYDRAULIC VALVE

Messages: C TAIL HYD VAL R TAIL HYD VAL L TAIL HYD VAL

Condition: A flight control shutoff valve is closed.

1 L, C, and R TAIL FLT CONTROL SHUTOFF switches must be ON for flight.

■ ■ ■ ■

Intentionally
Blank

TRAILING EDGE

TRAILING EDGE FLAP ASYMMETRY

Messages: TE FLAP ASYM

Condition: The trailing edge flaps are not symmetrically extended.

Caution! Do not arm the TRAILING EDGE (TE) ALTERNATE FLAPS switch.

Note: Do not use FMC fuel predictions with flaps extended.

1 GND PROX FLAP OVRD switch . . . . OVRD

2 Choose one:

◆ Indicated flap position **at or greater than 20**:

Use VREF 20 for landing.

►► **Go to step 4**

◆ Indicated flap position **between 5 and 20**:

Use VREF 30 + 20 for landing.

►► **Go to step 4**

◆ Indicated flap position **5 or less**:

►► **Go to step 3**

3 Use VREF 30 + 30 for landing.

Note: Tail clearance is reduced on landing.

▼ Continued on next page ▼

▼ **TRAILING EDGE FLAP ASYMMETRY continued** ▼

4 Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter.

5 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization. . . . . LDG ALT ____

Recall . . . . Checked

Autobrake . . . . ____

Landing data . . . . **VREF____, Minimums____**
VREF 20, VREF 30 + 20, or
VREF 30 + 30, as directed

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ____

Landing Checklist

Speedbrake . . . . ARMED

Landing gear . . . . Down

Flaps. . . . . **As directed**

■ ■ ■ ■

TRAILING EDGE

TRAILING EDGE FLAP DISAGREE

Messages: TE FLAP DISAGREE

Condition: The trailing edge flaps are not in the commanded position.

1 GND PROX FLAP OVRD switch . . . . .OVRD

2 Choose one:

◆Indicated flap position **greater than** 20:

Use current flaps and VREF 20 for landing.

▶▶**Go to step 9**

◆Indicated flap position **20 or less**:

Use flaps 20 and VREF 20 for landing.

▶▶**Go to step 3**

3 Choose one:

◆FLAP lever position **greater than** 20:

ALTN FLAPS selector. 20

▶▶**Go to step 4**

◆FLAP lever position **20 or less**:

ALTN FLAPS selector. . . . Position to agree with FLAP lever

▶▶**Go to step 4**

4 TE ALTN FLAPS arm switch . . . . ALTN

▼ **Continued on next page** ▼

▼ TRAILING EDGE FLAP DISAGREE continued ▼

5 Choose one:

◆ TRAILING EDGE light **stays illuminated**:

TE ALTN FLAPS arm switch . . . . Off

▶▶**Go to the TRAILING EDGE FLAP ASYMMETRY checklist on page 9.18**

■ ■ ■ ■

◆ TRAILING EDGE light **extinguishes**:

▶▶**Go to step 6**

6 ALTN FLAPS selector . . . . Extend or retract trailing edge flaps as needed

7 FLAP lever . . . . Position to agree with ALTN FLAPS selector

8 Choose one:

◆ LE SLAT DISAGREE message is **not** shown:

▶▶**Go to step 9**

◆ LE SLAT DISAGREE message is **shown**:

LE ALTN FLAPS arm switch . . . . ALTN

▶▶**Go to step 9**

9 Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter.

10 **Checklist Complete Except Deferred Items**

▼ Continued on next page ▼

▼ TRAILING EDGE FLAP DISAGREE continued ▼

Deferred Items

Descent Checklist

Pressurization . . . . LDG ALT ____

Recall . . . . Checked

Autobrake . . . . ____

Landing data . . . . **VREF 20, Minimums____**

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ____

Landing Checklist

Speedbrake . . . . ARMED

Landing gear . . . . Down

Flaps . . . . **.As directed**

■ ■ ■ ■

Intentionally
Blank

UNSCHED STAB TRIM

UNSCHEDULED STABILIZER TRIM

Messages: UNSCHD STAB TRIM

Condition: Stabilizer movement occurs without a signal to trim.

1 STAB TRIM CUT OUT switches (both) . . CUT OUT

Higher than normal control column force may be needed to prevent unwanted pitch change

2 ⚠ Autopilot disengage switch . . . . Push

3 C STAB TRIM CUT OUT switch . . . . .NORM

4 Choose one:

◆Unscheduled trim **does not occur**:

▶▶**Go to step 8**

◆Unscheduled trim **occurs**:

▶▶**Go to step 5**

5 C STAB TRIM CUT OUT switch . . . . CUT OUT

6 L STAB TRIM CUT OUT switch. . . . . .NORM

7 Choose one:

◆Unscheduled trim **does not occur**:

▶▶**Go to step 8**

◆Unscheduled trim **occurs**:

L STAB TRIM CUT OUT switch . . CUT OUT

▶▶**Go to step 8**

▼ **Continued on next page** ▼

UNSCHEDULED STABILIZER TRIM continued

8 Do **not** accomplish the following checklist:

STABILIZER TRIM

■ ■ ■ ■

OFF

WING HYDRAULIC VALVE

Messages: C WING HYD VAL R WING HYD VAL L WING HYD VAL

Condition: A wing flight control shutoff valve is closed.

1 L, C, and R WING FLT CONTROL SHUTOFF switches must be ON for flight.

■ ■ ■ ■

INOP

YAW DAMPER

Messages: L YAW DAMPER R YAW DAMPER

Condition: A yaw damper is inoperative because one of these occurs:
- A yaw damper system is failed
- An IRS is not aligned

1 YAW DAMPER switch . . . . Off

■ ■ ■ ■

Intentionally
Blank

Non-Normal Checklists — Chapter NNC
Flight Instruments, Displays — Section 10

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Intentionally
Blank

Airspeed Unreliable

Condition: The airspeed or Mach indications are suspected to be unreliable. (Items which may indicate Airspeed Unreliable are listed in the Additional Information section.)

Objective: Maintain control using manual pitch and thrust.

1 Check the pitch attitude and thrust.

2 **If** pitch attitude or thrust is **not** normal for phase of flight:

Autopilot disengage switch . . . . .Push

Autothrottle disconnect switch . . . . .Push

F/D switches (both) . . . . OFF

Establish normal pitch attitude and thrust setting for phase of flight.

Note: Normal pitch attitude and thrust settings are available in the FLIGHT WITH UNRELIABLE AIRSPEED table in the Performance Inflight chapter.

3 Altitude information, vertical speed information, limit N1, Reference N1, and N1 bug may be unreliable.

4 Altitude information, vertical speed information, limit EPR, Reference EPR, and EPR bug may be unreliable.

▼ Continued on next page ▼

▼ Airspeed Unreliable continued ▼

5 Cross check captain and first officer airspeed indications and standby airspeed indicator. An airspeed display differing by more than 15 knots from the standby indicator should be considered unreliable.

6 Choose one:

◆Reliable airspeed data source **can** be determined:

AIR DATA switch (unreliable side) . . ALTN

Invalid overspeed warning and invalid input to AFDS and autothrottle may occur or continue.

■ ■ ■ ■

◆Reliable airspeed data source can **not** be determined:

►►**Go to step 7**

7 Maintain normal pitch attitude and thrust setting for phase of flight. Refer to the FLIGHT WITH UNRELIABLE AIRSPEED table in the Performance Inflight chapter.

8 Maintain visual conditions if possible.

9 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization . . . . LDG ALT ____

Recall . . . . Checked

▼ Continued on next page ▼

▼ Airspeed Unreliable continued ▼

Autobrake . . . . ___

Landing data . . . . VREF___, Minimums__________

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . _____

Establish landing configuration early.

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

Refer to IRS ground speed on the CDU POS REF page and reported wind on approach.

Landing Checklist

Speedbrake . . . . ARMED

Landing gear . . . . Down

Flaps . . . . ___

■ ■ ■ ■

▼ Continued on next page ▼

▼ Airspeed Unreliable continued ▼

Additional Information

One or more of the following may be evidence of unreliable airspeed/Mach indication:

- speed/altitude information not consistent with pitch attitude and thrust setting
- speed/airspeed/Mach failure flags
- blank or fluctuating airspeed displays
- variation between captain and first officer airspeed displays
- amber line through one or more ADI flight mode annunciations
- overspeed indications
- radome damage or loss
- simultaneous overspeed and stall warnings

Display of one or more of the following EICAS messages may be evidence of unreliable airspeed/Mach indication:

- AILERON LOCKOUT
- ALT DISAGREE
- CAPT PITOT
- F/O PITOT
- IAS DISAGREE
- L AUX PITOT
- OVERSPEED
- PROBE HEAT
- R AUX PITOT
- RUDDER RATIO

Intentionally
Blank

ALTITUDE DISAGREE

Message: ALT DISAGREE

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

1 Airplane does not meet RVSM airspace requirements.

2 Transponder altitude received by ATC may be unreliable.

3 **Checklist Complete Except Deferred Items**

▼ Continued on next page ▼

▼ ALTITUDE DISAGREE continued ▼

Deferred Items

Descent Checklist

Pressurization . . . . LDG ALT ___

Recall . . . . Checked

Autobrake . . . . ___

Landing data . . . . VREF___, Minimums__________

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . _____

Maintain visual conditions if possible.

Establish landing configuration early.

Radio altitude reference available below 2500 feet.

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

Landing Checklist

Speedbrake . . . . ARMED

Landing gear . . . . Down

Flaps . . . . ___

■ ■ ■ ■

ATTITUDE DISAGREE

Message: ATT DISAGREE

Condition: The captain’s and the first officer’s attitude indications disagree.

■ ■ ■ ■

IAS DISAGREE

Message: IAS DISAGREE

Condition: The captain’s and the first officer’s airspeed indications disagree.

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

■ ■ ■ ■

INSTRUMENT SWITCH

Message: INSTR SWITCH

Condition: Both pilots’ ADI and HSI use the same symbol generator source.

1 Both ADIs and HSIs are displaying information from the center symbol generator.

■ ■ ■ ■

Non-Normal Checklists — Chapter NNC

Flight Management, Navigation — Section 11

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Intentionally
Blank

ATC FAULT

Messages: ATC FAULT

Condition: A transponder fault occurs.

■ ■ ■ ■

FMC FAIL

Messages: L FMC FAIL R FMC FAIL

Condition: An FMC is failed.

1 Choose one:

◆A **single** FMC is failed:

▶▶**Go to step 2**

◆**Both** FMCs are failed:

▶▶**Go to step 4**

2 NAV SOURCE selector . . . . .FMC-L or FMC-R

Select the operative FMC

3 During VOR approaches, one pilot must have raw data from the VOR associated with the approach displayed on the RDMI (RMI) or HSI in a VOR mode, no later than the final approach fix.

■ ■ ■ ■

4 Select autopilot roll and pitch modes appropriate for the desired flight path. LNAV and VNAV are not available.

5 Captain’s NAV SOURCE selector . . . . CDU–L

6 First Officer’s NAV SOURCE selector . . . . . . CDU–R

7 Route modifications must be entered into both CDUs. Enter any new waypoints by latitude and longitude.

8 Manually tune navigation radios.

▼ Continued on next page ▼

▼ **FMC FAIL continued** ▼

9 Refer to Performance Inflight chapter for VREF speed and other applicable performance information.

■ ■ ■ ■

FMC

FMC MESSAGE

Messages: FMC MESSAGE

Condition: An alert message is in the FMC scratchpad.

1 Choose one:

◆CDU message **is** FUEL QTY ERROR–PROG 2, FUEL DISAGREE–PROG 2, or INSUFFICIENT FUEL

►►**Go to the Engine Fuel Leak checklist on page 12.1**

■ ■ ■ ■

◆CDU message is **not** FUEL QTY ERROR–PROG 2, FUEL DISAGREE–PROG 2, or INSUFFICIENT FUEL:

Take action as needed per the message.

■ ■ ■ ■

GPS

Messages: L GPS R GPS
GPS

Condition: One or both GPS receivers are failed.

1 Choose one:

◆**L GPS or R GPS** message is shown:

The indicated GPS has failed.

■ ■ ■ ■

◆**GPS** message is shown:

Both GPSs have failed.

■ ■ ■ ■

DC FAIL

IRS DC FAIL

Messages: L IRS DC FAIL R IRS DC FAIL
C IRS DC FAIL

Condition: IRS backup DC power is failed.

■ ■ ■ ■

FAULT

IRS FAULT

Messages: L IRS FAULT   R IRS FAULT
C IRS FAULT

Condition: An IRS fault occurs.

1 Choose one:

◆**Left** IRS FAULT light is **illuminated**:

Captain's IRS switch . . . . ALTN

■ ■ ■ ■

◆**Right** IRS FAULT light is **illuminated**:

First Officer's IRS switch. . . . . ALTN

■ ■ ■ ■

◆**Center** IRS FAULT light is **illuminated**:

■ ■ ■ ■

ON DC

IRS ON DC

Messages: L IRS ON DC   R IRS ON DC
C IRS ON DC

Condition: IRS AC power is failed.

■ ■ ■ ■

UNABLE RNP

Messages: UNABLE RNP

Condition: The actual navigation performance is not sufficient.

1 **If** on a procedure or airway that has an RNP alerting requirement:

Select alternate procedure or airway, or initiate a go–around.

■ ■ ■ ■

2 **If** on a procedure or airway without RNP:

Verify position.

■ ■ ■ ■

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Intentionally
Blank

Engine Fuel Leak

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

1 C L and C R PUMP switches . . . . Off

2 Do **not** accomplish the following checklist:

FUEL CONFIGURATION

3 FUEL XFEED switches . . . . Off

4 Identify an engine fuel leak by observing a left or right main tank fuel quantity decreasing faster than the other.

5 An increase in fuel imbalance of approximately 1000 pounds or more in 30 minutes should be considered an engine fuel leak.

6 **If** conditions allow:

Visually check for engine fuel leak.

7 Choose one:

◆Engine fuel leak **confirmed**:

▶▶**Go to step 17**

◆Engine fuel leak **not confirmed**:

▶▶**Go to step 8**

8 Resume normal fuel management procedures.

▼ Continued on next page ▼

▼ **Engine Fuel Leak continued** ▼

9 Choose one:

◆FUEL DISAGREE-PROG 2 **and** FUEL QTY ERROR-PROG 2 messages are **not** shown on the CDU scratchpad:

►►**Go to step 12**

◆FUEL DISAGREE-PROG 2 **or** FUEL QTY ERROR-PROG 2 message is **shown** on the CDU scratchpad:

►►**Go to step 10**

10 Select PROGRESS PAGE 2.

11 TOTALIZER or CALCULATED . . . . Select USE for the most accurate indication

12 Choose one:

◆LOW FUEL message **not** shown:

■ ■ ■ ■

◆LOW FUEL message is **shown**:

FWD and AFT FUEL XFEED switches . . . On

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

►►**Go to step 13**

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

This ensures all fuel is available.

▼ **Continued on next page** ▼

▼ Engine Fuel Leak continued ▼

14 Plan to land at nearest suitable airport.

15 Avoid high nose up attitude and excessive acceleration and deceleration.

16 Do **not** accomplish the following checklist:

LOW FUEL

■ ■ ■ ■

17 A/T ARM switch . . . . OFF

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

19 FUEL CONTROL switch
(affected engine) . . . . Confirm . . . CUTOFF

20 Choose one:

◆APU is **available**:

▶▶**Go to step 21**

◆APU is **not available**:

▶▶**Go to step 22**

21 APU selector . . . . START, then ON

22 GND PROX FLAP OVRD switch . . . . OVRD

23 Transponder mode selector . . . . TA ONLY

24 Plan to land at the nearest suitable airport.

▼ Continued on next page ▼

▼ **Engine Fuel Leak continued** ▼

25 **If** wing anti–ice needed:

PACK control selector (affected side) . . . . OFF

ISLN switch (affected side) . . . . On

When wing anti–ice no longer needed:

L and R ISLN switches . . . . Off

26 Choose one:

◆FUEL DISAGREE-PROG 2 **and** FUEL QTY ERROR-PROG 2 messages are **not** shown on the CDU scratchpad:

▶▶**Go to step 29**

◆FUEL DISAGREE-PROG 2 **or** FUEL QTY ERROR-PROG 2 message is **shown** on the CDU scratchpad:

▶▶**Go to step 27**

27 PROGRESS PAGE 2 . . . . SELECT

28 TOTALIZER . . . . Select USE for TOTALIZER to determine fuel remaining

29 **After** engine shutdown, all remaining fuel can be used for the operating engine. Resume normal fuel management procedures.

30 Use flaps 20 and VREF 20 for landing.

31 Use flaps 5 for go-around.

▼ **Continued on next page** ▼

▼ Engine Fuel Leak continued ▼

32 Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter.

33 Do **not** accomplish the following checklists:

ENGINE SHUTDOWN

PACK OFF

34 Choose one:

◆ LOW FUEL message **not** shown:

►► **Go to step 39**

◆ LOW FUEL message is **shown**:

FWD and AFT FUEL XFEED switches . . . On

This ensures fuel is available to the operating engine if the low tank empties.

►► **Go to step 35**

35 Fuel PUMP switches (all) . . . . ON

This ensures all fuel is available.

36 Plan to land at nearest suitable airport.

37 Avoid high nose up attitude and excessive acceleration and deceleration.

38 Do **not** accomplish the following checklist:

LOW FUEL

39 **Checklist Complete Except Deferred Items**

▼ Continued on next page ▼

▼ Engine Fuel Leak continued ▼

Deferred Items

Descent Checklist

Pressurization . . . . LDG ALT ____

Recall . . . . Checked

Autobrake . . . . ____

Landing data . . . . **VREF 20, Minimums____**

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ____

Landing Checklist

Speedbrake . . . . ARMED

Landing gear . . . . Down

Flaps **20**

■ ■ ■ ■

▼ Continued on next page ▼

Engine Fuel Leak continued

Additional Information

One or more of the following may be evidence of an engine fuel leak:

- Visual observation of fuel spray from strut or engine
- Excessive engine fuel flow
- Total fuel quantity decreasing at an abnormal rate
- FUEL CONFIG message on EICAS.
- LOW FUEL message on EICAS
- FUEL DISAGREE–PROG 2 or FUEL QTY ERROR–PROG 2 message on the CDU scratchpad
- INSUFFICIENT FUEL message on the CDU scratchpad

FUEL CONFIG

FUEL CONFIGURATION

Messages: FUEL CONFIG

Condition: One or more of these occur:
- Both center pump switches are off with fuel in the center tank
- A fuel imbalance between main tanks
- The fuel quantity is low in a main tank

1 The FUEL CONFIG message may be caused by an engine fuel leak. For indications of an engine fuel leak, check:

Total fuel quantity remaining compared to planned fuel remaining.

Fuel flow indications, for an engine with excessive fuel flow.

Individual tank quantities.

Totalizer compared to calculated quantities (PROGRESS page 2). The TOTALIZER value is the sum of the individual tank quantities. The CALCULATED value is the totalizer value at engine start minus fuel used (calculated using fuel flow rates and time).

▼ Continued on next page ▼

▼ **FUEL CONFIGURATION continued** ▼

2 Choose one:

◆Engine fuel leak **indicated**:

▶▶**Go to the Engine Fuel Leak checklist on page 12.1**

■ ■ ■ ■

◆Engine fuel leak **not indicated**:

FWD and AFT FUEL XFEED switches . . . On

▶▶**Go to step 3**

3 FWD and AFT PUMP switches (low tank) . . . . . Off

This ensures fuel from the high tank feeds both engines.

4 **When** fuel balancing complete:

All FWD and AFT PUMP switches. . . . . ON

FWD and AFT FUEL XFEED switches . . . . . . Off

5 Choose one:

◆Fuel quantity is **low** in either main tank:

▶▶**Go to the LOW FUEL checklist on page 12.18**

■ ■ ■ ■

◆Fuel quantity is **not low** in either main tank:

■ ■ ■ ■

VALVE

FUEL CROSSFEED

Messages: AFT FUEL X-FEED FWD FUEL X-FEED

Condition: The fuel crossfeed valve is not in the commanded position.

1 **If** both crossfeed switches ON and one valve is open, fuel will crossfeed.

■ ■ ■ ■

Fuel Jettison

Condition: Fuel jettison is needed.

1 FUEL JETTISON selector . . . . .ON

2 FUEL JETTISON NOZZLE switches (both) . . . . .ON

3 Fuel jettison is from center tank only.

4 Time needed to empty full center tank is approximately 30 minutes.

5 Do **not** accomplish the following checklist:

WINDOW HEAT

6 **When** jettison is complete:

FUEL JETTISON NOZZLE switches (both) . . .Off

FUEL JETTISON selector . . . . OFF

Verify VREF speed for new gross weight.

■ ■ ■ ■

VALVE

FUEL JETTISON NOZZLE

Messages: FUEL JET NOZ

Condition: The fuel nozzle valve is not in the commanded position.

1 Choose one:

◆On the **ground**:

FUEL JETTISON NOZZLE switches (both) . . . . OFF

■ ■ ■ ■

◆In **flight**:

▶▶**Go to step 2**

2 Choose one:

◆FUEL JETTISON NOZZLE switch **ON**:

Fuel jettison time will be extended.

■ ■ ■ ■

◆FUEL JETTISON NOZZLE switch **OFF**:

Fuel Jettison Nozzle valve failed open.

■ ■ ■ ■

FAULT

FUEL JETTISON PUMP

Messages: L FUEL JET PUMP R FUEL JET PUMP

Condition: The pump pressure is low because of a fault.

1 Fuel jettison time will be extended.

■ ■ ■ ■

FAULT

FUEL JETTISON TRANSFER VALVE

Messages: L JET XFER VALVE R JET XFER VALVE

Condition: The jettison transfer valve is not in the commanded position.

1 Choose one:

◆FUEL JETTISON selector is **ON**:

Fuel jettison time will be extended.

■ ■ ■ ■

◆FUEL JETTISON selector is **OFF**:

Fuel jettison valve has failed open.

■ ■ ■ ■

Intentionally
Blank

PRESS

FUEL PUMP

Messages: CTR L FUEL PUMP
L AFT FUEL PUMP
L FWD FUEL PUMP
CTR R FUEL PUMP
R AFT FUEL PUMP
R FWD FUEL PUMP

Condition: The pump pressure is low.

1 Do not reset any tripped fuel pump or fuel pump control circuit breaker.

2 Choose one:

◆ **Left or right** pump PRESS light is illuminated:

PUMP switch (affected pump) . . . . Off

■ ■ ■ ■

◆ Center left **or** center right pump PRESS light is illuminated:

▶▶**Go to step 3**

◆ Center left **and** center right pump PRESS lights are illuminated:

C L and C R PUMP switches. . . . . Off

FWD and AFT XFEED switches. . . . . Off

▶▶**Go to step 6**

3 PUMP switch (affected pump). . . . . Off

4 FUEL XFEED switches (both) . . . . On

▼ **Continued on next page** ▼

▼ FUEL PUMP continued ▼

5 **When** center tank fuel depleted:

FWD and AFT XFEED switches . . . . Off

■ ■ ■ ■

6 Check available left and right main tank quantity is sufficient for the planned flight. Center tank fuel is not available.

■ ■ ■ ■

PRESS

FUEL SYSTEM PRESSURE

Messages: L FUEL SYS PRESS R FUEL SYS PRESS

Condition: The engine is on suction feed.

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

1 Choose one:

◆**Able** to maintain needed thrust on affected engine:

■ ■ ■ ■

◆**Unable** to maintain needed thrust on affected engine:

►►**Go to step 2**

2 FUEL XFEED switches (both) . . . . On

Note: Continued operation with the crossfeed valves open will result in a progressive fuel imbalance when both engines are feeding from the same main tank.

3 Do **not** balance fuel.

4 Do **not** accomplish the following checklist:

FUEL CONFIGURATION

5 **When** FUEL CONFIG light illuminates due to main tank imbalance:

FWD and AFT FUEL XFEED switches . . . . Off

▼ **Continued on next page** ▼

▼ **FUEL SYSTEM PRESSURE continued** ▼

Continue suction feed operation. Sufficient roll control is available to compensate for any main tank fuel imbalance.

If unable to maintain needed thrust on affected engine:

Operate at lower altitude.

■ ■ ■ ■

FUEL CONFIG

LOW FUEL

Messages: LOW FUEL

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

1 The LOW FUEL message may be caused by an engine fuel leak. For indications of an engine fuel leak, check:

Total fuel quantity remaining compared to planned fuel remaining.

Fuel flow indications, for an engine with excessive fuel flow.

Individual tank quantities.

Totalizer compared to calculated quantities (PROGRESS page 2). The TOTALIZER value is the sum of the individual tank quantities. The CALCULATED value is the totalizer value at engine start minus fuel used (calculated using fuel flow rates and time).

▼ Continued on next page ▼

▼ **LOW FUEL continued** ▼

2 Choose one:

◆**Indication** of engine fuel leak:

▶▶**Go to the Engine Fuel Leak checklist on page 12.1**

■ ■ ■ ■

◆**No indication** of engine fuel leak:

FWD and AFT FUEL XFEED switches . . . On

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

▶▶**Go to step 3**

3 Fuel PUMP switches (all) . . . . ON

This ensures all fuel is available.

4 Plan to land at nearest suitable airport.

5 Avoid high nose up attitude and excessive acceleration and deceleration.

■ ■ ■ ■

Low Fuel Temperature

Condition: Fuel temperature is near the minimum.

1 **When** fuel temperature is approaching fuel temperature limit (3 °C above the fuel freeze point):

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.

■ ■ ■ ■

Non-Normal Checklists — Chapter NNC

Hydraulics — Section 13

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OVHT

DEMAND HYDRAULIC OVERHEAT

Messages: C DEM HYD OVHT R DEM HYD OVHT
L DEM HYD OVHT

Condition: The pump temperature is high.

1 HYD DEMAND PUMP selector . . . . OFF

2 Do **not** accomplish the following checklist:

HYDRAULIC DEMAND PUMP

■ ■ ■ ■

PRESS

HYDRAULIC DEMAND PUMP

Messages: C HYD DEM PUMP R HYD DEM PUMP
L HYD DEM PUMP

Condition: The pump pressure is low.

Objective: To restore system pressure if the AUTO demand function failed to operate.

1 HYD DEMAND PUMP selector . . . . ON

2 Choose one:

◆PRESS light **stays illuminated**:

HYD DEMAND PUMP selector . . . . OFF

■ ■ ■ ■

◆PRESS light **extinguishes**:

Continue normal operation.

■ ■ ■ ■

OVHT

HYDRAULIC (1 or 2) OVERHEAT

Messages: C HYD 1 OVHT   C HYD 2 OVHT

Condition: The pump temperature is high.

1 ELEC HYD PRIMARY PUMP switch . . . . Off

2 Do **not** accomplish the following checklist:

HYDRAULIC PRIMARY (1 or 2)

■ ■ ■ ■

PRESS

HYDRAULIC PRIMARY (1 or 2)

Messages: C HYD PRIM 1   C HYD PRIM 2

Condition: The pump pressure is low.

1 ELEC HYD PRIMARY PUMP switch . . . . Off

■ ■ ■ ■

PRESS

HYDRAULIC PRIMARY PUMP

Messages: L HYD PRIM PUMP   R HYD PRIM PUMP

Condition: The pump pressure is low.

1 ENG HYD PRIMARY PUMP switch. . . . . Off

■ ■ ■ ■

QTY

HYDRAULIC QUANTITY

Messages: C HYD QTY R HYD QTY
L HYD QTY

Condition: The hydraulic quantity is low.

■ ■ ■ ■

SYS PRESS

HYDRAULIC SYSTEM PRESSURE (C only)

Messages: C HYD SYS PRESS

Condition: The hydraulic system pressure is low.

Objective: To attempt to restore system pressure, avoid further damage, and configure for landing using alternate systems.

1 C AIR HYD DEMAND PUMP selector . . . . ON

2 Choose one:

◆SYS PRESS light **extinguishes**:

Continue normal operation.

■ ■ ■ ■

◆SYS PRESS light **stays illuminated**:

►►**Go to step 3**

3 C AIR HYD DEMAND PUMP selector . . . . OFF

4 C1 and C2 ELEC HYD PRIMARY PUMP switches . . . . Off

5 Speedbrake lever . . . . DOWN

Do **not** arm speedbrake lever.

6 Manually extend speedbrakes after landing.

7 Use flaps 20 and VREF 20 for landing.

8 Do **not** autoland.

▼ **Continued on next page** ▼

▼ **HYDRAULIC SYSTEM PRESSURE (C only) continued** ▼

Inoperative Items

Center autopilot inop

Right autopilot stabilizer trim inop

Some spoiler panels on each wing inop
Roll rate may be reduced in flight. Speedbrake effectiveness may be reduced in flight and during landing.

Center system hydraulic power to stabilizer trim inop
Left system powers the trim at half rate.

Normal flap operation inop
Alternate flap operation is needed. Allow 3 minutes for flap extension during approach.

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

Automatic speedbrake system inop
Manual deployment is needed.

9 Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter.

10 Do **not** accomplish the following checklists:

HYDRAULIC DEMAND PUMP

HYDRAULIC PRIMARY (1 or 2)

SPOILERS

STABILIZER TRIM

YAW DAMPER

11 **Checklist Complete Except Deferred Items**

▼ **Continued on next page** ▼

▼ HYDRAULIC SYSTEM PRESSURE (C only) continued ▼

Deferred Items

Descent Checklist

Pressurization . . . . LDG ALT ____

Recall . . . . Checked

Autobrake . . . . ____

Landing data . . . . **VREF 20, Minimums____**

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ____

Alternate Flap Extension

GND PROX FLAP OVRD switch . . . . OVRD

ALTN FLAPS selector . . . . Set to agree with flap lever

LE ALTN FLAPS arm switch . . . . ALTN

TE ALTN FLAPS arm switch . . . . ALTN

If flap lever is UP:

Flap lever 1

This prevents uncommanded autothrottle disengagement.

ALTN FLAPS selector . . . . Set to extend or retract flaps as needed

▼ Continued on next page ▼

▼ HYDRAULIC SYSTEM PRESSURE (C only) continued ▼

Alternate Gear Extension

Landing gear lever . . . . OFF

Action is **not** reversible
Maximum 250K/.75M

ALTN GEAR EXTEND switch . . . . DN

After gear down lights illuminate:

Landing gear lever . . . . DN

RESERVE BKS & STRG switch . . . . ON

Choose one:

◆ Center 1 electric hydraulic primary pump PRESS light is **illuminated**:

Nose wheel steering is inoperative.

►► **Go to Do Not Accomplish ...**

◆ Center 1 electric hydraulic primary pump PRESS light is **not illuminated**:

►► **Go to Do Not Accomplish ...**

Do **not** accomplish the following checklists:

GEAR DOORS

RESERVE BRAKE VALVE

TAILSKID

▼ Continued on next page ▼

▼ **HYDRAULIC SYSTEM PRESSURE (C only) continued** ▼

Landing Checklist

Speedbrake . . . . **DOWN**

Landing gear . . . . Down

Flaps **20**

■ ■ ■ ■

SYS PRESS

HYDRAULIC SYSTEM PRESSURE (L only)

Messages: L HYD SYS PRESS

Condition: The hydraulic system pressure is low.

Objective: To attempt to restore system pressure and avoid further system damage.

1 L ELEC HYD DEMAND PUMP selector . . . . .ON

2 Choose one:

◆SYS PRESS light **extinguishes**:

Continue normal operation.

■ ■ ■ ■

◆SYS PRESS light **stays illuminated**:

►►**Go to step 3**

3 L ELEC HYD DEMAND PUMP selector . . . . OFF

4 L ENG HYD PRIMARY PUMP switch . . . . .Off

▼ **Continued on next page** ▼

▼ **HYDRAULIC SYSTEM PRESSURE (L only) continued** ▼

5 Avoid large or abrupt rudder inputs above 160 knots.

6 Do **not** autoland.

Inoperative Items

Left autopilot inop

Some spoiler panels on each wing inop

Roll rate may be reduced in flight. Speedbrake effectiveness may be reduced in flight and during landing.

Left system hydraulic power to stabilizer trim inop

Center system powers the trim at half rate.

Rudder ratio system inop

For Pratt and Whitney powered Aircraft.

Left thrust reverser inop

Right thrust reverser is available.

7 Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter.

8 Do **not** accomplish the following checklists:

HYDRAULIC DEMAND PUMP

HYDRAULIC PRIMARY PUMP

RUDDER RATIO

SPOILERS

STABILIZER TRIM

YAW DAMPER

■ ■ ■ ■

SYS PRESS

HYDRAULIC SYSTEM PRESSURE (R only)

Messages: R HYD SYS PRESS

Condition: The hydraulic system pressure is low.

Objective: To attempt to restore system pressure and avoid further system damage.

1 R ELEC HYD DEMAND PUMP selector . . . . .ON

2 Choose one:

◆SYS PRESS light **extinguishes**:

Continue normal operation.

■ ■ ■ ■

◆SYS PRESS light **stays illuminated**:

►►**Go to step 3**

3 R ELEC HYD DEMAND PUMP selector . . . . OFF

4 R ENG HYD PRIMARY PUMP switch . . . . .Off

5 Do **not** autoland.

Inoperative Items

Right autopilot inop

Autobrakes inop

Some spoiler panels on each wing inop
Roll rate may be reduced in flight. Speedbrake effectiveness may be reduced in flight and during landing.

▼ Continued on next page ▼

▼ HYDRAULIC SYSTEM PRESSURE (R only) continued ▼

For Pratt and Whitney powered Aircraft.

Right thrust reverser inop

6 Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter.

7 Do **not** accomplish the following checklists:

HYDRAULIC DEMAND PUMP

HYDRAULIC PRIMARY PUMP

SPOILERS

8 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization. . . . . LDG ALT ____

Recall . . . . Checked

Autobrake . . . .**OFF**

Landing data . . . . VREF____, Minimums____

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ____

Landing Checklist

Speedbrake . . . . ARMED

▼ Continued on next page ▼

▼ HYDRAULIC SYSTEM PRESSURE (R only) continued ▼

Landing gear . . . . Down

Flaps . . . . ____

■ ■ ■ ■

HYDRAULIC SYSTEM PRESSURE (L and C)

SYS PRESS   SYS PRESS

Messages: L HYD SYS PRESS   C HYD SYS PRESS

Condition: Two hydraulic system pressures are low.

Objective: To attempt to restore system pressure, avoid further system damage, and configure for landing using alternate systems.

1 L ELEC HYD DEMAND PUMP selector . . . . .ON

2 C AIR HYD DEMAND PUMP selector . . . . .ON

▼ Continued on next page ▼

▼ HYDRAULIC SYSTEM PRESSURE (L and C) continued ▼

3 Choose one:

◆ **Left and center** SYS PRESS lights **extinguish**:

Continue normal operation.

■ ■ ■ ■

◆ **Only left** SYS PRESS light **stays illuminated**:

►►Go to the HYDRAULIC SYSTEM PRESSURE (L only) checklist on page 13.8

◆ **Only center** SYS PRESS light **stays illuminated**:

►►Go to the HYDRAULIC SYSTEM PRESSURE (C only) checklist on page 13.4

◆ **Left and center** SYS PRESS lights **stay illuminated**:

►►Go to step 4

4 L ELEC HYD DEMAND PUMP selector . . . . OFF

5 C AIR HYD DEMAND PUMP selector. . . . . OFF

6 C1 and C2 ELEC HYD PRIMARY PUMP switches . . . . Off

7 L ENG HYD PRIMARY PUMP switch . . . . Off

8 Plan to land at the nearest suitable airport.

9 Crosswind limit is 20 knots.

▼ Continued on next page ▼

▼ HYDRAULIC SYSTEM PRESSURE (L and C) continued ▼

10 Speedbrake lever . . . . DOWN

Do **not** arm speedbrake lever.

11 Manually extend speedbrakes after landing.

12 Use flaps 20 and VREF 30 + 20 for landing.

13 Avoid large or abrupt rudder inputs above 160 knots.

14 Do **not** autoland.

Inoperative Items

All autopilots inop

Some spoiler panels on each wing inop

Roll rate may be reduced in flight. Speedbrake effectiveness may be reduced in flight and during landing.

Elevator feel inop

Column forces may be significantly higher than normal, particularly during landing flare.

Rudder ratio system inop

Normal flap operation inop

Alternate flap operation is needed. Allow 3 minutes for flap extension during approach.

Normal landing gear extension and retraction inop

Alternate gear extension is needed.

Automatic speedbrake system inop

▼ Continued on next page ▼

▼ HYDRAULIC SYSTEM PRESSURE (L and C) continued ▼

Left and Center system hydraulic power to stabilizer trim inop

Right system powers the trim at one quarter rate.

Alternate trim switches and automatic stabilizer trim inop

The control wheel stabilizer trim switches are available.

For Pratt and Whitney powered Aircraft.

Left thrust reverser inop

15 Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter.

16 Do **not** accomplish the following checklists:

HYDRAULIC DEMAND PUMP

HYDRAULIC PRIMARY (1 or 2)

HYDRAULIC PRIMARY PUMP

RUDDER RATIO

SPOILERS

STABILIZER TRIM

YAW DAMPER

17 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization. . . . . LDG ALT ____

Recall . . . . Checked

▼ Continued on next page ▼

▼ HYDRAULIC SYSTEM PRESSURE (L and C) continued ▼

Autobrake . . . . ____

Landing data . . . . . **VREF 30 + 20, Minimums**____

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ____

Alternate Flap Extension

GND PROX FLAP OVRD switch. . . . . .OVRD

ALTN FLAPS selector . . . . Set to agree with flap lever

LE ALTN FLAPS arm switch . . . . ALTN

TE ALTN FLAPS arm switch . . . . ALTN

If flap lever is UP:

Flap lever 1

This prevents uncommanded autothrottle disengagement.

ALTN FLAPS selector . . . . Set to extend or retract flaps as needed

Alternate Gear Extension

Landing gear lever . . . . OFF

▼ Continued on next page ▼

HYDRAULIC SYSTEM PRESSURE (L and C) continued

Action is **not** reversible
Maximum 250K/.75M

ALTN GEAR EXTEND switch . . . . DN

After gear down lights illuminate:

Landing gear lever . . . . DN

RESERVE BKS & STRG switch . . . . ON

Choose one:

- Center 1 electric hydraulic primary pump PRESS light is **illuminated**:

  Nose wheel steering is inoperative.

  Go to Do Not Accomplish ...

- Center 1 electric hydraulic primary pump PRESS light is **not illuminated**:

  Go to Do Not Accomplish ...

Do **not** accomplish the following checklists:

GEAR DOORS

RESERVE BRAKE VALVE

TAILSKID

Landing Checklist

Speedbrake . . . . **DOWN**

Landing gear . . . . Down

Flaps. **20**

HYDRAULIC SYSTEM PRESSURE (L and R)

SYS PRESS

SYS PRESS

Messages: L HYD SYS PRESS R HYD SYS PRESS

Condition: Two hydraulic system pressures are low.

Objective: To attempt to restore system pressure and avoid further system damage.

1 L and R ELEC HYD DEMAND PUMP selectors. . .ON

2 Choose one:

◆ **Left and right** SYS PRESS lights are **not illuminated**:

Continue normal operation.

■ ■ ■ ■

◆ **Only left** SYS PRESS light is **illuminated**:

►► **Go to the HYDRAULIC SYSTEM PRESSURE (L only) checklist on page 13.8**

◆ **Only right** SYS PRESS light is **illuminated**:

►► **Go to the HYDRAULIC SYSTEM PRESSURE (R only) checklist on page 13.10**

◆ **Left and right** SYS PRESS lights are **illuminated**:

►► **Go to step 3**

▼ **Continued on next page** ▼

HYDRAULIC SYSTEM PRESSURE (L and R) continued

3 L and R ELEC HYD DEMAND PUMP selectors. . OFF

4 L and R ENG HYD PRIMARY PUMP switches . . . Off

5 Plan to land at the nearest suitable airport.

6 Crosswind limit is 20 knots.

7 Use flaps 20 and VREF 30 + 20 for landing.

8 Avoid large or abrupt rudder inputs above 160 knots.

9 GND PROX FLAP OVRD switch . . . . OVRD

10 Do **not** autoland.

Inoperative Items

Left and Right autopilots inop
Center autopilot is available.

Autobrakes inop
Manual braking is needed.

Some spoiler panels on each wing inop
Roll rate may be reduced in flight. Speedbrake effectiveness may be reduced in flight and during landing.

Left system hydraulic power to stabilizer trim inop
Center system powers the trim at half rate.

Rudder ratio system inop

For Pratt and Whitney powered Aircraft.

Left and Right thrust reversers inop

11 Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter.

Continued on next page

▼ HYDRAULIC SYSTEM PRESSURE (L and R) continued ▼

12 Do **not** accomplish the following checklists:

HYDRAULIC DEMAND PUMP

HYDRAULIC PRIMARY PUMP

RUDDER RATIO

SPOILERS

STABILIZER TRIM

YAW DAMPER

13 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization . . . . LDG ALT ____

Recall . . . . Checked

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

Landing data **. . . . .VREF 30 + 20, Minimums____**

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ____

Landing Checklist

Speedbrake . . . . ARMED

Landing gear . . . . Down

▼ Continued on next page ▼

▼ HYDRAULIC SYSTEM PRESSURE (L and R) continued ▼

Flaps. **20**

■ ■ ■ ■

HYDRAULIC SYSTEM PRESSURE (R and C)

SYS PRESS   SYS PRESS

Messages: R HYD SYS PRESS   C HYD SYS PRESS

Condition: Two hydraulic system pressures are low.

Objective: To attempt to restore system pressure, avoid further system damage, and configure for landing using alternate systems.

1 R ELEC HYD DEMAND PUMP selectors . . . . .ON

2 C AIR HYD DEMAND PUMP selectors . . . . .ON

▼ Continued on next page ▼

▼ **HYDRAULIC SYSTEM PRESSURE (R and C) continued** ▼

3 Choose one:

◆ **Right and center** SYS PRESS lights **extinguish**:

Continue normal operation.

■ ■ ■ ■

◆ **Only right** SYS PRESS light **stays illuminated**:

►► **Go to the HYDRAULIC SYSTEM PRESSURE (R only) checklist on page 13.10**

◆ **Only center** SYS PRESS light **stays illuminated**:

►► **Go to the HYDRAULIC SYSTEM PRESSURE (C only) checklist on page 13.4**

◆ **Right and center** SYS PRESS lights **stay illuminated**:

►► **Go to step 4**

4 R ELEC HYD DEMAND PUMP selectors . . . . OFF

5 C AIR HYD DEMAND PUMP selectors . . . . OFF

6 C1 and C2 ELEC HYD PRIMARY PUMP switches . . . . Off

7 R ENG HYD PRIMARY PUMP switch . . . . Off

8 Plan to land at the nearest suitable airport.

9 Crosswind limit is 20 knots.

▼ **Continued on next page** ▼

▼ HYDRAULIC SYSTEM PRESSURE (R and C) continued ▼

10 Speedbrake lever . . . . DOWN

Do **not** arm speedbrake lever.

11 Do **not** autoland.

12 Manually extend speedbrakes after landing.

13 Use flaps 20 and VREF 30 + 20 for landing.

Inoperative Items

Right and Center autopilots inop

Some spoiler panels on each wing inop
Roll rate may be reduced in flight. Speedbrake effectiveness may be reduced in flight and during landing.

Center system hydraulic power to stabilizer trim inop
Left system powers the trim at half rate.

Normal flap operation inop
Alternate flap operation is needed. Allow 3 minutes for flap extension during approach.

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

Autobrakes inop
Manual braking is needed.

Normal and alternate brakes inop
Reserve brakes source to alternate brakes is available.

Automatic speedbrake system inop

For Pratt and Whitney powered Aircraft.

Right thrust reverser inop

▼ Continued on next page ▼

▼ **HYDRAULIC SYSTEM PRESSURE (R and C) continued** ▼

14 Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter.

15 Do **not** accomplish the following checklists:

HYDRAULIC DEMAND PUMP

HYDRAULIC PRIMARY (1 or 2)

HYDRAULIC PRIMARY PUMP

SPOILERS

STABILIZER TRIM

YAW DAMPER

16 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization. . . . . LDG ALT ____

Recall . . . . Checked

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

Landing data **. . . . .VREF 30 + 20, Minimums____**

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ____

▼ **Continued on next page** ▼

Alternate Flap Extension

GND PROX FLAP OVRD switch . . . . OVRD

ALTN FLAPS selector . . . . Set to agree with flap lever

LE ALTN FLAPS arm switch . . . . ALTN

TE ALTN FLAPS arm switch . . . . ALTN

If flap lever is UP:

Flap lever 1

This prevents uncommanded autothrottle disengagement.

ALTN FLAPS selector . . . . Set to extend or retract flaps as needed

Alternate Gear Extension

Landing gear lever . . . . OFF

Action is **not** reversible
Maximum 250K/.75M

ALTN GEAR EXTEND switch . . . . DN

After gear down lights illuminate:

Landing gear lever . . . . DN

RESERVE BKS & STRG switch . . . . ON

▼ Continued on next page ▼

▼ HYDRAULIC SYSTEM PRESSURE (R and C) continued ▼

Choose one:

◆ Center 1 electric hydraulic primary pump PRESS light is **illuminated**:

Nose wheel steering is inoperative.

Only accumulator pressure is available for brakes.

Apply steady, increasing brake pressure and hold to a full stop. Do not taxi.

►► Go to Do Not Accomplish ...

◆ Center 1 electric hydraulic primary pump PRESS light is **not illuminated**:

►► Go to Do Not Accomplish ...

Do **not** accomplish the following checklists:

GEAR DOORS

RESERVE BRAKE VALVE

TAILSKID

Landing Checklist

Speedbrake . . . . **DOWN**

Landing gear . . . . Down

Flaps **20**

■ ■ ■ ■

OVHT

PRIMARY HYDRAULIC OVERHEAT

Messages: L PRIM HYD OVHT   R PRIM HYD OVHT

Condition: The pump temperature is high.

1 ENG HYD PRIMARY PUMP switch . . . . Off

2 Do **not** accomplish the following checklist:

HYDRAULIC PRIMARY PUMP

■ ■ ■ ■

UNLKD

RAT UNLOCKED

Messages: RAT UNLOCKED

Condition: The ram air turbine is not stowed and locked.

■ ■ ■ ■

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AIR/GROUND SYSTEM

Messages: AIR/GND SYS

Condition: The air/ground system is failed in the air mode.

Inoperative Items

One or both thrust reversers inop

Automatic speedbrake inop

Manual speedbrake extension after landing is needed.

Autobrakes inop

Manual braking is needed.

1 When deployed manually, spoiler capability is reduced.

2 Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter.

3 **Checklist Complete Except Deferred Items**

▼ Continued on next page ▼

▼ AIR/GROUND SYSTEM continued ▼

Deferred Items

Descent Checklist

Pressurization . . . . LDG ALT ___
Recall . . . . Checked
Autobrake **. . . . . .OFF**
Landing data . . . . VREF___, Minimums___
Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ___

Landing Checklist

Speedbrake **. . . . . DOWN**
Landing gear . . . . Down
Flaps . . . . ___

■ ■ ■ ■

ANTISKID

ANTISKID

Messages: ANTISKID

Condition: An antiskid system fault occurs.

1 Braking effectiveness may be reduced.

2 Use minimum braking consistent with runway conditions to reduce possibility of tire blowout.

3 Autobrake system is inoperative.

4 Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter.

■ ■ ■ ■

ANTISKID

ANTISKID OFF

Messages: ANTISKID OFF

Condition: The antiskid system power is off.

1 Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter.

■ ■ ■ ■

AUTO BRAKES

AUTOBRAKES

Messages: AUTOBRAKES

Condition: One of these occurs:
- The autobrake system is disarmed
- The autobrake system is failed

1 AUTO BRAKES selector . . . . Reselect

2 Choose one:

◆AUTO BRAKES light **extinguishes**:

■ ■ ■ ■

◆AUTO BRAKES light **stays illuminated**:

AUTO BRAKES selector . . . . OFF

■ ■ ■ ■

Intentionally
Blank

BRAKE SOURCE

BRAKE SOURCE

Messages: BRAKE SOURCE

Condition: Normal and alternate brake system pressures are low.

1 RESERVE BKS & STRG switch. . . . . .ON

2 Choose one:

◆BRAKE SOURCE light **extinguishes**:

■ ■ ■ ■

◆BRAKE SOURCE light **stays illuminated**:

▶▶**Go to step 3**

3 AUTOBRAKE selector. . . . . OFF

4 Only accumulator pressure is available for braking. During landing rollout, apply steady, increasing brake pressure and hold to a full stop.

5 **Checklist Complete Except Deferred Items**

▼ **Continued on next page** ▼

▼ **BRAKE SOURCE continued** ▼

Deferred Items

Descent Checklist

Pressurization . . . . LDG ALT ___

Recall . . . . Checked

Autobrake . . . . **OFF**

Landing data . . . . VREF___, Minimums___

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ___

Landing Checklist

Speedbrake . . . . ARMED

Landing gear . . . . Down

Flaps . . . . ___

After Landing

Do **not** taxi.

■ ■ ■ ■

GEAR

DRAG BRACE

Messages: L DRAG BRACE R DRAG BRACE

Condition: The main landing gear is down with the drag brace unlocked.

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

Observe the gear EXTEND OR EXTENDED limit speed of 270K/.82M

1 Increase airspeed until GEAR light extinguishes.

2 Choose one:

◆GEAR light is **extinguished**:

■ ■ ■ ■

◆GEAR light stays **illuminated**:

►►**Go to step 3**

3 Use flaps 30 for landing. This ensures slowest landing speed.

4 Do **not** arm speedbrake lever.

5 Manually extend speedbrakes after landing for gradual speedbrake extension.

6 GND PROX GEAR OVRD switch . . . . .OVRD

7 **Checklist Complete Except Deferred Items**

▼ Continued on next page ▼

▼ DRAG BRACE continued ▼

Deferred Items

Descent Checklist

Pressurization . . . . LDG ALT ____

Recall . . . . Checked

Autobrake . . . . ____

Landing data . . . . **VREF 30, Minimums**____

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ____

When at pattern altitude

PACK control selectors (both) . . . . OFF

Fuel PUMP switches (all) . . . . Off

Do **not** accomplish the following checklists:

FUEL SYSTEM PRESSURE

PACK OFF

Landing Checklist

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

Landing gear . . . . Down

Flaps **. 30**

■ ■ ■ ■

GEAR

GEAR DISAGREE

Messages: GEAR DISAGREE

Condition: The landing gear position disagrees with the landing gear lever position.

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

1 Choose one:

◆ Landing gear lever **UP**:

Observe the gear EXTEND OR EXTENDED limit speed of 270 K/.82 M.

Flight with gear down increases fuel consumption and decreases climb performance. Refer to the Gear Down performance tables in Performance Inflight chapter for flight planning.

■ ■ ■ ■

◆ Landing gear lever **DN and any** gear down (green) lights **not** illuminated:

▶▶**Go to step 2**

◆ Landing gear lever **DN and all** gear down (green) lights **illuminated**:

GND PROX GEAR OVRD switch . . . . OVRD

Accomplish normal landing.

■ ■ ■ ■

▼ Continued on next page ▼

▼ **GEAR DISAGREE continued** ▼

2 Landing gear lever . . . . OFF

Observe the gear EXTEND OR EXTENDED limit speed of 250K/.75M

3 ALTN GEAR EXTEND switch . . . . DN

4 Choose one:

◆ **All** gear down (green) lights **illuminated**:

Landing gear lever . . . . DN

■ ■ ■ ■

◆ **Any** gear down (green) light **not** illuminated:

►► **Go to step 5**

5 Plan to land on available gear.

6 Landing gear lever . . . . DN

7 GND PROX GEAR OVRD switch . . . . OVRD

8 Use flaps 30 for landing.

This ensures slowest landing speed.

9 Do **not** arm speedbrake lever.

10 Choose one:

◆ Stopping distance is **not critical**:

►► **Go to step 13**

◆ Stopping distance is **critical**:

►► **Go to step 11**

▼ **Continued on next page** ▼

▼ GEAR DISAGREE continued ▼

11 Extend the speedbrakes after all gear, or the nose or engine nacelle have contacted the runway.

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

13 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization . . . . LDG ALT ____

Recall . . . . Checked

Autobrake . . . . ____

Landing data . . . . **VREF 30, Minimums____**

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ____

When at pattern altitude

PACK control selectors (both) . . . . OFF

Fuel PUMP switches (all) . . . . Off

Do **not** accomplish the following checklists:

FUEL SYSTEM PRESSURE

PACK OFF

▼ Continued on next page ▼

Landing Checklist

Speedbrake . . . .**DOWN**

Landing gear . . . . Down

Flaps. **30**

■ ■ ■ ■

DOORS

GEAR DOORS

Messages: GEAR DOORS

Condition: One or more landing gear doors are not closed.

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

1 Choose one:

◆Landing gear lever **UP or DN**:

Observe the gear EXTEND OR EXTENDED limit speed of 270 K/.82 M.

The gear doors may close when airspeed is reduced to normal flap extension speed.

■ ■ ■ ■

◆Landing gear lever **OFF**:

Landing gear lever . . . . UP

■ ■ ■ ■

Gear Lever Will Not Move Up

Condition: The landing gear lever cannot move to UP.

1 Landing gear lever
LOCK OVRD switch . . . . Push and hold

2 Landing gear lever . . . . UP, then OFF

■ ■ ■ ■

NOSE AIR/GROUND SYSTEM

Messages: NOSE A/G SYS

Condition: The nose air/ground system is failed in the air mode.

1 Takeoff configuration warning system inoperative.

■ ■ ■ ■

PARK BRAKE

PARKING BRAKE [ADVISORY]

Messages: PARKING BRAKE

Condition: The parking brake is set.

1 Antiskid is inoperative.

■ ■ ■ ■

VALVE

RESERVE BRAKE VALVE

Messages: RSV BRAKE VAL

Condition: A reserve brakes and steering valve is not in the commanded position.

1 Choose one:

◆Center hydraulic system is **operative**:

■ ■ ■ ■

◆Center hydraulic system is **inoperative**:

▶▶**Go to step 2**

2 Nose wheel steering is inoperative.

3 Choose one:

◆Right hydraulic system is **operative**:

■ ■ ■ ■

◆Right hydraulic system is **inoperative**:

▶▶**Go to step 4**

4 Only accumulator pressure is available for brakes.

5 Apply steady, increasing brake pressure and hold to a full stop.

6 Do **not** taxi.

■ ■ ■ ■

GEAR

SIDE BRACE

Messages: L SIDE BRACE R SIDE BRACE

Condition: The main landing gear is down with the side brace unlocked.

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

1 Observe the gear EXTEND OR EXTENDED limit speed of 270K/.82M

2 Decrease airspeed until GEAR light extinguishes. Decrease to VREF 30 and flaps 30, if needed.

3 Choose one:

◆GEAR light is **extinguished**:

■ ■ ■ ■

◆GEAR light stays **illuminated**:

▶▶**Go to step 4**

4 Use flaps 30 for landing. This ensures slowest landing speed.

5 Do **not** arm speedbrake lever.

6 Manually extend speedbrakes after landing for gradual speedbrake extension.

7 GND PROX GEAR OVRD switch . . . . OVRD

8 **Checklist Complete Except Deferred Items**

▼ Continued on next page ▼

▼ SIDE BRACE continued ▼

Deferred Items

Descent Checklist

Pressurization . . . . LDG ALT ____

Recall . . . . Checked

Autobrake . . . . ____

Landing data **. . . . . VREF 30, Minimums____**

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ____

When at pattern altitude

PACK control selectors (both) . . . . OFF

Fuel PUMP switches (all) . . . . Off

Do **not** accomplish the following checklists:

FUEL SYSTEM PRESSURE

PACK OFF

Landing Checklist

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

Landing gear . . . . Down

Flaps **. 30**

■ ■ ■ ■

TAILSKID

TAILSKID

Messages: TAILSKID

Condition: The tailskid is not in the commanded position.

■ ■ ■ ■

Non-Normal Checklists — Chapter NNC

Warning Systems — Section 15

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ALT ALERT

ALTITUDE ALERT

Message: ALTITUDE ALERT

Condition: A deviation from the MCP set altitude occurs.

■ ■ ■ ■

ALTITUDE CALLOUTS

Message: ALT CALLOUTS

Condition: Altitude voice annunciations during approach are not supplied.

■ ■ ■ ■

CONFIG

CONFIG FLAPS

Message: FLAPS

Condition: The flaps are not in a takeoff position during takeoff.

■ ■ ■ ■

CONFIG

CONFIG GEAR NOT DOWN

Message: GEAR NOT DOWN

Condition: A landing gear is not down and locked and one of these occurs:

- A thrust lever is at idle below 800 feet radio altitude
- The flaps are in a landing position

■ ■ ■ ■

CONFIG

CONFIG PARKING BRAKE

Message: PARKING BRAKE

Condition: The parking brake is set during takeoff.

■ ■ ■ ■

CONFIG

CONFIG SPOILERS

Message: SPOILERS

Condition: The speedbrake lever is not DOWN during takeoff.

■ ■ ■ ■

CONFIG

CONFIG STABILIZER

Message: STABILIZER

Condition: The stabilizer is not in the green band during takeoff.

■ ■ ■ ■

EICAS CONTROL PANEL

Message: EICAS CONT PNL

Condition: The EICAS control panel is failed.

■ ■ ■ ■

EICAS DISPLAY

Message: EICAS DISPLAY

Condition: One EICAS display is failed.

■ ■ ■ ■

GROUND PROXIMITY SYSTEM

Message: GND PROX SYS

Condition: A ground proximity warning system fault occurs.

1 Some or all ground proximity alerts are not available.

2 Ground proximity alerts that occur are valid.

■ ■ ■ ■

OVSPD

OVERSPEED

Message: OVERSPEED

Condition: Airspeed is more than Vmo/Mmo.

■ ■ ■ ■

TCAS

Message: TCAS

Condition: TCAS system is failed.

■ ■ ■ ■

TCAS OFF

Message: TCAS OFF

Condition: TCAS modes TA or TA/RA are not selected.

■ ■ ■ ■

TERRAIN OVERRIDE

Message: TERR OVRD

Condition: The ground proximity terrain override switch is in override.

1 Look–ahead terrain alerts and the terrain display are not provided.

■ ■ ■ ■

TERRAIN POSITION

Message: TERR POS

Condition: Terrain position data is lost.

1 Position data for the terrain map and look-ahead terrain alerts are lost. Ground proximity alerts that occur are valid.

■ ■ ■ ■

WINDSHEAR SYSTEM

Message: WINDSHEAR SYS

Condition: A windshear system fault occurs.

1 Some or all windshear alerts are not available.

2 Windshear alerts that occur are still valid.

■ ■ ■ ■

Intentionally
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Introduction

Note: This Section Reserved For Operator-Developed Information.

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Performance Inflight — Chapter PI-QRH
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767-300 CF6-80C2B6F LB FAA CATC CATD TO1-10% TO2-20%

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 (290/.78)

Flaps Up, Set Max Climb Thrust

PRESSURE ALTITUDE (FT)		WEIGHT (1000 LB)				
		220	260	300	350	400
40000	**PITCH ATT**	**4.0**	**4.0**	**4.0**		
	V/S (FT/MIN)	1700	1100	500		
30000	**PITCH ATT**	**4.5**	**4.0**	**4.0**	**4.0**	**4.0**
	V/S (FT/MIN)	2700	2200	1800	1300	900
20000	**PITCH ATT**	**7.0**	**6.5**	**6.0**	**6.0**	**5.5**
	V/S (FT/MIN)	4200	3400	2900	2300	1800
10000	**PITCH ATT**	**10.5**	**9.5**	**8.5**	**8.0**	**7.5**
	V/S (FT/MIN)	5700	4700	4000	3200	2700
SEA LEVEL	**PITCH ATT**	**13.0**	**11.5**	**10.5**	**9.5**	**9.0**
	V/S (FT/MIN)	6300	5300	4500	3700	3100

Cruise (.78/290)

Flaps Up, %N1 for Level Flight

PRESSURE ALTITUDE (FT)		WEIGHT (1000 LB)				
		220	260	300	350	400
40000	**PITCH ATT**	**2.0**	**2.5**	**3.5**	**4.0**	
	%N1	88	92	97	107	
35000	**PITCH ATT**	**1.5**	**2.0**	**2.5**	**3.0**	**3.5**
	%N1	85	87	89	93	98
30000	**PITCH ATT**	**1.0**	**1.5**	**1.5**	**2.0**	**2.5**
	%N1	84	86	87	89	92

Descent (.78/290)

Flaps Up, Set Idle Thrust

PRESSURE ALTITUDE (FT)		WEIGHT (1000 LB)				
		220	260	300	350	400
40000	**PITCH ATT**	**-1.5**	**-0.5**	**-0.0**	**0.5**	
	V/S (FT/MIN)	-2600	-2600	-2600	-2800	
30000	**PITCH ATT**	**-2.5**	**-2.0**	**-1.0**	**-0.5**	**0.0**
	V/S (FT/MIN)	-2700	-2400	-2200	-2100	-2000
20000	**PITCH ATT**	**-2.5**	**-1.5**	**-1.0**	**-0.5**	**0.5**
	V/S (FT/MIN)	-2400	-2100	-2000	-1900	-1800
10000	**PITCH ATT**	**-2.5**	**-2.0**	**-1.0**	**-0.5**	**0.5**
	V/S (FT/MIN)	-2100	-1900	-1800	-1700	-1600

Holding (VREF30+80)

Flaps Up, %N1 for Level Flight

PRESSURE ALTITUDE (FT)		WEIGHT (1000 LB)				
		220	260	300	350	220
10000	**PITCH ATT**	**4.5**	**5.0**	**5.0**	**5.5**	**5.5**
	%N1	60	64	67	72	76

Flight With Unreliable Airspeed / Turbulent Air Penetration

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

Terminal Area (5000 FT)

Gear Up, %N1 for Level Flight

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 LB) 220	260	300	350	400
FLAPS UP (VREF30 + 80)	**PITCH ATT**	**4.5**	**5.0**	**5.0**	**5.5**	**5.5**
	%N1	56	60	63	68	71
FLAPS 1 (VREF30 + 60)	**PITCH ATT**	**6.0**	**6.5**	**7.0**	**7.0**	**7.0**
	%N1	56	61	65	70	73
FLAPS 5 (VREF30 + 40)	**PITCH ATT**	**4.5**	**5.0**	**5.0**	**5.0**	**5.0**
	%N1	59	64	67	72	75
FLAPS 15 (VREF30 + 20)	**PITCH ATT**	**6.0**	**6.0**	**6.5**	**6.0**	**5.5**
	%N1	60	65	69	74	77
FLAPS 20 (VREF30 + 20)	**PITCH ATT**	**4.5**	**4.5**	**4.5**	**4.5**	**4.0**
	%N1	62	67	70	75	78

Final Approach (1500 FT)

Gear Down, %N1 for 3° Glideslope

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 LB) 220	260	300	350	400
FLAPS 25 (VREF25 + 10)	**PITCH ATT**	**0.5**	**1.0**	**1.0**	**1.0**	**1.0**
	%N1	54	59	62	67	70
FLAPS 30 (VREF30 + 10)	**PITCH ATT**	**1.0**	**1.0**	**1.0**	**0.5**	**-0.5**
	%N1	57	62	66	71	75

Max Climb %N1

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

TAT (°C)	PRESSURE ALTITUDE (1000 FT)/SPEED (KIAS OR MACH)								
	0	5	10	15	20	25	30	35	40
	250	250	250	290	290	290	290	.78	.78
60	96.5	97.2	97.0	97.4	96.7	95.1	96.1	95.1	94.7
50	97.6	98.7	99.0	99.6	98.9	97.3	98.2	95.0	93.8
40	98.8	99.8	100.4	101.2	101.0	99.3	100.1	97.0	95.8
30	99.1	101.1	101.6	102.4	102.5	101.2	101.9	98.8	97.7
20	97.5	101.3	103.3	103.8	104.1	102.8	103.4	100.5	99.4
10	95.8	99.6	102.9	104.4	105.6	104.6	104.7	102.6	100.9
0	94.2	97.8	101.1	102.6	105.0	106.9	106.5	104.3	102.4
-10	92.5	96.1	99.4	100.8	103.2	105.3	107.1	106.3	104.3
-20	90.8	94.3	97.6	99.0	101.5	103.4	105.1	106.5	106.4
-30	89.1	92.4	95.7	97.1	99.7	101.5	103.2	104.4	104.4
-40	87.3	90.5	93.9	95.2	97.8	99.5	101.2	102.2	102.2
-50	85.5	88.6	91.9	93.3	95.8	97.5	99.1	100.1	100.1

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)								
	0	5	10	15	20	25	30	35	40
PACKS OFF	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENGINE ANTI-ICE ON	-0.6	-0.6	-0.6	-0.6	-0.8	-0.9	-1.1	-1.4	-1.9
ENGINE & WING ANTI-ICE ON	-0.9	-0.9	-1.0	-1.1	-1.3	-1.4	-1.7	-2.2	-2.4

VREF (KIAS)

WEIGHT (1000 LB)	FLAPS		
	30	25	20
420	179	171	179
400	172	166	174
380	166	162	169
360	159	158	164
340	151	153	159
320	145	149	154
300	140	144	149
280	135	139	144
260	130	134	139
240	124	129	134
220	119	123	128

ADVISORY INFORMATION

Normal Configuration Landing Distance

Flaps 25

Dry Runway

	LANDING DISTANCE AND ADJUSTMENT (FT)											
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		TEMP ADJ PER 10°C		APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	340000 LB LANDING WEIGHT	PER 10000 LB ABV/ BLW 340000 LB	PER 1000 FT ABOVE SEA LEVEL	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 10 KTS ABOVE VREF25	ONE REV	NO REV
MAX MANUAL	3260	110/-60	80	-130	440	50	-40	80	-70	250	80	170
MAX AUTO	5490	130/-130	150	-250	840	0	0	160	-160	600	0	0
AUTOBRAKE 4	5670	140/-140	160	-260	880	0	0	160	-160	630	0	0
AUTOBRAKE 3	6520	160/-160	190	-300	1040	0	-20	190	-190	710	0	0
AUTOBRAKE 2	7270	190/-190	220	-350	1190	50	-120	220	-210	630	110	110
AUTOBRAKE 1	7950	220/-220	250	-390	1360	170	-220	250	-230	580	480	620

Good Reported Braking Action

MAX MANUAL	4500	110/-100	120	-210	720	120	-110	120	-110	340	260	580
MAX AUTO	5500	130/-130	150	-250	860	20	0	160	-160	600	20	80
AUTOBRAKE 4	5670	140/-140	160	-260	880	10	0	160	-160	630	10	50
AUTOBRAKE 3	6520	160/-160	190	-300	1040	0	-20	190	-190	710	0	0

Medium Reported Braking Action

MAX MANUAL	6190	170/-160	190	-330	1190	300	-230	180	-170	440	690	1660
MAX AUTO	6210	170/-160	190	-330	1190	260	-160	190	-170	570	600	1580
AUTOBRAKE 4	6280	170/-160	190	-330	1200	240	-140	190	-180	610	530	1510
AUTOBRAKE 3	6840	180/-170	200	-350	1260	160	-100	200	-200	710	350	1100

Poor Reported Braking Action

MAX MANUAL	8010	240/-230	260	-480	1830	660	-440	250	-220	520	1450	3870
MAX AUTO	8010	240/-230	260	-480	1820	660	-440	250	-220	510	1460	3890
AUTOBRAKE 4	8010	240/-230	260	-480	1820	670	-430	250	-220	520	1460	3890
AUTOBRAKE 3	8080	240/-220	260	-480	1840	610	-360	250	-230	660	1330	3760

Reference distance assumes sea level, standard day, no wind or slope, VREF25 approach speed and 2 engine reverse thrust.
Reference distance for manual braking is applicable for auto spoilers only, for manual spoilers operation increase landing distance by 400 ft.
Reference distance for auto braking is applicable for auto or manual spoilers.
Includes distance from 50 ft above threshold (1000 ft of air distance).
Actual (unfactored) distances are shown.

ADVISORY INFORMATION

Normal Configuration Landing Distance

Flaps 30

Dry Runway

BRAKING CONFIGURATION	LANDING DISTANCE AND ADJUSTMENT (FT) REF DIST 340000 LB LANDING WEIGHT	WT ADJ PER 10000 LB ABV/ BLW 340000 LB	ALT ADJ PER 1000 FT ABV SEA LEVEL	WIND ADJ PER 10 KTS HEAD WIND	WIND ADJ PER 10 KTS TAIL WIND	SLOPE ADJ PER 1% DOWN HILL	SLOPE ADJ PER 1% UP HILL	TEMP ADJ PER 10°C ABV ISA	TEMP ADJ PER 10°C BLW ISA	APP SPD ADJ PER 10 KTS ABOVE VREF 30	REVERSE THRUST ADJ ONE REV	REVERSE THRUST ADJ NO REV
MAX MANUAL	3230	140/-70	80	-130	440	50	-40	80	-70	250	80	160
MAX AUTO	5380	210/-140	150	-240	830	0	0	150	-150	600	0	0
AUTOBRAKE 4	5550	220/-140	150	-250	870	0	0	160	-160	620	0	0
AUTOBRAKE 3	6380	260/-170	180	-300	1020	0	-10	190	-190	720	0	0
AUTOBRAKE 2	7150	280/-200	210	-340	1180	40	-110	210	-210	640	80	80
AUTOBRAKE 1	7830	300/-220	240	-390	1350	160	-210	240	-230	580	410	540

Good Reported Braking Action

MAX MANUAL	4470	160/-110	120	-210	720	120	-110	120	-110	350	240	540
MAX AUTO	5390	210/-140	150	-250	850	20	0	150	-150	600	20	80
AUTOBRAKE 4	5550	220/-140	150	-250	870	10	0	160	-160	620	10	50
AUTOBRAKE 3	6380	260/-170	180	-300	1020	0	-10	190	-190	720	0	0

Medium Reported Braking Action

MAX MANUAL	6140	230/-170	190	-330	1190	300	-240	180	-170	450	650	1540
MAX AUTO	6150	250/-170	190	-330	1190	280	-170	180	-170	560	600	1500
AUTOBRAKE 4	6210	250/-170	190	-330	1200	260	-150	190	-180	600	540	1430
AUTOBRAKE 3	6720	280/-180	200	-350	1250	170	-100	200	-190	720	360	1060

Poor Reported Braking Action

MAX MANUAL	7970	310/-230	260	-480	1830	680	-440	250	-220	520	1370	3600
MAX AUTO	7970	310/-230	260	-480	1830	680	-440	250	-220	520	1380	3610
AUTOBRAKE 4	7970	310/-230	260	-480	1830	680	-440	250	-220	520	1380	3610
AUTOBRAKE 3	8010	330/-230	260	-480	1840	640	-360	250	-230	670	1290	3520

Reference distance assumes sea level, standard day, no wind or slope, VREF30 approach speed and 2 engine reverse thrust.
Reference distance for manual braking is applicable for auto spoilers only, for manual spoilers operation increase landing distance by 400 ft.
Reference distance for auto braking is applicable for both auto and manual spoilers.
Includes distance from 50 ft above threshold (1000 ft of air distance).
Actual (unfactored) distances are shown.

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Dry Runway

		LANDING DISTANCES AND ADJUSTMENTS (FT)								
		REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
LANDING CONFIGURATION	VREF	340000 LB LDG WT	PER 10000 LB ABV/BLW 340000 LB	PER 1000 FT ABV S.L.	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 10 KTS ABV VREF	ONE REV	NO REV
AIR/GRD SYS (FLAPS 25)	VREF25	4290	80/-90	100	-170/570	90/-80	110/-110	420	0	0
AIR/GRD SYS (FLAPS 30)	VREF30	4260	150/-90	100	-170/570	90/-80	110/-110	440	0	0
ALL FLAPS AND SLATS UP LANDING	VREF30+50	4730	240/-100	130	-170/570	80/-70	130/-120	320	200	440
ANTI-SKID OFF (FLAPS 25)	VREF25	6060	140/-140	160	-290/1010	190/-160	160/-150	440	410	960
ANTI-SKID OFF (FLAPS 30)	VREF30	5970	200/-140	160	-290/1010	190/-160	160/-150	450	380	880
ENGINE FAILURE (FLAPS 20)	VREF20	3530	130/-70	90	-140/470	60/-50	90/-90	280	0	110
HYD SYS PRESS (C ONLY) (FLAPS 20)	VREF20	4220	100/-90	100	-160/530	70/-60	100/-100	380	140	300
HYD SYS PRESS (L ONLY) (FLAPS 25)	VREF25	3420	80/-70	80	-130/460	50/-50	80/-80	290	100	200
HYD SYS PRESS (L ONLY) (FLAPS 30)	VREF30	3400	110/-70	80	-130/460	60/-50	80/-80	300	90	190
HYD SYS PRESS (R ONLY) (FLAPS 25)	VREF25	3760	80/-80	90	-150/530	70/-60	90/-90	310	140	300
HYD SYS PRESS (R ONLY) (FLAPS 30)	VREF30	3740	130/-80	90	-150/530	70/-70	90/-90	330	130	280
HYD SYS PRESS (L AND C) (FLAPS 20)	VREF30+20	5050	170/-100	130	-180/600	100/-90	130/-130	510	230	510
HYD SYS PRESS (L AND R) (FLAPS 20)	VREF30+20	4720	160/-100	130	-180/610	110/-90	130/-120	420	260	570
HYD SYS PRESS (R AND C) (FLAPS 20)	VREF30+20	6000	220/-130	170	-230/780	160/-140	170/-160	580	430	990

***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 max manual braking and maximum reverse thrust when available on operating engine(s).

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Dry Runway

		LANDING DISTANCES AND ADJUSTMENTS (FT)								
		REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
LANDING CONFIGURATION	VREF	340000 LB LDG WT	PER 10000 LB ABV/BLW 340000 LB	PER 1000 FT ABV S.L.	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 10 KTS ABV VREF	ONE REV	NO REV
LE SLAT ASYM (FLAPS > 20)	VREF30+20	3780	160/-80	90	-140/480	60/-50	90/-90	270	120	260
LE SLAT ASYM (FLAPS = 20)	VREF30+30	4260	150/-90	110	-150/520	70/-60	110/-110	310	160	340
LE SLAT ASYM (5 < FLAPS < 20)	VREF30+40	4570	160/-90	120	-160/540	80/-70	120/-120	320	180	390
LE SLAT DIS-AGREE (FLAPS > 20)	VREF20	3460	130/-70	80	-130/450	50/-50	80/-80	260	100	220
LE SLAT DISAGREE - ALTN FLAP EXT ACOMPLISHED (FLAPS = 20)	VREF20	3460	130/-70	80	-130/450	50/-50	80/-80	260	100	220
LE SLAT DISAGREE - ALTN FLAP EXT FAILED (FLAPS = 20)	VREF30+30	4050	170/-80	100	-150/500	60/-60	100/-100	280	140	290
REVERSER UNLOCKED (FLAPS 20)	VREF30+30	4380	160/-90	110	-160/540	80/-70	120/-110	330	0	180
TE FLAP ASYM (FLAPS ≥ 20)	VREF20	3460	130/-70	80	-130/450	50/-50	80/-80	260	100	220
TE FLAP ASYM (5 < FLAPS < 20)	VREF30+20	3780	160/-80	90	-140/480	60/-50	90/-90	270	120	260
TE FLAP ASYM (FLAPS ≤ 5)	VREF30+30	4000	190/-80	100	-150/490	60/-50	100/-100	270	130	290
TE FLAP DISAGREE (FLAPS ≥ 20)	VREF20	3460	130/-70	80	-130/450	50/-50	80/-80	260	100	220
TE FLAP DISAGREE (5 < FLAPS < 20)	VREF30+20	3780	160/-80	90	-140/480	60/-50	90/-90	270	120	260
TE FLAP DISAGREE (FLAPS ≤ 5)	VREF30+30	4000	190/-80	100	-150/490	60/-50	100/-100	270	130	290

***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 max manual braking and maximum reverse thrust when available on operating engine(s).

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Good Reported Braking Action

		LANDING DISTANCES AND ADJUSTMENTS (FT)								
		REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
LANDING CONFIGURATION	VREF	340000 LB LDG WT	PER 10000 LB ABV/BLW 340000 LB	PER 1000 FT ABV S.L.	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 10 KTS ABV VREF	ONE REV	NO REV
AIR/GRD SYS (FLAPS 25)	VREF25	6360	140/-140	180	-300/1010	270/-220	180/-180	620	0	0
AIR/GRD SYS (FLAPS 30)	VREF30	6300	230/-140	180	-300/1010	280/-230	180/-180	640	0	0
ALL FLAPS AND SLATS UP LANDING	VREF30+50	6400	200/-140	190	-250/860	160/-150	190/-180	380	530	1220
ANTI-SKID OFF (FLAPS 25)	VREF25	6820	170/-170	190	-350/1240	290/-230	190/-180	490	630	1530
ANTI-SKID OFF (FLAPS 30)	VREF30	6720	240/-170	190	-350/1240	290/-230	190/-180	490	590	1410
ENGINE FAILURE (FLAPS 20)	VREF20	5100	140/-120	140	-230/800	160/-140	140/-140	410	0	410
HYD SYS PRESS (C ONLY) (FLAPS 20)	VREF20	5730	160/-140	160	-250/840	170/-150	160/-150	510	430	1010
HYD SYS PRESS (L ONLY) (FLAPS 25)	VREF25	4730	110/-110	130	-220/750	140/-120	130/-120	390	300	680
HYD SYS PRESS (L ONLY) (FLAPS 30)	VREF30	4710	170/-110	130	-220/750	140/-120	130/-120	400	280	640
HYD SYS PRESS (R ONLY) (FLAPS 25)	VREF25	4730	110/-110	130	-220/750	140/-120	130/-120	390	300	680
HYD SYS PRESS (R ONLY) (FLAPS 30)	VREF30	4710	170/-110	130	-220/750	140/-120	130/-120	400	280	640
HYD SYS PRESS (L AND C) (FLAPS 20)	VREF30+20	6810	250/-160	200	-280/940	230/-190	200/-190	640	650	1560
HYD SYS PRESS (L AND R) (FLAPS 20)	VREF30+20	5960	220/-140	180	-250/860	190/-170	180/-170	510	530	1250
HYD SYS PRESS (R AND C) (FLAPS 20)	VREF30+20	6810	250/-160	200	-280/940	230/-190	200/-190	640	650	1560

***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 max manual braking and maximum reverse thrust when available on operating engine(s).

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Good Reported Braking Action

		LANDING DISTANCES AND ADJUSTMENTS (FT)								
		REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
LANDING CONFIGURATION	VREF	340000 LB LDG WT	PER 10000 LB ABV/BLW 340000 LB	PER 1000 FT ABV S.L.	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 10 KTS ABV VREF	ONE REV	NO REV
LE SLAT ASYM (FLAPS > 20)	VREF30+20	5290	180/-120	150	-230/790	150/-130	150/-140	380	380	860
LE SLAT ASYM (FLAPS = 20)	VREF30+30	5950	200/-140	170	-250/840	170/-150	170/-170	420	470	1080
LE SLAT ASYM (5 < FLAPS < 20)	VREF30+40	6380	210/-150	190	-260/870	180/-160	190/-180	430	520	1190
LE SLAT DIS-AGREE (FLAPS > 20)	VREF20	4830	130/-110	130	-220/750	130/-120	130/-130	370	330	750
LE SLAT DISAGREE - ALTN FLAP EXT ACOMPLISHED (FLAPS = 20)	VREF20	4830	130/-110	130	-220/750	130/-120	130/-130	370	330	750
LE SLAT DISAGREE - ALTN FLAP EXT FAILED (FLAPS = 20)	VREF30+30	5670	180/-130	160	-240/810	150/-140	160/-160	380	420	950
REVERSER UNLOCKED (FLAPS 20)	VREF30+30	6350	210/-150	180	-270/900	210/-180	190/-180	470	0	590
TE FLAP ASYM (FLAPS ≥ 20)	VREF20	4830	130/-110	130	-220/750	130/-120	130/-130	370	330	750
TE FLAP ASYM (5 < FLAPS < 20)	VREF30+20	5310	180/-120	150	-230/790	140/-130	150/-140	380	380	880
TE FLAP ASYM (FLAPS ≤ 5)	VREF30+30	5640	180/-130	160	-230/810	150/-130	160/-150	370	430	980
TE FLAP DISAGREE (FLAPS ≥ 20)	VREF20	4830	130/-110	130	-220/750	130/-120	130/-130	370	330	750
TE FLAP DISAGREE (5 < FLAPS < 20)	VREF30+20	5310	180/-120	150	-230/790	140/-130	150/-140	380	380	880
TE FLAP DISAGREE (FLAPS ≤ 5)	VREF30+30	5640	180/-130	160	-230/810	150/-130	160/-150	370	430	980

***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 max manual braking and maximum reverse thrust when available on operating engine(s).

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Medium Reported Braking Action

		LANDING DISTANCES AND ADJUSTMENTS (FT)								
		REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
LANDING CONFIGURATION	VREF	340000 LB LDG WT	PER 10000 LB ABV/ BLW 340000 LB	PER 1000 FT ABV S.L.	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 10 KTS ABV VREF	ONE REV	NO REV
AIR/GRD SYS (FLAPS 25)	VREF25	10140	210/-210	310	-560/1950	1000/-670	320/-320	870	0	0
AIR/GRD SYS (FLAPS 30)	VREF30	9970	340/-210	310	-550/1940	1000/-670	320/-320	870	0	0
ALL FLAPS AND SLATS UP LANDING	VREF30+50	9110	310/-230	300	-400/1400	410/-330	300/-270	520	1430	3670
ANTI-SKID OFF (FLAPS 25)	VREF25	8580	240/-230	260	-500/1870	640/-440	250/-230	560	1370	3680
ANTI-SKID OFF (FLAPS 30)	VREF30	8480	320/-230	260	-500/1870	650/-440	250/-230	560	1290	3390
ENGINE FAILURE (FLAPS 20)	VREF20	7440	220/-200	230	-390/1360	440/-340	230/-220	560	0	1250
HYD SYS PRESS (C ONLY) (FLAPS 20)	VREF20	7720	240/-210	240	-380/1340	400/-310	240/-220	630	1120	2890
HYD SYS PRESS (L ONLY) (FLAPS 25)	VREF25	6480	180/-170	200	-340/1220	330/-260	200/-180	490	780	1900
HYD SYS PRESS (L ONLY) (FLAPS 30)	VREF30	6450	250/-170	200	-340/1220	340/-260	200/-180	500	740	1780
HYD SYS PRESS (R ONLY) (FLAPS 25)	VREF25	6480	180/-170	200	-340/1220	330/-260	200/-180	490	780	1900
HYD SYS PRESS (R ONLY) (FLAPS 30)	VREF30	6450	250/-170	200	-340/1220	340/-260	200/-180	500	740	1780
HYD SYS PRESS (L AND C) (FLAPS 20)	VREF30+20	9040	350/-240	290	-420/1460	500/-390	290/-260	740	1530	4090
HYD SYS PRESS (L AND R) (FLAPS 20)	VREF30+20	8140	310/-220	270	-390/1370	430/-340	260/-240	620	1300	3370
HYD SYS PRESS (R AND C) (FLAPS 20)	VREF30+20	9040	350/-240	290	-420/1460	500/-390	290/-260	740	1530	4090

***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 max manual braking and maximum reverse thrust when available on operating engine(s).

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Medium Reported Braking Action

		LANDING DISTANCES AND ADJUSTMENTS (FT)								
		REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
LANDING CONFIGURATION	VREF	340000 LB LDG WT	PER 10000 LB ABV/BLW 340000 LB	PER 1000 FT ABV S.L.	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 10 KTS ABV VREF	ONE REV	NO REV
LE SLAT ASYM (FLAPS > 20)	VREF30+20	7310	270/-190	230	-360/1280	350/-280	230/-210	490	980	2430
LE SLAT ASYM (FLAPS = 20)	VREF30+30	8170	290/-210	260	-380/1350	390/-320	260/-240	530	1170	2930
LE SLAT ASYM (5 < FLAPS < 20)	VREF30+40	8720	300/-220	290	-400/1380	410/-330	280/-260	540	1340	3430
LE SLAT DIS- AGREE (FLAPS > 20)	VREF20	6710	200/-180	210	-340/1230	330/-260	200/-190	490	880	2200
LE SLAT DISAGREE - ALTN FLAP EXT ACOMPLISHED (FLAPS = 20)	VREF20	6710	200/-180	210	-340/1230	330/-260	200/-190	490	880	2200
LE SLAT DISAGREE - ALTN FLAP EXT FAILED (FLAPS = 20)	VREF30+30	7800	270/-200	250	-370/1310	360/-290	250/-230	490	1050	2620
REVERSER UNLOCKED (FLAPS 20)	VREF30+30	9160	320/-230	290	-430/1510	530/-420	290/-280	610	0	1680
TE FLAP ASYM (FLAPS ≥ 20)	VREF20	6710	200/-180	210	-340/1230	330/-260	200/-190	490	880	2200
TE FLAP ASYM (5 < FLAPS < 20)	VREF30+20	7370	270/-190	230	-360/1280	350/-280	230/-210	490	1010	2540
TE FLAP ASYM (FLAPS ≤ 5)	VREF30+30	7850	280/-200	250	-370/1310	360/-290	250/-230	490	1110	2810
TE FLAP DISAGREE (FLAPS ≥ 20)	VREF20	6710	200/-180	210	-340/1230	330/-260	200/-190	490	880	2200
TE FLAP DISAGREE (5 < FLAPS < 20)	VREF30+20	7370	270/-190	230	-360/1280	350/-280	230/-210	490	1010	2540
TE FLAP DISAGREE (FLAPS ≤ 5)	VREF30+30	7850	280/-200	250	-370/1310	360/-290	250/-230	490	1110	2810

***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 max manual braking and maximum reverse thrust when available on operating engine(s).

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Poor Reported Braking Action

LANDING CONFIGURATION	VREF	LANDING DISTANCES AND ADJUSTMENTS (FT)								
		REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
		340000 LB LDG WT	PER 10000 LB ABV/ BLW 340000 LB	PER 1000 FT ABV S.L.	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 10 KTS ABV VREF	ONE REV	NO REV
AIR/GRD SYS (FLAPS 25)	VREF25	16740	290/-180	570	-1120/4230	6080/-2020	600/-590	1090	0	0
AIR/GRD SYS (FLAPS 30)	VREF30	16320	440/-180	550	-1100/4180	5960/-1970	580/-570	1080	0	0
ALL FLAPS AND SLATS UP LANDING	VREF30+50	12000	440/-330	430	-590/2140	900/-630	410/-370	640	3020	8970
ANTI-SKID OFF (FLAPS 25)	VREF25	11270	350/-330	370	-800/3310	3040/-940	350/-310	630	3540	14250
ANTI-SKID OFF (FLAPS 30)	VREF30	11160	440/-330	360	-800/3310	3040/-950	350/-310	630	3380	13380
ENGINE FAILURE (FLAPS 20)	VREF20	10240	330/-290	340	-600/2200	1100/-700	330/-310	690	0	3070
HYD SYS PRESS (C ONLY) (FLAPS 20)	VREF20	9840	330/-290	330	-550/2030	840/-570	320/-290	710	2280	6740
HYD SYS PRESS (L ONLY) (FLAPS 25)	VREF25	8360	250/-240	280	-500/1870	710/-480	270/-240	560	1610	4380
HYD SYS PRESS (L ONLY) (FLAPS 30)	VREF30	8340	340/-240	280	-500/1870	730/-490	270/-240	570	1530	4080
HYD SYS PRESS (R ONLY) (FLAPS 25)	VREF25	8360	250/-240	280	-500/1870	710/-480	270/-240	560	1610	4380
HYD SYS PRESS (R ONLY) (FLAPS 30)	VREF30	8340	340/-240	280	-500/1870	730/-490	270/-240	570	1530	4080
HYD SYS PRESS (L AND C) (FLAPS 20)	VREF30+20	11330	460/-320	400	-600/2160	990/-670	380/-340	800	2910	8920
HYD SYS PRESS (L AND R) (FLAPS 20)	VREF30+20	10390	420/-300	360	-560/2060	890/-610	350/-310	690	2540	7490
HYD SYS PRESS (R AND C) (FLAPS 20)	VREF30+20	11330	460/-320	400	-600/2160	990/-670	380/-340	800	2910	8920

***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 max manual braking and maximum reverse thrust when available on operating engine(s).

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Poor Reported Braking Action

		LANDING DISTANCES AND ADJUSTMENTS (FT)								
		REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
LANDING CONFIGURATION	VREF	340000 LB LDG WT	PER 10000 LB ABV/ BLW 340000 LB	PER 1000 FT ABV S.L.	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 10 KTS ABV VREF	ONE REV	NO REV
LE SLAT ASYM (FLAPS > 20)	VREF30+20	9460	360/-270	320	-530/1950	760/-520	310/-280	570	2010	5610
LE SLAT ASYM (FLAPS = 20)	VREF30+30	10460	390/-290	360	-560/2040	820/-570	350/-320	600	2310	6530
LE SLAT ASYM (5 < FLAPS < 20)	VREF30+40	11270	420/-310	400	-570/2100	870/-610	380/-340	630	2700	7890
LE SLAT DIS-AGREE (FLAPS > 20)	VREF20	8750	290/-250	290	-510/1900	730/-500	280/-260	580	1860	5230
LE SLAT DISAGREE - ALTN FLAP EXT ACOMPLISHED (FLAPS = 20)	VREF20	8750	290/-250	290	-510/1900	730/-500	280/-260	580	1860	5230
LE SLAT DISAGREE - ALTN FLAP EXT FAILED (FLAPS = 20)	VREF30+30	10020	370/-280	340	-540/1990	780/-540	330/-300	560	2120	5910
REVERSER UNLOCKED (FLAPS 20)	VREF30+30	12380	450/-340	420	-660/2380	1260/-830	410/-390	730	0	3880
TE FLAP ASYM (FLAPS ≥ 20)	VREF20	8750	290/-250	290	-510/1900	730/-500	280/-260	580	1860	5230
TE FLAP ASYM (5 < FLAPS < 20)	VREF30+20	9590	370/-270	330	-530/1960	760/-520	320/-280	590	2160	6210
TE FLAP ASYM (FLAPS ≤ 5)	VREF30+30	10170	380/-280	350	-540/2000	780/-540	340/-300	580	2290	6540
TE FLAP DISAGREE (FLAPS ≥ 20)	VREF20	8750	290/-250	290	-510/1900	730/-500	280/-260	580	1860	5230
TE FLAP DISAGREE (5 < FLAPS < 20)	VREF30+20	9590	370/-270	330	-530/1960	760/-520	320/-280	590	2160	6210
TE FLAP DISAGREE (FLAPS ≤ 5)	VREF30+30	10170	380/-280	350	-540/2000	780/-540	340/-300	580	2290	6540

***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 max manual braking and maximum reverse thrust when available on operating engine(s).

ADVISORY INFORMATION

Recommended Brake Cooling Schedule

Reference Brake Energy Per Brake (Millions of Foot Pounds)

			BRAKES ON SPEED (KIAS)*																	
			80			100			120			140			160			180		
WEIGHT (1000 LB)	OAT		PRESSURE ALTITUDE (1000 FT)																	
	°F	°C	0	2	4	0	2	4	0	2	4	0	2	4	0	2	4	0	2	4
420	40	4	16.2	17.2	18.2	24.4	26.0	27.5	34.0	36.2	38.5	44.7	47.7	50.7	56.4	60.2	64.1			
	60	16	16.8	17.8	18.8	25.3	26.9	28.6	35.2	37.6	39.9	46.4	49.5	52.7	58.5	62.6	66.6			
	80	27	17.4	18.4	19.5	26.2	27.9	29.6	36.5	39.0	41.4	48.1	51.4	54.6	60.7	64.9	69.1			
	100	38	17.8	18.9	20.0	26.9	28.6	30.4	37.5	40.0	42.5	49.4	52.8	56.2	62.5	66.8	71.2			
	120	49	18.0	19.2	20.3	27.4	29.2	31.0	38.3	40.9	43.5	50.6	54.1	57.6	64.1	68.6	73.0			
380	40	4	14.8	15.7	16.6	22.3	23.7	25.2	31.0	33.0	35.1	40.8	43.5	46.2	51.4	54.9	58.5			
	60	16	15.4	16.3	17.2	23.1	24.6	26.1	32.2	34.3	36.4	42.3	45.2	48.0	53.4	57.0	60.7			
	80	27	15.9	16.9	17.9	24.0	25.5	27.0	33.4	35.6	37.8	43.9	46.8	49.8	55.4	59.2	63.0			
	100	38	16.3	17.3	18.3	24.6	26.2	27.7	34.2	36.5	38.8	45.1	48.1	51.2	57.0	60.9	64.8			
	120	49	16.5	17.5	18.6	25.0	26.6	28.3	34.9	37.3	39.6	46.1	49.3	52.4	58.4	62.4	66.5			
340	40	4	13.5	14.3	15.1	20.2	21.5	22.8	28.0	29.9	31.7	36.8	39.2	41.7	46.3	49.4	52.6	56.5	60.4	64.3
	60	16	14.0	14.8	15.7	21.0	22.3	23.6	29.1	31.0	32.9	38.2	40.7	43.3	48.1	51.3	54.6	58.7	62.7	66.8
	80	27	14.5	15.3	16.2	21.7	23.1	24.5	30.2	32.1	34.1	39.6	42.2	44.9	49.8	53.2	56.6	60.8	65.0	69.3
	100	38	14.8	15.7	16.6	22.3	23.7	25.1	30.9	33.0	35.0	40.7	43.4	46.1	51.3	54.8	58.3	62.6	67.0	71.3
	120	49	15.0	15.9	16.8	22.6	24.1	25.6	31.5	33.6	35.7	41.5	44.4	47.2	52.5	56.1	59.7	64.2	68.7	73.2
300	40	4	12.1	12.9	13.6	18.1	19.3	20.4	25.0	26.6	28.3	32.7	34.9	37.0	41.0	43.8	46.6	49.9	53.4	56.8
	60	16	12.6	13.3	14.1	18.8	20.0	21.2	26.0	27.6	29.3	33.9	36.2	38.4	42.6	45.5	48.4	51.9	55.4	59.0
	80	27	13.0	13.8	14.6	19.5	20.7	21.9	26.9	28.7	30.4	35.2	37.5	39.8	44.2	47.2	50.1	53.8	57.5	61.1
	100	38	13.3	14.1	14.9	19.9	21.2	22.5	27.6	29.4	31.2	36.1	38.5	40.9	45.4	48.5	51.6	55.3	59.1	63.0
	120	49	13.5	14.3	15.1	20.3	21.6	22.9	28.1	30.0	31.8	36.9	39.4	41.8	46.4	49.6	52.8	56.7	60.6	64.6
260	40	4	10.8	11.5	12.1	16.0	17.0	18.0	22.0	23.4	24.8	28.6	30.4	32.3	35.6	38.0	40.4	43.2	46.1	49.0
	60	16	11.2	11.9	12.6	16.6	17.7	18.7	22.8	24.3	25.7	29.6	31.6	33.5	37.0	39.5	41.9	44.8	47.8	50.9
	80	27	11.6	12.3	13.0	17.2	18.3	19.4	23.6	25.2	26.7	30.7	32.7	34.7	38.3	40.9	43.5	46.5	49.6	52.8
	100	38	11.9	12.6	13.3	17.6	18.7	19.8	24.2	25.8	27.3	31.5	33.6	35.6	39.4	42.0	44.7	47.8	51.0	54.3
	120	49	12.0	12.7	13.5	17.9	19.0	20.2	24.7	26.3	27.9	32.1	34.3	36.4	40.2	43.0	45.7	48.9	52.2	55.6
220	40	4	9.6	10.1	10.7	14.0	14.8	15.7	18.9	20.1	21.3	24.3	25.9	27.4	30.1	32.1	34.0	36.1	38.6	41.0
	60	16	9.9	10.5	11.1	14.5	15.4	16.3	19.6	20.9	22.1	25.2	26.9	28.5	31.2	33.3	35.3	37.5	40.0	42.5
	80	27	10.3	10.9	11.5	15.0	15.9	16.8	20.3	21.6	22.9	26.2	27.8	29.5	32.4	34.5	36.6	38.9	41.5	44.1
	100	38	10.5	11.1	11.7	15.3	16.3	17.2	20.8	22.1	23.5	26.8	28.5	30.3	33.2	35.4	37.6	40.0	42.6	45.3
	120	49	10.6	11.2	11.8	15.6	16.5	17.5	21.2	22.5	23.9	27.3	29.1	30.9	33.9	36.1	38.4	40.8	43.6	46.3

***To correct for wind, enter table with the brakes on speed minus one half the headwind or plus 1.5 times the tailwind.**
If ground speed is used for brakes on speed, ignore wind, altitude, and OAT effects.

Adjusted Brake Energy Per Brake (Millions of Foot Pounds)
No Reverse Thrust

		REFERENCE BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS)											
EVENT		5	10	15	20	25	30	35	40	45	50	55	60
RTO MAX MAN		5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0	60.0
LANDING	MAX MAN	1.0	6.1	11.2	16.1	21.0	25.8	30.5	35.2	39.8	44.5	49.1	53.8
	MAX AUTO	1.7	6.1	10.4	14.7	18.9	23.1	27.3	31.5	35.8	40.0	44.3	48.7
	AUTOBRAKE 4	1.9	6.0	10.1	14.1	18.1	22.0	26.0	29.9	33.8	37.8	41.8	45.8
	AUTOBRAKE 3	1.8	5.7	9.5	13.2	17.0	20.7	24.3	28.0	31.6	35.3	39.0	42.8
	AUTOBRAKE 2	1.7	5.4	9.0	12.5	15.9	19.3	22.7	26.1	29.4	32.8	36.2	39.7
	AUTOBRAKE 1	1.7	5.0	8.2	11.3	14.4	17.4	20.3	23.3	26.2	29.1	32.1	35.0

ADVISORY INFORMATION

Recommended Brake Cooling Schedule

Two Engines Reverse Thrust

		REFERENCE BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS)											
EVENT		5	10	15	20	25	30	35	40	45	50	55	60
LANDING	MAX MAN	0.0	5.0	9.9	14.6	19.2	23.8	28.2	32.6	37.0	41.3	45.6	49.9
	MAX AUTO	0.2	3.7	7.3	10.8	14.3	17.9	21.5	25.1	28.7	32.4	36.2	40.0
	AUTOBRAKE 4	0.0	2.9	6.0	9.0	12.1	15.1	18.2	21.3	24.5	27.7	30.9	34.2
	AUTOBRAKE 3	0.0	1.8	4.3	6.9	9.5	12.1	14.8	17.4	20.1	23.9	25.7	28.6
	AUTOBRAKE 2	0.0	0.7	2.8	4.8	6.9	8.9	11.0	13.1	15.3	17.6	19.9	22.2
	AUTOBRAKE 1	0.0	0.4	1.8	3.2	4.6	6.0	7.5	9.0	10.5	12.1	13.8	15.5

Cooling Time (Minutes)

Category "C" and "D" Brakes

	ADJUSTED BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS)									
	14 & BELOW	15	16	18	20	24	28	34	35 TO 42	43 & ABOVE
	BRAKE TEMPERATURE MONITOR SYSTEM INDICATION ON EICAS									
	UP TO 1	1	1	2	2	3	4	5	5 TO 6	7 & ABOVE
INFLIGHT GEAR DOWN	NO SPECIAL PROCEDURE REQUIRED	1	1	2	2	3	4	6	CAUTION	FUSE PLUG MELT ZONE
GROUND		11	15	19	24	34	44	59		

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.
For one brake deactivated, increase brake energy by 15 percent.
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 6 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 10 minutes.
Brake temperature monitor system (BTMS) indication on EICAS 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.

Performance Inflight - QRH — Chapter PI-QRH

Engine Inoperative — Section 12

ENGINE INOP

Initial Max Continuous %N1

Based on .80M, packs on or off and APU on

TAT (°C)	PRESSURE ALTITUDE (1000 FT)							
	29	31	33	35	37	39	41	43
20	103.8	103.4	102.5					
15	104.4	104.0	103.3	102.3	101.1	100.8	100.8	100.8
10	105.2	104.6	104.0	103.2	101.9	101.4	101.4	101.4
5	106.1	105.5	104.7	103.9	102.6	102.1	102.2	102.2
0	107.1	106.4	105.6	104.7	103.3	102.9	102.9	102.9
-5	106.9	107.5	106.6	105.7	104.3	103.9	103.9	103.9
-10	106.0	107.1	107.7	106.7	105.3	104.9	104.9	104.9
-15	105.1	106.2	107.1	107.8	106.5	106.2	106.2	106.2
-20	104.2	105.3	106.2	106.9	106.6	106.4	106.4	106.4
-25	103.2	104.3	105.3	105.8	105.8	105.6	105.6	105.6
-30	102.3	103.3	104.3	104.7	104.7	104.7	104.7	104.7
-35	101.3	102.4	103.3	103.6	103.6	103.6	103.6	103.6
-40	100.3	101.3	102.3	102.6	102.6	102.6	102.6	102.6

ENGINE INOP

Max Continuous %N1

37000 FT to 27000 FT Pressure Altitudes

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

37000 FT PRESS ALT		TAT (°C)												
KIAS	M	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	20
200	.63	102.6	103.6	104.7	105.8	106.9	105.8	104.8	104.1	103.3	101.8	98.8	95.7	
220	.69	102.6	103.6	104.7	105.8	106.9	105.9	104.8	104.0	103.3	102.4	100.4	97.5	
240	.74	102.6	103.6	104.7	105.8	106.9	106.1	105.0	104.0	103.3	102.5	101.7	99.4	
260	.80	102.6	103.6	104.7	105.8	106.6	106.5	105.3	104.3	103.3	102.6	101.9	101.1	
35000 FT PRESS ALT		TAT (°C)												
KIAS	M	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	20
200	.60	102.6	103.6	104.7	105.8	106.9	107.2	106.2	105.5	104.7	103.2	100.2	97.1	
220	.66	102.6	103.6	104.7	105.8	106.9	107.3	106.2	105.4	104.7	103.8	101.8	98.8	
240	.71	102.6	103.6	104.7	105.8	106.9	107.5	106.4	105.3	104.6	104.0	102.9	100.5	
260	.77	102.6	103.6	104.7	105.8	106.9	107.7	106.6	105.6	104.5	103.9	103.2	102.1	
33000 FT PRESS ALT		TAT (°C)												
KIAS	M	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	20
200	.58	102.6	103.6	104.7	105.8	106.9	107.9	107.2	106.5	105.8	104.9	102.6	99.6	
220	.63	102.6	103.6	104.7	105.8	106.9	107.9	107.3	106.3	105.7	105.0	104.1	101.2	
240	.68	102.6	103.6	104.7	105.8	106.9	107.9	107.4	106.4	105.5	104.9	104.1	102.7	
260	.74	102.6	103.6	104.7	105.8	106.9	107.9	107.4	106.5	105.5	104.7	104.1	103.3	
31000 FT PRESS ALT		TAT (°C)												
KIAS	M	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	20
200	.55	102.6	103.6	104.7	105.8	106.8	107.9	108.1	107.2	106.6	106.0	105.0	102.0	
220	.61	102.6	103.6	104.7	105.8	106.9	107.9	108.2	107.3	106.6	106.0	105.3	103.5	
240	.66	102.6	103.6	104.7	105.8	106.9	107.9	108.2	107.3	106.4	105.7	105.1	104.4	
260	.71	102.6	103.6	104.7	105.8	106.9	107.9	108.3	107.3	106.4	105.5	104.9	104.3	
29000 FT PRESS ALT		TAT (°C)												
KIAS	M	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	20
200	.53	102.6	103.6	104.7	105.8	106.8	107.9	108.4	107.5	106.8	106.1	105.5	103.6	100.7
220	.58	102.6	103.6	104.7	105.8	106.9	107.9	108.5	107.7	106.7	106.1	105.5	104.9	102.1
240	.63	102.6	103.6	104.7	105.8	106.9	107.9	108.7	107.7	106.8	106.0	105.4	104.8	103.5
260	.68	102.6	103.6	104.7	105.8	106.9	107.9	108.8	107.7	106.8	105.9	105.3	104.7	104.0
27000 FT PRESS ALT		TAT (°C)												
KIAS	M	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	20
200	.51	102.6	103.6	104.7	105.8	106.8	107.9	108.2	107.2	106.3	105.6	104.8	104.1	101.4
220	.56	102.6	103.6	104.7	105.8	106.8	107.9	108.4	107.4	106.4	105.6	104.9	104.2	102.7
240	.60	102.6	103.6	104.7	105.8	106.9	107.9	108.6	107.6	106.7	105.7	105.0	104.3	103.6
260	.65	102.2	103.2	104.2	105.1	106.1	107.0	107.9	107.8	106.8	105.9	105.0	104.3	103.6

%N1 Adjustments for Engine Bleed

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)					
	27	29	31	33	35	37
ENGINE ANTI-ICE ON	-0.8	-0.9	-1.0	-1.1	-1.2	-1.4
ENGINE & WING ANTI-ICE ON	-1.7	-1.9	-2.1	-2.3	-2.5	-2.9

ENGINE INOP

Max Continuous %N1

25000 FT to 16000 FT Pressure Altitudes

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

25000 FT PRESS ALT		TAT (°C)														
KIAS	M	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	20	25	30
200	.49	102.6	103.6	104.7	105.8	106.8	107.8	107.8	106.9	105.9	104.9	104.1	103.3	101.8	99.0	
220	.53	102.3	103.3	104.3	105.3	106.2	107.1	107.9	107.1	106.1	105.0	104.2	103.4	102.7	100.3	
240	.58	101.6	102.6	103.6	104.5	105.5	106.4	107.2	107.2	106.3	105.3	104.3	103.6	102.8	101.5	
260	.63	100.8	101.8	102.8	103.8	104.7	105.6	106.5	107.3	106.6	105.6	104.6	103.8	103.0	102.2	
24000 FT PRESS ALT		TAT (°C)														
KIAS	M	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	20	25	30
200	.48	102.6	103.6	104.7	105.8	106.8	107.9	108.4	107.6	106.6	105.6	104.9	104.1	103.2	100.5	
220	.52	102.3	103.3	104.3	105.3	106.2	107.2	108.0	107.7	106.8	105.8	104.9	104.1	103.4	101.6	
240	.57	101.6	102.6	103.6	104.5	105.5	106.4	107.3	107.8	107.0	106.0	105.0	104.2	103.5	102.7	
260	.61	100.8	101.8	102.8	103.7	104.7	105.6	106.5	107.4	107.1	106.2	105.2	104.4	103.6	102.8	
22000 FT PRESS ALT		TAT (°C)														
KIAS	M	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	20	25	30
200	.46	102.6	103.6	104.7	105.8	106.8	107.9	108.9	109.8	108.9	107.9	106.9	106.1	105.2	103.7	
220	.50	102.6	103.6	104.7	105.8	106.8	107.9	108.9	109.8	109.0	108.0	107.0	106.1	105.3	104.4	
240	.55	102.6	103.6	104.7	105.7	106.6	107.6	108.5	109.4	109.2	108.2	107.2	106.3	105.4	104.6	
260	.59	102.0	103.0	104.0	105.0	105.9	106.9	107.8	108.7	109.3	108.5	107.5	106.5	105.6	104.8	
20000 FT PRESS ALT		TAT (°C)														
KIAS	M	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	20	25	30
200	.44	102.6	103.6	104.7	105.8	106.8	107.9	108.9	109.9	110.8	109.8	108.8	107.9	106.9	106.1	104.0
220	.48	102.6	103.6	104.7	105.8	106.8	107.9	108.9	109.9	110.8	109.9	108.9	108.0	107.0	106.1	104.8
240	.53	102.6	103.6	104.7	105.8	106.8	107.9	108.9	109.9	110.8	110.1	109.1	108.1	107.2	106.2	105.4
260	.57	102.4	103.4	104.4	105.4	106.4	107.4	108.3	109.3	110.2	110.1	109.3	108.3	107.4	106.4	105.6
18000 FT PRESS ALT		TAT (°C)														
KIAS	M	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	20	25	30
200	.42	102.6	103.6	104.7	105.8	106.8	107.9	108.9	109.9	110.9	110.4	109.4	108.4	107.5	106.7	105.6
220	.46	102.6	103.6	104.7	105.8	106.8	107.9	108.9	109.9	110.9	110.3	109.3	108.3	107.4	106.6	105.7
240	.51	102.3	103.3	104.3	105.3	106.3	107.2	108.2	109.1	110.1	110.2	109.4	108.4	107.4	106.6	105.7
260	.55	101.6	102.6	103.6	104.6	105.6	106.6	107.5	108.5	109.4	110.3	109.5	108.6	107.6	106.7	105.8
16000 FT PRESS ALT		TAT (°C)														
KIAS	M	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	20	25	30
200	.41	100.9	102.0	103.0	104.1	105.1	106.2	107.2	108.2	109.1	110.1	109.5	108.6	107.7	106.9	106.1
220	.45	100.6	101.7	102.7	103.7	104.8	105.8	106.8	107.8	108.8	109.8	109.4	108.5	107.6	106.8	105.9
240	.49	100.3	101.3	102.3	103.4	104.4	105.4	106.4	107.4	108.4	109.4	109.4	108.5	107.5	106.7	105.9
260	.53	99.9	101.0	102.0	103.0	104.0	105.0	106.1	107.1	108.0	109.0	109.5	108.6	107.7	106.8	106.0

%N1 Adjustments for Engine Bleed

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)					
	16	18	20	22	24	25
ENGINE ANTI-ICE ON	-0.4	-0.4	-0.5	-0.6	-0.7	-0.7
ENGINE & WING ANTI-ICE ON	-1.1	-1.1	-1.2	-1.4	-1.5	-1.5

ENGINE INOP

Max Continuous %N1
14000 FT to 5000 FT Pressure Altitudes
Based on engine bleed for packs on or off and anti-ice off

14000 FT PRESS ALT		TAT (°C)														
KIAS	M	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	20	25	30
200	.39	101.1	102.1	103.1	104.2	105.2	106.3	107.3	108.3	109.3	110.2	109.4	108.5	107.6	106.8	106.1
220	.43	100.8	101.8	102.8	103.9	104.8	105.8	106.8	107.7	108.6	109.6	109.4	108.4	107.6	106.7	106.0
240	.47	100.2	101.2	102.2	103.2	104.1	105.1	106.0	107.0	107.9	108.9	109.4	108.4	107.5	106.6	105.9
260	.51	99.5	100.5	101.5	102.5	103.4	104.4	105.3	106.2	107.2	108.1	109.1	108.4	107.5	106.7	105.9

12000 FT PRESS ALT		TAT (°C)														
KIAS	M	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	20	25	30
200	.38	100.0	101.0	101.9	102.9	103.9	104.8	105.8	106.7	107.7	108.6	109.2	108.2	107.4	106.6	105.8
220	.41	99.4	100.4	101.4	102.4	103.4	104.3	105.3	106.2	107.1	108.1	109.0	108.3	107.4	106.6	105.8
240	.45	98.9	99.9	100.9	101.9	102.8	103.8	104.7	105.6	106.6	107.5	108.4	108.4	107.5	106.7	105.9
260	.49	98.4	99.4	100.3	101.3	102.3	103.2	104.1	105.1	106.0	106.9	107.8	108.5	107.6	106.8	105.9

10000 FT PRESS ALT		TAT (°C)														
KIAS	M	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	20	25	30
200	.36	98.2	99.2	100.2	101.2	102.1	103.1	104.0	104.9	105.8	106.8	107.7	107.8	107.0	106.2	105.4
220	.40	97.7	98.7	99.7	100.7	101.6	102.6	103.5	104.4	105.4	106.3	107.2	107.8	107.0	106.2	105.4
240	.43	97.4	98.4	99.3	100.3	101.3	102.2	103.1	104.1	105.0	105.9	106.8	107.7	107.2	106.4	105.6
260	.47	97.0	98.0	99.0	99.9	100.9	101.8	102.7	103.7	104.6	105.5	106.4	107.3	107.4	106.6	105.8

5000 FT PRESS ALT		TAT (°C)														
KIAS	M	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	20	25	30
200	.33	95.5	96.5	97.5	98.4	99.4	100.3	101.2	102.1	103.1	104.0	104.8	105.7	106.6	106.4	105.7
220	.36	95.1	96.1	97.1	98.0	99.0	99.9	100.8	101.7	102.7	103.6	104.4	105.3	106.2	106.4	105.7
240	.40	94.7	95.7	96.7	97.6	98.6	99.5	100.4	101.3	102.2	103.1	104.0	104.9	105.8	106.4	105.7
260	.43	94.4	95.4	96.4	97.3	98.3	99.2	100.1	101.0	101.9	102.8	103.7	104.6	105.5	106.3	105.9

%N1 Adjustments for Engine Bleed

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)			
	5	10	12	14
ENGINE ANTI-ICE ON	-0.6	-0.5	-0.5	-0.6
ENGINE & WING ANTI-ICE ON	-1.2	-1.1	-1.2	-1.2

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 DRIFT DOWN	LEVEL OFF		ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
420	406	276	18300	17300	15500
400	388	270	19700	18800	17400
380	369	263	20900	20200	19200
360	349	256	22100	21400	20600
340	330	249	23300	22600	21700
320	310	242	24700	23900	23000
300	291	235	26100	25400	24300
280	271	227	27800	27300	26200
260	252	219	29400	29300	28600
240	233	211	31100	31100	30800
220	213	202	32900	32900	32700

Includes APU fuel burn.

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
265	249	234	222	210	200	191	182	174	167	161
533	500	470	444	421	400	381	364	348	333	320
803	752	707	667	632	600	571	545	521	499	479
1074	1005	945	891	843	800	761	726	694	664	637
1346	1259	1182	1115	1054	1000	951	907	866	829	796
1618	1513	1420	1338	1265	1200	1141	1088	1039	994	953
1892	1767	1659	1562	1477	1400	1331	1268	1211	1159	1111
2165	2022	1897	1786	1688	1600	1521	1449	1383	1324	1269
2438	2277	2135	2010	1899	1800	1710	1629	1556	1488	1427

Driftdown/Cruise Fuel and Time

AIR DIST (NM)	FUEL REQUIRED (1000 LB)											TIME (HR:MIN)
	WEIGHT AT START OF DRIFTDOWN (1000 LB)											
	220	240	260	280	300	320	340	360	380	400	420	
200	3.5	3.7	4.0	4.2	4.4	4.7	4.9	5.2	5.6	5.9	6.0	0:29
400	7.5	8.0	8.7	9.2	9.8	10.4	10.9	11.6	12.2	12.9	13.4	0:60
600	11.3	12.2	13.2	14.0	15.0	15.9	16.7	17.7	18.7	19.7	20.4	1:31
800	15.1	16.3	17.6	18.8	20.0	21.3	22.4	23.7	25.0	26.3	27.4	2:02
1000	18.9	20.4	22.0	23.5	25.0	26.6	28.0	29.6	31.2	32.8	34.3	2:34
1200	22.5	24.3	26.3	28.1	30.0	31.8	33.5	35.4	37.3	39.3	41.0	3:06
1400	26.1	28.3	30.5	32.6	34.8	37.0	39.0	41.2	43.4	45.6	47.7	3:38
1600	29.7	32.1	34.7	37.1	39.6	42.0	44.4	46.8	49.3	51.9	54.3	4:10
1800	33.2	35.9	38.8	41.5	44.3	47.1	49.7	52.4	55.2	58.1	60.8	4:43

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 and APU on

WEIGHT (1000 LB)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
420	15300	12900	10100
410	16100	13900	11200
400	17000	15000	12300
390	17800	16000	13500
380	18700	17100	14600
370	19500	18100	15700
360	20300	19000	16900
350	20900	20000	18100
340	21500	20600	19300
330	22100	21200	20300
320	22800	21900	20900
310	23500	22500	21500
300	24100	23200	22100
290	24900	23900	22800
280	25700	24600	23400
270	26700	25500	24100
260	27600	26800	24800
250	28600	28000	26200
240	29600	29300	27700
230	30600	30400	29300
220	31500	31400	30600

With engine anti-ice on, decrease altitude capability by 1800 ft.
With engine and wing anti-ice on, decrease altitude capability by 3800 ft.

ENGINE INOP

MAX CONTINUOUS THRUST

Long Range Cruise Control

WEIGHT (1000 LB)		PRESSURE ALTITUDE (1000 FT)								
		10	14	18	21	23	25	27	29	31
420	%N1	98.9	102.5							
	MACH	.584	.617							
	KIAS	324	319							
	FF/ENG	14058	14193							
400	%N1	97.5	100.9	105.3						
	MACH	.573	.606	.643						
	KIAS	318	313	308						
	FF/ENG	13339	13421	13752						
380	%N1	96.0	99.4	103.3						
	MACH	.563	.596	.631						
	KIAS	312	307	302						
	FF/ENG	12635	12695	12923						
360	%N1	94.4	97.8	101.5	105.2					
	MACH	.550	.585	.619	.647					
	KIAS	305	301	296	292					
	FF/ENG	11912	11976	12117	12403					
340	%N1	92.9	96.1	99.6	102.9					
	MACH	.538	.572	.606	.634					
	KIAS	298	295	290	286					
	FF/ENG	11215	11267	11346	11549					
320	%N1	91.2	94.4	97.8	100.8	103.2				
	MACH	.525	.559	.594	.621	.640				
	KIAS	291	288	284	279	277				
	FF/ENG	10540	10566	10625	10739	10905				
300	%N1	89.6	92.6	96.0	98.7	100.8	103.5			
	MACH	.512	.545	.580	.606	.625	.645			
	KIAS	283	280	277	273	270	268			
	FF/ENG	9873	9852	9903	9966	10078	10257			
280	%N1	87.8	90.8	94.0	96.7	98.5	100.8	103.7		
	MACH	.498	.530	.566	.593	.610	.629	.649		
	KIAS	276	272	270	266	263	261	259		
	FF/ENG	9219	9175	9209	9251	9288	9413	9597		
260	%N1	85.8	88.8	91.9	94.5	96.3	98.3	100.6	103.9	
	MACH	.484	.515	.549	.576	.595	.612	.632	.653	
	KIAS	268	264	261	259	257	254	252	249	
	FF/ENG	8574	8506	8497	8536	8571	8611	8740	8925	
240	%N1	83.8	86.8	89.8	92.3	94.0	95.9	97.9	100.3	
	MACH	.468	.499	.532	.559	.578	.596	.614	.635	
	KIAS	259	256	253	251	249	247	244	242	
	FF/ENG	7928	7855	7819	7842	7862	7889	7932	8059	
220	%N1	81.5	84.5	87.6	89.9	91.6	93.4	95.2	97.3	99.8
	MACH	.449	.482	.514	.540	.559	.577	.596	.615	.635
	KIAS	248	247	244	242	240	239	236	234	232
	FF/ENG	7259	7214	7156	7144	7170	7187	7208	7250	7367

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
288	265	245	228	213	200	190	181	173	166	159
578	532	490	456	427	400	380	362	346	331	318
869	799	737	685	640	600	571	544	519	497	477
1160	1067	984	914	854	800	761	725	692	662	636
1453	1335	1231	1143	1068	1000	951	906	865	828	794
1747	1605	1479	1373	1282	1200	1141	1087	1038	993	953
2042	1875	1728	1603	1496	1400	1332	1269	1211	1158	1111
2339	2147	1977	1833	1710	1600	1521	1449	1383	1323	1269
2637	2419	2226	2064	1924	1800	1711	1629	1555	1487	1427

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	5.6	0:41	4.9	0:40	4.4	0:39	4.0	0:38	3.7	0:37
400	11.6	1:18	10.7	1:15	10.0	1:12	9.4	1:10	9.0	1:07
600	17.6	1:56	16.4	1:51	15.4	1:46	14.6	1:42	14.2	1:38
800	23.5	2:33	22.0	2:27	20.8	2:20	19.8	2:15	19.3	2:09
1000	29.4	3:11	27.6	3:03	26.1	2:55	24.9	2:48	24.3	2:41
1200	35.1	3:50	33.1	3:39	31.4	3:29	30.0	3:21	29.2	3:12
1400	40.9	4:29	38.5	4:16	36.5	4:04	35.0	3:54	34.1	3:44
1600	46.5	5:08	43.8	4:53	41.7	4:39	39.9	4:27	38.9	4:16
1800	52.1	5:47	49.1	5:31	46.7	5:15	44.8	5:01	43.6	4:48

Fuel Required Adjustment (1000 LB)

REFERENCE FUEL REQUIRED (1000 LB)	WEIGHT AT CHECK POINT (1000 LB)				
	200	250	300	350	400
5	-0.8	-0.4	0.0	0.6	1.1
10	-1.8	-0.9	0.0	1.4	2.6
15	-2.8	-1.4	0.0	2.2	4.2
20	-3.8	-1.9	0.0	3.0	5.7
25	-4.8	-2.4	0.0	3.7	7.3
30	-5.8	-2.8	0.0	4.5	8.8
35	-6.8	-3.3	0.0	5.3	10.4
40	-7.8	-3.8	0.0	6.0	11.9
45	-8.8	-4.3	0.0	6.7	13.5
50	-9.8	-4.8	0.0	7.5	15.1
55	-10.8	-5.3	0.0	8.2	16.7

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
420	%N1	87.4	90.4	95.0	100.3			
	KIAS	259	259	259	259			
	FF/ENG	12060	12150	12380	12850			
400	%N1	85.8	88.9	93.4	98.5	105.8		
	KIAS	252	252	252	252	252		
	FF/ENG	11430	11490	11680	12050	12880		
380	%N1	84.2	87.4	91.8	96.7	103.1		
	KIAS	246	246	246	246	246		
	FF/ENG	10820	10860	11010	11300	11940		
360	%N1	82.6	85.6	90.1	94.9	100.7		
	KIAS	239	239	239	239	239		
	FF/ENG	10210	10230	10340	10580	11080		
340	%N1	80.7	83.8	88.3	93.0	98.5		
	KIAS	231	231	231	231	231		
	FF/ENG	9610	9620	9690	9870	10260		
320	%N1	78.8	82.1	86.5	91.1	96.2	103.7	
	KIAS	225	225	225	225	225	225	
	FF/ENG	9020	9020	9060	9200	9490	10170	
300	%N1	76.8	80.1	84.6	89.1	94.0	100.3	
	KIAS	220	220	220	220	220	220	
	FF/ENG	8440	8430	8450	8550	8770	9250	
280	%N1	74.8	77.9	82.5	87.0	91.8	97.4	
	KIAS	215	215	215	215	215	215	
	FF/ENG	7880	7860	7870	7930	8090	8440	
260	%N1	72.7	75.8	80.5	85.0	89.6	94.8	102.6
	KIAS	210	210	210	210	210	210	210
	FF/ENG	7340	7310	7300	7330	7450	7700	8290
240	%N1	70.2	73.6	78.1	82.7	87.3	92.2	98.6
	KIAS	204	204	204	204	204	204	204
	FF/ENG	6800	6770	6750	6760	6840	7000	7400
220	%N1	67.8	71.1	75.6	80.4	84.9	89.6	95.2
	KIAS	199	199	199	199	199	199	199
	FF/ENG	6280	6240	6220	6210	6250	6360	6640

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

Intentionally
Blank

Performance Inflight - QRH Chapter PI-QRH
Gear Down Section 13

GEAR DOWN

200 KIAS Max Climb %N1

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

TAT (°C)	PRESSURE ALTITUDE (1000 FT)												
	0	5	10	12	14	16	18	20	22	24	26	28	30
55	96.7	97.4	97.0	97.0	96.6	96.7	97.0	97.1	96.1	95.2	96.3	98.2	99.9
50	97.2	98.3	98.1	98.1	97.8	97.9	98.3	98.3	97.3	96.2	96.2	97.5	99.2
45	97.9	98.8	99.1	99.1	98.9	99.0	99.5	99.5	98.5	97.4	97.4	98.1	98.8
40	98.5	99.3	99.9	100.1	99.9	100.2	100.6	100.7	99.6	98.6	98.5	99.3	99.9
35	99.1	100.0	100.4	100.7	100.9	101.2	101.7	101.8	100.7	99.7	99.6	100.4	101.0
30	99.6	100.6	101.1	101.2	101.4	102.1	102.8	102.9	101.8	100.8	100.7	101.4	102.1
25	98.7	101.4	101.7	101.9	102.0	102.6	103.5	103.9	102.9	101.8	101.7	102.5	103.1
20	97.9	101.9	102.5	102.6	102.7	103.3	104.1	104.6	103.7	102.8	102.7	103.4	104.1
15	97.1	101.0	103.5	103.4	103.4	104.0	104.9	105.3	104.5	103.6	103.6	104.4	105.0
10	96.3	100.2	103.6	104.4	104.2	104.8	105.7	106.2	105.3	104.5	104.4	105.2	105.9
5	95.5	99.3	102.7	103.9	104.9	105.6	106.5	107.0	106.2	105.4	105.3	105.9	106.6
0	94.7	98.4	101.8	103.0	104.0	105.6	107.3	107.8	107.2	106.3	106.2	106.7	107.2
-5	93.8	97.5	100.9	102.1	103.0	104.7	106.7	108.3	108.2	107.6	107.1	107.5	108.0
-10	93.0	96.6	100.0	101.2	102.2	103.7	105.8	107.3	108.2	108.5	108.5	108.5	108.5
-15	92.1	95.7	99.1	100.3	101.2	102.8	104.8	106.4	107.3	107.5	107.5	107.5	107.5
-20	91.3	94.8	98.2	99.3	100.3	102.0	103.9	105.5	106.3	106.5	106.5	106.5	106.5
-25	90.4	93.9	97.3	98.4	99.4	101.0	103.0	104.6	105.4	105.4	105.4	105.4	105.4
-30	89.5	93.0	96.4	97.5	98.5	100.0	102.0	103.7	104.4	104.4	104.4	104.4	104.4
-35	88.6	92.0	95.4	96.5	97.5	99.0	101.1	102.7	103.3	103.3	103.3	103.3	103.3
-40	87.7	91.1	94.5	95.6	96.5	98.1	100.1	101.8	102.2	102.2	102.2	102.2	102.2

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)												
	0	5	10	12	14	16	18	20	22	24	26	28	30
PACKS OFF	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENGINE ANTI-ICE ON	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.7	-0.8	-0.8	-0.9	-1.0	-1.0	-1.1
ENGINE & WING ANTI-ICE ON	-0.9	-0.9	-1.0	-1.0	-1.1	-1.1	-1.2	-1.3	-1.3	-1.4	-1.5	-1.5	-1.7

Long Range Cruise Altitude Capability

WEIGHT (1000 LB)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
400	21400	20000	18300
380	23200	21700	20300
360	25100	23500	22100
340	27000	25400	23900
320	28400	27700	26100
300	29900	29800	28700
280	31200	31100	30600
260	32500	32400	32000
240	33900	33800	33500
220	35300	35300	35000

GEAR DOWN

Long Range Cruise Control

WEIGHT (1000 LB)		PRESSURE ALTITUDE (1000 FT)										
		10	14	18	21	23	25	27	29	31	33	35
420	%N1	91.7	95.2	99.2								
	MACH	.473	.508	.547								
	KIAS	262	261	260								
	FF/ENG	10536	10639	10900								
400	%N1	90.2	93.7	97.6	100.9							
	MACH	.462	.497	.536	.565							
	KIAS	256	255	255	254							
	FF/ENG	9983	10059	10267	10508							
380	%N1	88.8	92.1	95.8	99.0	101.6						
	MACH	.452	.486	.523	.553	.574						
	KIAS	250	249	249	248	247						
	FF/ENG	9452	9498	9633	9835	10042						
360	%N1	87.3	90.5	94.1	97.1	99.4	102.3					
	MACH	.441	.474	.510	.540	.560	.582					
	KIAS	244	243	242	242	241	241					
	FF/ENG	8927	8935	9028	9201	9336	9566					
340	%N1	85.6	88.8	92.4	95.3	97.4	99.8	103.0				
	MACH	.430	.461	.497	.527	.547	.568	.589				
	KIAS	237	236	236	236	235	234	233				
	FF/ENG	8407	8388	8453	8577	8692	8853	9071				
320	%N1	83.9	87.2	90.6	93.3	95.4	97.5	100.2	103.7			
	MACH	.418	.449	.484	.512	.533	.553	.575	.595			
	KIAS	231	230	229	229	229	228	228	226			
	FF/ENG	7885	7864	7899	7967	8075	8179	8365	8564			
300	%N1	82.1	85.4	88.7	91.3	93.2	95.3	97.6	100.5			
	MACH	.405	.436	.469	.497	.517	.538	.558	.581			
	KIAS	224	223	222	222	222	222	221	220			
	FF/ENG	7380	7347	7344	7395	7455	7562	7668	7863			
280	%N1	80.4	83.4	86.7	89.3	91.1	93.1	95.2	97.6	100.8		
	MACH	.394	.422	.455	.482	.501	.521	.542	.563	.586		
	KIAS	218	216	215	215	215	214	214	213	213		
	FF/ENG	6918	6832	6817	6845	6878	6945	7041	7159	7348		
260	%N1	78.2	81.3	84.7	87.2	89.0	90.8	92.8	95.0	97.5	100.9	
	MACH	.382	.408	.440	.465	.484	.504	.525	.546	.568	.590	
	KIAS	210	209	208	207	207	207	207	206	206	205	
	FF/ENG	6445	6323	6304	6300	6329	6361	6432	6522	6654	6817	
240	%N1	75.8	79.4	82.5	85.0	86.7	88.5	90.4	92.4	94.6	97.3	100.9
	MACH	.367	.395	.424	.449	.467	.486	.506	.527	.548	.571	.593
	KIAS	202	202	200	200	199	199	199	199	198	198	196
	FF/ENG	5948	5864	5796	5785	5785	5813	5843	5914	6005	6136	6293
220	%N1	73.4	76.8	80.1	82.6	84.3	86.0	87.8	89.7	91.8	94.0	96.8
	MACH	.353	.380	.407	.432	.449	.466	.486	.506	.528	.550	.573
	KIAS	194	194	192	192	192	191	191	191	191	190	190
	FF/ENG	5476	5399	5295	5280	5272	5272	5296	5325	5397	5486	5613

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	189	179	170	161	154
655	584	523	474	435	400	377	356	338	322	308
989	880	787	713	653	600	566	535	507	483	461
1327	1180	1053	953	871	800	754	713	676	643	614
1670	1482	1320	1193	1090	1000	943	891	844	803	766
2018	1787	1590	1435	1309	1200	1131	1069	1013	962	918
2371	2096	1862	1678	1529	1400	1319	1246	1180	1121	1069
2729	2409	2136	1922	1750	1600	1507	1423	1347	1279	1219
3093	2725	2411	2167	1970	1800	1695	1599	1513	1437	1370
3462	3044	2688	2412	2191	2000	1882	1775	1679	1594	1519

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT)									
	10		14		18		22		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	10.4	0:50	9.5	0:48	8.7	0:46	8.0	0:44	7.2	0:42
400	21.5	1:37	19.9	1:33	18.5	1:28	17.3	1:24	16.0	1:18
600	32.4	2:26	30.1	2:18	28.2	2:11	26.5	2:04	24.7	1:55
800	43.1	3:15	40.1	3:05	37.6	2:55	35.4	2:45	33.2	2:32
1000	53.5	4:05	49.9	3:52	46.8	3:39	44.2	3:26	41.4	3:09
1200	63.7	4:56	59.5	4:40	55.9	4:24	52.8	4:09	49.4	3:47
1400	73.7	5:48	68.9	5:29	64.7	5:10	61.1	4:51	57.3	4:26
1600	83.5	6:41	78.1	6:18	73.4	5:56	69.4	5:35	64.9	5:05
1800	93.0	7:35	87.1	7:09	81.9	6:44	77.4	6:19	72.4	5:45
2000	102.4	8:31	95.9	8:00	90.2	7:32	85.3	7:04	79.8	6:26

Fuel Required Adjustment (1000 LB)

REFERENCE FUEL REQUIRED (1000 LB)	WEIGHT AT CHECK POINT (1000 LB)				
	200	250	300	350	400
10	-1.7	-0.8	0.0	1.4	3.0
20	-3.6	-1.8	0.0	2.9	6.2
30	-5.5	-2.7	0.0	4.4	9.3
40	-7.3	-3.6	0.0	5.8	12.3
50	-9.2	-4.6	0.0	7.2	15.2
60	-11.1	-5.5	0.0	8.6	18.1
70	-12.9	-6.5	0.0	9.9	20.8
80	-14.8	-7.4	0.0	11.1	23.4
90	-16.6	-8.4	0.0	12.3	25.9
100	-18.4	-9.3	0.0	13.5	28.4
110	-20.3	-10.3	0.0	14.6	30.7

Descent at VREF30 + 70

PRESSURE ALTITUDE (1000 FT)	5	10	15	17	19	21	23	25	27	29	31	33	35
DISTANCE (NM)	16	26	36	40	44	48	52	56	60	64	67	71	74
TIME (MINUTES)	7	10	12	13	14	15	16	16	17	18	19	19	20

GEAR DOWN

Holding
Flaps Up

WEIGHT (1000 LB)		PRESSURE ALTITUDE (FT)						
		1500	5000	10000	15000	20000	25000	30000
420	%N1	83.2	86.0	90.2	94.7	100.1		
	KIAS	249	249	249	249	249		
	FF/ENG	10410	10380	10420	10590	11030		
400	%N1	81.5	84.4	88.6	93.0	98.2		
	KIAS	242	242	242	242	242		
	FF/ENG	9860	9810	9830	9950	10280		
380	%N1	79.8	82.9	87.1	91.4	96.4		
	KIAS	236	236	236	236	236		
	FF/ENG	9360	9300	9290	9370	9620		
360	%N1	78.1	81.3	85.4	89.7	94.5	100.5	
	KIAS	229	229	229	229	229	229	
	FF/ENG	8830	8770	8720	8780	8960	9420	
340	%N1	76.2	79.2	83.5	87.8	92.4	98.0	
	KIAS	221	221	221	221	221	221	
	FF/ENG	8280	8220	8150	8180	8310	8640	
320	%N1	74.5	77.4	81.8	86.1	90.5	95.7	104.1
	KIAS	215	215	215	215	215	215	215
	FF/ENG	7790	7730	7660	7650	7740	7980	8610
300	%N1	72.8	75.7	80.2	84.4	88.8	93.8	100.6
	KIAS	210	210	210	210	210	210	210
	FF/ENG	7360	7300	7220	7190	7250	7430	7890
280	%N1	70.9	74.0	78.3	82.6	87.0	91.8	97.7
	KIAS	205	205	205	205	205	205	205
	FF/ENG	6940	6870	6790	6740	6770	6890	7230
260	%N1	69.0	72.2	76.4	80.8	85.2	89.7	95.2
	KIAS	200	200	200	200	200	200	200
	FF/ENG	6520	6450	6370	6300	6310	6390	6630
240	%N1	67.0	70.0	74.4	79.0	83.3	87.7	92.8
	KIAS	194	194	194	194	194	194	194
	FF/ENG	6110	6040	5950	5880	5860	5910	6070
220	%N1	65.1	67.9	72.5	76.8	81.2	85.6	90.4
	KIAS	189	189	189	189	189	189	189
	FF/ENG	5710	5640	5550	5470	5430	5450	5550

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 DRIFT DOWN	LEVEL OFF		ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
380	363	233	4900	3100	
360	345	226	7400	5700	3700
340	326	218	9700	8200	6400
320	307	213	11700	10500	8900
300	288	208	13600	12800	11200
280	270	203	15500	15100	13800
260	250	198	17100	17000	16100
240	231	193	19100	19000	18400
220	212	187	21000	20900	20400

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
370	1800		
360	3300		
350	4700	2100	
340	6100	3600	
330	7500	5100	2600
320	8800	6700	4100
310	10100	8200	5700
300	11400	9600	7400
290	12700	11200	9000
280	14000	12800	10600
270	15200	14500	12400
260	16100	15800	14200
250	17100	17000	15800
240	18200	18100	17400
230	19300	19200	18500
220	20300	20200	19700

With engine anti-ice on, decrease altitude capability by 1200 ft.
With engine and wing anti-ice on, decrease altitude capability by 2500 ft.

GEAR DOWN
ENGINE INOP
MAX CONTINUOUS THRUST

Long Range Cruise Control

WEIGHT (1000 LB)		PRESSURE ALTITUDE (1000 FT) 6	8	10	12	14	16	18	20
340	%N1	102.0	104.2						
	MACH	.393	.404						
	KIAS	234	231						
	FF/ENG	16362	16453						
320	%N1	99.8	101.8	104.2					
	MACH	.384	.395	.406					
	KIAS	228	226	224					
	FF/ENG	15297	15345	15441					
300	%N1	97.7	99.6	101.6	104.1				
	MACH	.374	.386	.397	.408				
	KIAS	222	221	219	217				
	FF/ENG	14271	14281	14327	14419				
280	%N1	95.5	97.3	99.2	101.3	103.8			
	MACH	.364	.375	.387	.398	.409			
	KIAS	216	215	214	212	209			
	FF/ENG	13262	13254	13268	13307	13398			
260	%N1	93.2	94.9	96.7	98.6	100.8	103.4		
	MACH	.353	.364	.376	.388	.399	.410		
	KIAS	209	208	207	206	204	202		
	FF/ENG	12280	12250	12244	12256	12287	12388		
240	%N1	90.9	92.5	94.2	96.0	97.9	100.1	102.9	
	MACH	.341	.352	.364	.376	.388	.399	.412	
	KIAS	202	201	200	199	198	196	194	
	FF/ENG	11318	11274	11245	11241	11247	11277	11435	
220	%N1	88.3	90.0	91.6	93.3	95.1	97.0	99.4	102.7
	MACH	.328	.339	.350	.362	.374	.387	.400	.416
	KIAS	194	194	193	192	191	190	189	189
	FF/ENG	10333	10314	10276	10249	10244	10247	10337	10638

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
165	147	131	119	109	100	93	88	83	78	75
337	298	264	239	218	200	187	175	165	156	148
509	450	399	359	328	300	280	262	246	233	221
683	602	534	480	437	400	374	350	329	310	294
858	756	669	601	547	500	467	437	410	387	367
1034	910	805	723	657	600	560	524	491	463	439
1211	1064	940	844	767	700	653	610	573	540	512
1389	1220	1076	965	877	800	746	697	654	616	584
1569	1377	1214	1088	987	900	839	784	735	693	657
1749	1534	1351	1210	1097	1000	932	871	817	769	729

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT)							
	6		10		14		18	
	FUEL (1000 LB)	TIME (HR:MIN)	FUEL (1000 LB)	TIME (HR:MIN)	FUEL (1000 LB)	TIME (HR:MIN)	FUEL (1000 LB)	TIME (HR:MIN)
100	5.3	0:28	4.8	0:27	4.3	0:26	3.9	0:26
200	11.2	0:53	10.4	0:51	9.8	0:49	9.5	0:48
300	17.0	1:18	15.9	1:15	15.2	1:12	14.9	1:10
400	22.7	1:43	21.4	1:39	20.5	1:36	20.3	1:32
500	28.4	2:09	26.8	2:04	25.8	1:59	25.5	1:55
600	34.0	2:35	32.1	2:28	30.9	2:23	30.7	2:17
700	39.5	3:01	37.4	2:53	36.0	2:47	35.7	2:40
800	44.9	3:27	42.6	3:18	41.0	3:10	40.7	3:03
900	50.3	3:54	47.7	3:43	45.9	3:34	45.5	3:26
1000	55.6	4:21	52.7	4:09	50.7	3:59	50.3	3:49

Fuel Required Adjustment (1000 LB)

REFERENCE FUEL REQUIRED (1000 LB)	WEIGHT AT CHECK POINT (1000 LB)				
	200	250	300	350	400
5	-0.9	-0.5	0.0	0.7	1.5
10	-2.0	-1.0	0.0	1.6	3.2
15	-3.1	-1.5	0.0	2.4	4.9
20	-4.1	-2.0	0.0	3.3	6.6
25	-5.2	-2.5	0.0	4.1	8.3
30	-6.2	-3.1	0.0	5.0	10.1
35	-7.3	-3.6	0.0	5.8	11.8
40	-8.3	-4.1	0.0	6.6	13.5
45	-9.4	-4.6	0.0	7.5	15.1
50	-10.4	-5.2	0.0	8.3	16.8
55	-11.5	-5.7	0.0	9.1	18.5
60	-12.5	-6.2	0.0	10.0	20.2
65	-13.6	-6.8	0.0	10.8	21.9
70	-14.6	-7.3	0.0	11.6	23.5

Includes APU fuel burn.

GEAR DOWN
ENGINE INOP
MAX CONTINUOUS THRUST

Holding
Flaps Up

WEIGHT (1000 LB)		PRESSURE ALTITUDE (FT) 1500	5000	10000	15000	20000
400	%N1	101.6				
	KIAS	242				
	FF/ENG	19390				
380	%N1	99.7				
	KIAS	236				
	FF/ENG	18220				
360	%N1	97.6	101.3			
	KIAS	229	229			
	FF/ENG	17050	17320			
340	%N1	95.5	98.9			
	KIAS	221	221			
	FF/ENG	15860	16020			
320	%N1	93.5	96.7	102.4		
	KIAS	215	215	215		
	FF/ENG	14830	14940	15390		
300	%N1	91.7	94.8	100.0		
	KIAS	210	210	210		
	FF/ENG	13920	13990	14290		
280	%N1	89.8	92.8	97.7	104.6	
	KIAS	205	205	205	205	
	FF/ENG	13020	13070	13260	13890	
260	%N1	87.8	90.8	95.4	101.3	
	KIAS	200	200	200	200	
	FF/ENG	12150	12180	12300	12690	
240	%N1	85.7	88.6	93.1	98.4	
	KIAS	194	194	194	194	
	FF/ENG	11280	11290	11360	11600	
220	%N1	83.4	86.4	90.8	95.7	102.7
	KIAS	189	189	189	189	189
	FF/ENG	10450	10440	10480	10630	11170

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

Performance Inflight - QRH — Chapter PI-QRH

Text — Section 15

Introduction

This chapter contains information to supplement performance data from the Flight Management Computer (FMC). In addition, sufficient inflight data is provided to complete a flight with the FMC inoperative. In the event of conflict between data presented in this chapter and that contained in the approved Airplane Flight Manual, the Flight Manual shall always take precedence.

General

Flight with Unreliable Airspeed / Turbulent Air Penetration

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

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

Max Climb %N1

This table shows Max Climb %N1 for a 250/290/.78 climb speed schedule, normal engine bleed for packs on and anti-ice off. Enter the table with airport pressure altitude and TAT and read %N1. %N1 adjustments are shown for packs off and anti-ice operation.

VREF

This table contains flaps 30, 25 and 20 reference speeds for a given weight.

Advisory Information

Normal Configuration Landing Distance

Tables are provided as advisory information for normal configuration landing distances on dry runways and slippery runways with good, medium, and poor reported braking action. These values are actual landing distances and do not include the 1.67 regulatory factor. Therefore, they cannot be used to determine the dispatch required landing field length.

To use these tables, determine the reference landing distance for the selected braking configuration. Then adjust the reference distance for landing weight, altitude, wind, slope, temperature, approach speed, and the number of operative thrust reversers to obtain the actual landing distance.

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

Use of the autobrake system commands the airplane to a constant deceleration rate. In some conditions, such as a runway with "poor" braking action, the airplane may not be able to achieve these deceleration rates. In these cases, runway slope and inoperative reversers influence the stopping distance. Since it cannot be determined quickly when this becomes a factor, it is appropriate to add the effects of slope and inoperative reversers when using the autobrake system.

Non-normal Configuration Landing Distance

Advisory information is provided to support non-normal configurations that affect 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, temperature, and speed conditions as well as thrust reverser configuration. Each adjustment is independently added to the reference landing distance. Landing distance includes the effects 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 landing at short time intervals or a rejected takeoff.

Enter the Recommended Brake Cooling Schedule table with the airplane weight, the brakes on speed adjusted for wind and 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.

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 Thrust) 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 or brake temperature monitor system (BTMS) indication on EICAS. Times are provided for ground cooling and inflight gear down cooling.

If brake temperature monitor indication on EICAS is available, the hottest brake indication 10 to 15 minutes after the airplane has come to a complete stop, or inflight with gear retracted, may be used to determine the recommended cooling schedule by entering at the bottom of the chart. The brake temperature light illuminates when the hottest brake is registering 5 on the EICAS indication and extinguishes as the hottest brake cools with an EICAS indication of 4.

Engine Inoperative

Initial Max Continuous %N1

The Initial Max Continuous %N1 setting for use following an engine failure is shown. The table is based on the typical all engine cruise speed of .80M to provide a target %N1 setting at the start of driftdown. Once driftdown is established, the Max Continuous %N1 table should be used to determine %N1 for the given conditions.

Max Continuous %N1

Power setting is based on one engine operating with packs on or off and all anti-ice bleeds off. Enter the table with pressure altitude and IAS or Mach to read %N1.

It is desirable to maintain engine thrust 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. The cruise segment is at a level off altitude which is based on 100 ft/min residual rate of climb.

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 are 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 .78/290/250 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 Fuel Required Adjustment table with the fuel required for the reference weight and the actual weight at checkpoint. Read fuel and time required 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 for all phases of flight. The data is based on engine bleeds for normal air conditioning.

NOTE: The Flight Management Computer System (FMCS) does not contain special provisions for operation with landing gear extended. As a result, the FMCS will generate inaccurate enroute speed schedules, display non-conservative predictions of fuel burn, estimated time of arrival (ETA), maximum altitude, and compute overly shallow descent path. To obtain accurate ETA predictions, gear down cruise speed and altitude should be entered on the CLB and CRZ pages. Gear down cruise speed should also be entered on the DES page and a STEP SIZE of zero should be entered on the PERF INIT or CRZ page. Use of the VNAV during descent under these circumstances is not recommended.

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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767-300 PW4060 LB FAA CATC CATD

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 (290/.78)

Flaps Up, Set Max Climb Thrust

PRESSURE ALTITUDE (FT)		WEIGHT (1000 LB)				
		220	260	300	350	400
40000	**PITCH ATT**	**4.0**	**4.0**	**3.5**		
	V/S (FT/MIN)	1500	1000	300		
30000	**PITCH ATT**	**4.0**	**4.0**	**3.5**	**3.5**	**4.0**
	V/S (FT/MIN)	2600	2100	1700	1200	900
20000	**PITCH ATT**	**6.5**	**6.0**	**6.0**	**5.5**	**5.5**
	V/S (FT/MIN)	4000	3100	2700	2100	1700
10000	**PITCH ATT**	**10.0**	**9.0**	**8.0**	**7.5**	**7.5**
	V/S (FT/MIN)	5300	4400	3700	3000	2500
SEA LEVEL	**PITCH ATT**	**12.5**	**11.0**	**10.0**	**9.5**	**9.0**
	V/S (FT/MIN)	6000	5000	4300	3500	3000

Cruise (.78/290)

Flaps Up, EPR for Level Flight

PRESSURE ALTITUDE (FT)		WEIGHT (1000 LB)				
		220	260	300	350	400
40000	**PITCH ATT**	**2.0**	**2.5**	**3.5**	**4.0**	
	EPR	1.22	1.33	1.53	1.87	
35000	**PITCH ATT**	**1.5**	**1.5**	**2.5**	**3.0**	**3.5**
	EPR	1.13	1.17	1.24	1.37	1.59
30000	**PITCH ATT**	**1.0**	**1.0**	**1.5**	**2.0**	**2.5**
	EPR	1.08	1.11	1.14	1.20	1.26

Descent (.78/290)

Flaps Up, Set Idle Thrust

PRESSURE ALTITUDE (FT)		WEIGHT (1000 LB)				
		220	260	300	350	400
40000	**PITCH ATT**	**-1.0**	**0.0**	**0.0**	**0.5**	
	V/S (FT/MIN)	-2200	-2200	-2400	-2900	
30000	**PITCH ATT**	**-2.5**	**-1.5**	**-1.5**	**-0.5**	**0.0**
	V/S (FT/MIN)	-2500	-2300	-2100	-2000	-2000
20000	**PITCH ATT**	**-2.5**	**-1.5**	**-1.0**	**0.0**	**0.5**
	V/S (FT/MIN)	-2300	-2100	-1900	-1800	-1800
10000	**PITCH ATT**	**-2.5**	**-2.0**	**-1.0**	**0.0**	**0.5**
	V/S (FT/MIN)	-2100	-1900	-1700	-1600	-1600

Holding (VREF30 + 80)

Flaps Up, EPR for Level Flight

PRESSURE ALTITUDE (FT)		WEIGHT (1000 LB)				
		220	260	300	350	400
10000	**PITCH ATT**	**4.5**	**5.0**	**5.0**	**5.5**	**5.5**
	EPR	1.02	1.03	1.05	1.06	1.07

Flight With Unreliable Airspeed / Turbulent Air Penetration

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

Terminal Area (5000 FT)

Gear Up, EPR for Level Flight

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 LB)				
		220	260	300	350	400
FLAPS UP (VREF30 + 80)	**PITCH ATT**	**4.5**	**5.0**	**5.0**	**5.5**	**5.5**
	EPR	1.01	1.01	1.03	1.04	1.05
FLAPS 1 (VREF30 + 60)	**PITCH ATT**	**6.0**	**6.5**	**7.0**	**7.0**	**7.0**
	EPR	1.03	1.04	1.05	1.07	1.08
FLAPS 5 (VREF30 + 40)	**PITCH ATT**	**4.5**	**5.0**	**5.0**	**5.0**	**5.0**
	EPR	1.05	1.07	1.08	1.10	1.11
FLAPS 15 (VREF30 + 20)	**PITCH ATT**	**6.0**	**6.0**	**6.5**	**6.0**	**5.5**
	EPR	1.07	1.08	1.10	1.12	1.14
FLAPS 20 (VREF30 + 20)	**PITCH ATT**	**4.5**	**4.5**	**4.5**	**4.5**	**4.0**
	EPR	1.07	1.09	1.11	1.13	1.16

Final Approach (1500 FT)

Gear Down, EPR for 3° Glideslope

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 LB)				
		220	260	300	350	400
FLAPS 25 (VREF25 + 10)	**PITCH ATT**	**0.5**	**1.0**	**1.0**	**1.0**	**1.0**
	EPR	1.05	1.06	1.07	1.08	1.10
FLAPS 30 (VREF30 + 10)	**PITCH ATT**	**1.0**	**1.0**	**1.0**	**0.5**	**-0.5**
	EPR	1.06	1.08	1.09	1.11	1.13

Max Climb EPR

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

TAT (°C)	PRESSURE ALTITUDE (1000 FT)/SPEED (KIAS OR MACH)								
	0	5	10	15	20	25	30	35	40
	250	250	250	290	290	290	290	.78	.78
60	1.24	1.25	1.25	1.21	1.20	1.18	1.14	1.08	1.05
50	1.28	1.29	1.29	1.26	1.24	1.23	1.21	1.15	1.11
40	1.32	1.34	1.34	1.31	1.30	1.29	1.27	1.21	1.18
30	1.33	1.40	1.40	1.38	1.37	1.36	1.35	1.29	1.25
20	1.33	1.40	1.46	1.46	1.45	1.44	1.43	1.37	1.34
10	1.33	1.40	1.46	1.47	1.53	1.53	1.53	1.47	1.44
0	1.33	1.40	1.46	1.47	1.53	1.57	1.63	1.57	1.54
-10	1.33	1.40	1.46	1.47	1.53	1.57	1.64	1.67	1.63
-20 & BELOW	1.33	1.40	1.46	1.47	1.53	1.57	1.64	1.68	1.66

EPR Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)								
	0	5	10	15	20	25	30	35	40
PACKS OFF	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.03
ENGINE ANTI-ICE ON	-0.01	-0.02	-0.02	-0.03	-0.03	-0.03	-0.04	-0.04	-0.05
ENGINE & WING ANTI-ICE ON	-0.02	-0.03	-0.04	-0.05	-0.05	-0.05	-0.07	-0.07	-0.08

VREF (KIAS)

WEIGHT (1000 LB)	FLAPS		
	30	25	20
420	179	171	179
400	172	166	174
380	166	162	169
360	159	158	164
340	151	153	159
320	145	149	154
300	140	144	149
280	135	139	144
260	130	134	139
240	124	129	134
220	119	123	128

ADVISORY INFORMATION

Normal Configuration Landing Distance
Flaps 25
Dry Runway

	LANDING DISTANCE AND ADJUSTMENT (FT)											
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		TEMP ADJ PER 10°C		APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	340000 LB LANDING WEIGHT	PER 10000 LB ABV/ BLW 340000 LB	PER 1000 FT ABOVE SEA LEVEL	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 10 KTS ABOVE VREF25	ONE REV	NO REV
MAX MANUAL	3280	110/-70	80	-130	440	50	-40	80	-80	250	70	140
MAX AUTO	5490	130/-130	150	-250	840	0	0	160	-160	600	0	0
AUTOBRAKE 4	5670	140/-140	160	-260	880	0	0	160	-160	630	0	0
AUTOBRAKE 3	6520	160/-160	190	-300	1040	0	0	190	-190	740	0	0
AUTOBRAKE 2	7330	190/-190	220	-350	1190	30	-110	230	-210	660	60	60
AUTOBRAKE 1	8040	220/-220	260	-400	1370	170	-220	270	-230	580	430	520

Good Reported Braking Action

MAX MANUAL	4550	110/-100	130	-210	740	130	-110	130	-120	350	230	520
MAX AUTO	5500	130/-130	150	-250	860	20	-10	160	-160	600	20	80
AUTOBRAKE 4	5670	140/-140	160	-260	880	10	0	160	-160	630	10	50
AUTOBRAKE 3	6520	160/-160	190	-300	1040	0	0	190	-190	740	0	0

Medium Reported Braking Action

MAX MANUAL	6300	170/-160	200	-330	1220	310	-240	210	-180	450	640	1540
MAX AUTO	6300	170/-160	200	-330	1220	300	-170	210	-180	570	610	1510
AUTOBRAKE 4	6340	170/-160	200	-340	1220	270	-150	210	-190	620	550	1450
AUTOBRAKE 3	6880	180/-180	210	-360	1280	170	-90	220	-210	740	350	1080

Poor Reported Braking Action

MAX MANUAL	8220	240/-230	280	-500	1910	720	-460	310	-250	520	1400	3700
MAX AUTO	8220	240/-230	280	-500	1910	720	-460	310	-250	510	1400	3710
AUTOBRAKE 4	8220	240/-230	280	-500	1910	720	-460	310	-250	510	1400	3710
AUTOBRAKE 3	8230	240/-230	280	-500	1920	690	-370	300	-260	680	1340	3640

Reference distance assumes sea level, standard day, no wind or slope, VREF25 approach speed and 2 engine reverse thrust.
Reference distance for manual braking is applicable for auto spoilers only, for manual spoilers operation increase landing distance by 400 ft.
Reference distance for auto braking is applicable for auto or manual spoilers.
Includes distance from 50 ft above threshold (1000 ft of air distance).
Actual (unfactored) distances are shown.

ADVISORY INFORMATION

Normal Configuration Landing Distance

Flaps 30

Dry Runway

	LANDING DISTANCE AND ADJUSTMENT (FT)											
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		TEMP ADJ PER 10°C		APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	340000 LB LANDING WEIGHT	PER 10000 LB ABV/ BLW 340000 LB	PER 1000 FT ABOVE SEA LEVEL	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABOVE ISA	BELOW ISA	PER 10 KTS ABOVE VREF30	ONE REV	NO REV
MAX MANUAL	3250	140/-70	80	-130	440	50	-50	80	-80	260	60	130
MAX AUTO	5380	210/-140	150	-240	830	0	0	150	-150	600	0	0
AUTOBRAKE 4	5550	220/-140	150	-250	870	0	0	160	-160	620	0	0
AUTOBRAKE 3	6380	260/-170	180	-300	1020	0	0	190	-190	730	0	0
AUTOBRAKE 2	7200	280/-200	210	-350	1180	10	-100	220	-210	670	30	30
AUTOBRAKE 1	7920	300/-220	250	-400	1360	160	-210	260	-230	580	350	440

Good Reported Braking Action

MAX MANUAL	4520	160/-110	120	-210	740	130	-110	130	-120	350	220	480
MAX AUTO	5390	210/-140	150	-250	850	20	-10	150	-150	600	20	80
AUTOBRAKE 4	5560	220/-140	160	-250	870	10	0	160	-160	620	10	50
AUTOBRAKE 3	6380	260/-170	180	-300	1020	0	0	190	-190	730	0	0

Medium Reported Braking Action

MAX MANUAL	6260	230/-170	200	-330	1220	320	-250	210	-180	450	600	1430
MAX AUTO	6260	250/-170	190	-330	1220	310	-190	210	-180	550	600	1420
AUTOBRAKE 4	6270	250/-170	200	-330	1220	290	-160	200	-190	600	550	1380
AUTOBRAKE 3	6760	280/-190	210	-350	1280	180	-100	210	-200	730	360	1030

Poor Reported Braking Action

MAX MANUAL	8180	310/-240	280	-500	1920	730	-470	300	-250	520	1320	3420
MAX AUTO	8180	310/-240	280	-500	1910	730	-470	300	-250	520	1320	3430
AUTOBRAKE 4	8180	310/-240	280	-500	1910	730	-470	300	-250	520	1320	3430
AUTOBRAKE 3	8180	330/-240	280	-500	1920	720	-380	300	-260	670	1290	3390

Reference distance assumes sea level, standard day, no wind or slope, VREF30 approach speed and 2 engine reverse thrust.
Reference distance for manual braking is applicable for auto spoilers only, for manual spoilers operation increase landing distance by 400 ft.
Reference distance for auto braking is applicable for both auto and manual spoilers.
Includes distance from 50 ft above threshold (1000 ft of air distance).
Actual (unfactored) distances are shown.

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Dry Runway

		LANDING DISTANCES AND ADJUSTMENTS (FT)								
		REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
LANDING CONFIGURATION	VREF	340000 LB LDG WT	PER 10000 LB ABV/BLW 340000 LB	PER 1000 FT ABV S.L.	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 10 KTS ABV VREF	ONE REV	NO REV
AIR/GRD SYS (FLAPS 25)	VREF25	4260	80/-90	110	-170/560	80/-70	100/-100	420	0	0
AIR/GRD SYS (FLAPS 30)	VREF30	4230	150/-90	110	-170/570	90/-80	100/-100	440	0	0
ALL FLAPS AND SLATS UP LANDING	VREF30+50	4780	240/-100	130	-170/570	80/-70	130/-130	330	180	390
ANTI-SKID OFF (FLAPS 25)	VREF25	6150	140/-140	170	-300/1040	200/-170	170/-160	450	380	870
ANTI-SKID OFF (FLAPS 30)	VREF30	6060	210/-140	160	-290/1030	200/-170	170/-160	450	350	800
ENGINE FAILURE (FLAPS 20)	VREF20	3550	130/-70	90	-140/470	60/-50	90/-90	280	0	90
HYD SYS PRESS (C ONLY) (FLAPS 20)	VREF20	4260	100/-90	100	-160/540	70/-60	110/-100	390	120	260
HYD SYS PRESS (L ONLY) (FLAPS 25)	VREF25	3530	80/-70	90	-140/480	60/-60	90/-80	300	0	90
HYD SYS PRESS (L ONLY) (FLAPS 30)	VREF30	3510	120/-70	90	-140/480	60/-60	90/-80	310	0	80
HYD SYS PRESS (R ONLY) (FLAPS 25)	VREF25	3910	80/-80	100	-160/560	80/-70	100/-100	340	0	130
HYD SYS PRESS (R ONLY) (FLAPS 30)	VREF30	3890	130/-80	100	-160/560	80/-80	100/-100	350	0	130
HYD SYS PRESS (L AND C) (FLAPS 20)	VREF30+20	5310	180/-110	140	-190/640	120/-110	140/-140	570	0	250
HYD SYS PRESS (L AND R) (FLAPS 20)	VREF30+20	5280	180/-110	140	-210/700	150/-130	150/-140	520	0	0
HYD SYS PRESS (R AND C) (FLAPS 20)	VREF30+20	6470	230/-140	180	-250/850	210/-180	190/-180	670	0	510

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

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Dry Runway

LANDING CONFIGURATION	VREF	LANDING DISTANCES AND ADJUSTMENTS (FT) REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
		340000 LB LDG WT	PER 10000 LB ABV/BLW 340000 LB	PER 1000 FT ABV S.L.	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 10 KTS ABV VREF	ONE REV	NO REV
LE SLAT ASYM (FLAPS > 20)	VREF30+20	3820	160/-80	100	-140/490	60/-50	100/-90	280	100	220
LE SLAT ASYM (FLAPS = 20)	VREF30+30	4300	150/-90	110	-160/520	70/-60	120/-110	310	140	290
LE SLAT ASYM (5 < FLAPS < 20)	VREF30+40	4610	160/-90	120	-160/540	80/-70	130/-120	320	160	340
LE SLAT DISAGREE (FLAPS > 20)	VREF20	3490	130/-70	80	-130/460	50/-50	90/-80	270	80	180
LE SLAT DISAGREE - ALTN FLAP EXT ACOMPLISHED (FLAPS = 20)	VREF20	3490	130/-70	80	-130/460	50/-50	90/-80	270	80	180
LE SLAT DISAGREE - ALTN FLAP EXT FAILED (FLAPS = 20)	VREF30+30	4090	170/-80	100	-150/500	60/-60	110/-100	280	120	250
REVERSER UNLOCKED (FLAPS 20)	VREF30+30	4410	160/-90	110	-160/540	80/-70	120/-110	330	0	150
TE FLAP ASYM (FLAPS ≥ 20)	VREF20	3490	130/-70	80	-130/460	50/-50	90/-80	270	80	180
TE FLAP ASYM (5 < FLAPS < 20)	VREF30+20	3820	160/-80	100	-140/490	60/-50	100/-90	280	100	220
TE FLAP ASYM (FLAPS ≤ 5)	VREF30+30	4040	200/-80	100	-150/500	60/-60	110/-100	270	110	250
TE FLAP DISAGREE (FLAPS ≥ 20)	VREF20	3490	130/-70	80	-130/460	50/-50	90/-80	270	80	180
TE FLAP DISAGREE (5 < FLAPS < 20)	VREF30+20	3820	160/-80	100	-140/490	60/-50	100/-90	280	100	220
TE FLAP DISAGREE (FLAPS ≤ 5)	VREF30+30	4040	200/-80	100	-150/500	60/-60	110/-100	270	110	250

***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 max manual braking and maximum reverse thrust when available on operating engine(s).

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Good Reported Braking Action

LANDING CONFIGURATION	VREF	LANDING DISTANCES AND ADJUSTMENTS (FT) REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
		340000 LB LDG WT	PER 10000 LB ABV/BLW 340000 LB	PER 1000 FT ABV S.L.	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 10 KTS ABV VREF	ONE REV	NO REV
AIR/GRD SYS (FLAPS 25)	VREF25	6270	140/-140	180	-290/990	260/-220	170/-170	620	0	0
AIR/GRD SYS (FLAPS 30)	VREF30	6210	230/-140	180	-290/990	270/-220	170/-170	630	0	0
ALL FLAPS AND SLATS UP LANDING	VREF30+50	6500	200/-140	200	-260/870	170/-150	210/-180	380	490	1120
ANTI-SKID OFF (FLAPS 25)	VREF25	6960	170/-170	200	-360/1280	300/-240	210/-190	490	590	1410
ANTI-SKID OFF (FLAPS 30)	VREF30	6860	240/-170	200	-360/1280	310/-240	200/-180	490	550	1290
ENGINE FAILURE (FLAPS 20)	VREF20	5140	140/-120	140	-230/810	160/-140	150/-140	410	0	360
HYD SYS PRESS (C ONLY) (FLAPS 20)	VREF20	5820	160/-140	170	-250/860	180/-150	170/-150	510	400	920
HYD SYS PRESS (L ONLY) (FLAPS 25)	VREF25	5060	120/-120	140	-240/820	170/-140	140/-140	430	0	330
HYD SYS PRESS (L ONLY) (FLAPS 30)	VREF30	5030	180/-120	140	-240/820	170/-150	140/-140	440	0	310
HYD SYS PRESS (R ONLY) (FLAPS 25)	VREF25	5060	120/-120	140	-240/820	170/-140	140/-140	430	0	330
HYD SYS PRESS (R ONLY) (FLAPS 30)	VREF30	5030	180/-120	140	-240/820	170/-150	140/-140	440	0	310
HYD SYS PRESS (L AND C) (FLAPS 20)	VREF30+20	7530	280/-170	220	-310/1050	310/-260	230/-210	750	0	850
HYD SYS PRESS (L AND R) (FLAPS 20)	VREF30+20	7210	250/-160	210	-310/1050	330/-270	210/-210	690	0	0
HYD SYS PRESS (R AND C) (FLAPS 20)	VREF30+20	7530	280/-170	220	-310/1050	310/-260	230/-210	750	0	850

***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 max manual braking and maximum reverse thrust when available on operating engine(s).

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Good Reported Braking Action

		LANDING DISTANCES AND ADJUSTMENTS (FT)								
		REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
LANDING CONFIGURATION	VREF	340000 LB LDG WT	PER 10000 LB ABV/BLW 340000 LB	PER 1000 FT ABV S.L.	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 10 KTS ABV VREF	ONE REV	NO REV
LE SLAT ASYM (FLAPS > 20)	VREF30+20	5370	180/-120	160	-230/800	150/-130	160/-150	380	340	770
LE SLAT ASYM (FLAPS = 20)	VREF30+30	6040	200/-140	180	-250/860	180/-150	190/-170	430	430	990
LE SLAT ASYM (5 < FLAPS < 20)	VREF30+40	6470	210/-140	200	-260/890	190/-160	210/-180	430	480	1100
LE SLAT DISAGREE (FLAPS > 20)	VREF20	4910	130/-110	140	-220/770	140/-120	140/-130	380	290	670
LE SLAT DISAGREE - ALTN FLAP EXT ACOMPLISHED (FLAPS = 20)	VREF20	4910	130/-110	140	-220/770	140/-120	140/-130	380	290	670
LE SLAT DISAGREE - ALTN FLAP EXT FAILED (FLAPS = 20)	VREF30+30	5760	180/-130	170	-240/830	160/-140	180/-160	390	380	860
REVERSER UNLOCKED (FLAPS 20)	VREF30+30	6400	210/-150	190	-270/910	210/-180	200/-180	470	0	540
TE FLAP ASYM (FLAPS ≥ 20)	VREF20	4910	130/-110	140	-220/770	140/-120	140/-130	380	290	670
TE FLAP ASYM (5 < FLAPS < 20)	VREF30+20	5390	180/-120	160	-230/800	150/-130	160/-150	380	350	790
TE FLAP ASYM (FLAPS ≤ 5)	VREF30+30	5730	180/-130	170	-240/820	150/-140	180/-160	380	390	890
TE FLAP DISAGREE (FLAPS ≥ 20)	VREF20	4910	130/-110	140	-220/770	140/-120	140/-130	380	290	670
TE FLAP DISAGREE (5 < FLAPS < 20)	VREF30+20	5390	180/-120	160	-230/800	150/-130	160/-150	380	350	790
TE FLAP DISAGREE (FLAPS ≤ 5)	VREF30+30	5730	180/-130	170	-240/820	150/-140	180/-160	380	390	890

***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 max manual braking and maximum reverse thrust when available on operating engine(s).

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Medium Reported Braking Action

LANDING CONFIGURATION	VREF	LANDING DISTANCES AND ADJUSTMENTS (FT)								
		REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
		340000 LB LDG WT	PER 10000 LB ABV/ BLW 340000 LB	PER 1000 FT ABV S.L.	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 10 KTS ABV VREF	ONE REV	NO REV
AIR/GRD SYS (FLAPS 25)	VREF25	9830	220/-210	330	-530/1860	920/-630	290/-300	850	0	0
AIR/GRD SYS (FLAPS 30)	VREF30	9660	340/-220	330	-530/1850	910/-620	290/-290	860	0	0
ALL FLAPS AND SLATS UP LANDING	VREF30+50	9300	310/-230	320	-410/1450	430/-350	340/-280	520	1370	3500
ANTI-SKID OFF (FLAPS 25)	VREF25	8860	240/-230	280	-530/1980	720/-470	290/-260	560	1310	3460
ANTI-SKID OFF (FLAPS 30)	VREF30	8750	320/-230	280	-530/1980	730/-480	290/-260	570	1230	3170
ENGINE FAILURE (FLAPS 20)	VREF20	7540	220/-200	240	-390/1390	450/-350	250/-220	570	0	1150
HYD SYS PRESS (C ONLY) (FLAPS 20)	VREF20	7910	240/-210	260	-390/1390	420/-330	270/-230	630	1060	2730
HYD SYS PRESS (L ONLY) (FLAPS 25)	VREF25	7350	190/-180	230	-400/1410	470/-350	240/-210	560	0	1030
HYD SYS PRESS (L ONLY) (FLAPS 30)	VREF30	7280	270/-190	230	-400/1410	470/-360	230/-210	570	0	950
HYD SYS PRESS (R ONLY) (FLAPS 25)	VREF25	7350	190/-180	230	-400/1410	470/-350	240/-210	560	0	1030
HYD SYS PRESS (R ONLY) (FLAPS 30)	VREF30	7280	270/-190	230	-400/1410	470/-360	230/-210	570	0	950
HYD SYS PRESS (L AND C) (FLAPS 20)	VREF30+20	10730	400/-270	350	-510/1750	790/-580	370/-320	920	0	2440
HYD SYS PRESS (L AND R) (FLAPS 20)	VREF30+20	11520	400/-260	350	-570/1950	1090/-760	360/-350	960	0	0
HYD SYS PRESS (R AND C) (FLAPS 20)	VREF30+20	10730	400/-270	350	-510/1750	790/-580	370/-320	920	0	2440

***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 max manual braking and maximum reverse thrust when available on operating engine(s).

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Medium Reported Braking Action

LANDING CONFIGURATION	VREF	REF DIST: 340000 LB LDG WT	WT ADJ: PER 10000 LB ABV/BLW 340000 LB	ALT ADJ: PER 1000 FT ABV S.L.	WIND ADJ: PER 10 KTS HEAD/ TAIL WIND	SLOPE ADJ: PER 1% DOWN/ UP HILL	TEMP ADJ: PER 10°C ABV/ BLW ISA	APP SPD ADJ: PER 10 KTS ABV VREF	REVERSE THRUST ADJ: ONE REV	REVERSE THRUST ADJ: NO REV
LE SLAT ASYM (FLAPS > 20)	VREF30+20	7480	270/-190	250	-370/1320	370/-290	260/-220	490	920	2270
LE SLAT ASYM (FLAPS = 20)	VREF30+30	8340	290/-210	280	-400/1390	410/-330	300/-250	530	1110	2770
LE SLAT ASYM (5 < FLAPS < 20)	VREF30+40	8920	300/-220	310	-410/1430	430/-350	320/-270	540	1280	3250
LE SLAT DISAGREE (FLAPS > 20)	VREF20	6870	200/-180	220	-360/1270	350/-280	230/-200	490	830	2040
LE SLAT DISAGREE - ALTN FLAP EXT ACOMPLISHED (FLAPS = 20)	VREF20	6870	200/-180	220	-360/1270	350/-280	230/-200	490	830	2040
LE SLAT DISAGREE - ALTN FLAP EXT FAILED (FLAPS = 20)	VREF30+30	7970	270/-200	260	-380/1360	380/-310	280/-240	490	1000	2460
REVERSER UNLOCKED (FLAPS 20)	VREF30+30	9270	320/-230	300	-440/1530	550/-430	320/-280	620	0	1580
TE FLAP ASYM (FLAPS ≥ 20)	VREF20	6870	200/-180	220	-360/1270	350/-280	230/-200	490	830	2040
TE FLAP ASYM (5 < FLAPS < 20)	VREF30+20	7540	270/-190	250	-370/1320	370/-290	260/-220	490	950	2370
TE FLAP ASYM (FLAPS ≤ 5)	VREF30+30	8030	280/-200	270	-380/1360	380/-310	280/-240	490	1050	2640
TE FLAP DISAGREE (FLAPS ≥ 20)	VREF20	6870	200/-180	220	-360/1270	350/-280	230/-200	490	830	2040
TE FLAP DISAGREE (5 < FLAPS < 20)	VREF30+20	7540	270/-190	250	-370/1320	370/-290	260/-220	490	950	2370
TE FLAP DISAGREE (FLAPS ≤ 5)	VREF30+30	8030	280/-200	270	-380/1360	380/-310	280/-240	490	1050	2640

***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 max manual braking and maximum reverse thrust when available on operating engine(s).

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Poor Reported Braking Action

		LANDING DISTANCES AND ADJUSTMENTS (FT)								
		REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
LANDING CONFIGURATION	VREF	340000 LB LDG WT	PER 10000 LB ABV/BLW 340000 LB	PER 1000 FT ABV S.L.	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 10 KTS ABV VREF	ONE REV	NO REV
AIR/GRD SYS (FLAPS 25)	VREF25	15630	310/-270	640	-1010/3750	4210/-1740	490/-490	1060	0	0
AIR/GRD SYS (FLAPS 30)	VREF30	15230	460/-270	620	-990/3710	4120/-1700	480/-480	1050	0	0
ALL FLAPS AND SLATS UP LANDING	VREF30+50	12380	440/-330	470	-620/2260	990/-680	500/-390	640	2960	8700
ANTI-SKID OFF (FLAPS 25)	VREF25	11990	350/-340	420	-890/3770	4840/-1110	430/-410	630	3680	14100
ANTI-SKID OFF (FLAPS 30)	VREF30	11880	440/-340	410	-890/3770	4800/-1120	420/-410	630	3500	13210
ENGINE FAILURE (FLAPS 20)	VREF20	10460	330/-290	360	-620/2270	1170/-740	370/-330	700	0	2870
HYD SYS PRESS (C ONLY) (FLAPS 20)	VREF20	10190	330/-290	370	-580/2140	950/-620	380/-310	720	2220	6470
HYD SYS PRESS (L ONLY) (FLAPS 25)	VREF25	10200	280/-270	340	-640/2380	1280/-760	360/-310	670	0	2580
HYD SYS PRESS (L ONLY) (FLAPS 30)	VREF30	10090	370/-270	340	-640/2380	1290/-760	350/-310	670	0	2360
HYD SYS PRESS (R ONLY) (FLAPS 25)	VREF25	10200	280/-270	340	-640/2380	1280/-760	360/-310	670	0	2580
HYD SYS PRESS (R ONLY) (FLAPS 30)	VREF30	10090	370/-270	340	-640/2380	1290/-760	350/-310	670	0	2360
HYD SYS PRESS (L AND C) (FLAPS 20)	VREF30+20	14580	550/-390	520	-800/2860	1980/-1170	550/-450	1040	0	5800
HYD SYS PRESS (L AND R) (FLAPS 20)	VREF30+20	17950	570/-390	550	-1020/3640	3920/-1910	580/-540	1190	0	0
HYD SYS PRESS (R AND C) (FLAPS 20)	VREF30+20	14580	550/-390	520	-800/2860	1980/-1170	550/-450	1040	0	5800

***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 max manual braking and maximum reverse thrust when available on operating engine(s).

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Poor Reported Braking Action

		LANDING DISTANCES AND ADJUSTMENTS (FT)								
		REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
LANDING CONFIGURATION	VREF	340000 LB LDG WT	PER 10000 LB ABV/BLW 340000 LB	PER 1000 FT ABV S.L.	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 10 KTS ABV VREF	ONE REV	NO REV
LE SLAT ASYM (FLAPS > 20)	VREF30+20	9770	360/-270	350	-550/2060	850/-560	370/-310	570	1940	5350
LE SLAT ASYM (FLAPS = 20)	VREF30+30	10790	390/-290	400	-580/2150	920/-620	420/-340	610	2250	6270
LE SLAT ASYM (5 < FLAPS < 20)	VREF30+40	11640	420/-320	440	-610/2210	970/-650	460/-370	630	2640	7610
LE SLAT DISAGREE (FLAPS > 20)	VREF20	9060	290/-250	320	-540/2010	820/-540	340/-280	580	1800	4970
LE SLAT DISAGREE - ALTN FLAP EXT ACOMPLISHED (FLAPS = 20)	VREF20	9060	290/-250	320	-540/2010	820/-540	340/-280	580	1800	4970
LE SLAT DISAGREE - ALTN FLAP EXT FAILED (FLAPS = 20)	VREF30+30	10340	370/-280	370	-570/2100	870/-580	390/-330	560	2050	5650
REVERSER UNLOCKED (FLAPS 20)	VREF30+30	12610	450/-340	440	-680/2450	1340/-860	470/-400	730	0	3680
TE FLAP ASYM (FLAPS ≥ 20)	VREF20	9060	290/-250	320	-540/2010	820/-540	340/-280	580	1800	4970
TE FLAP ASYM (5 < FLAPS < 20)	VREF30+20	9930	370/-270	360	-560/2070	850/-570	380/-310	590	2100	5920
TE FLAP ASYM (FLAPS ≤ 5)	VREF30+30	10520	380/-280	380	-570/2120	870/-590	410/-330	580	2220	6260
TE FLAP DISAGREE (FLAPS ≥ 20)	VREF20	9060	290/-250	320	-540/2010	820/-540	340/-280	580	1800	4970
TE FLAP DISAGREE (5 < FLAPS < 20)	VREF30+20	9930	370/-270	360	-560/2070	850/-570	380/-310	590	2100	5920
TE FLAP DISAGREE (FLAPS ≤ 5)	VREF30+30	10520	380/-280	380	-570/2120	870/-590	410/-330	580	2220	6260

***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 max manual braking and maximum reverse thrust when available on operating engine(s).

ADVISORY INFORMATION

Recommended Brake Cooling Schedule

Reference Brake Energy Per Brake (Millions of Foot Pounds)

			BRAKES ON SPEED (KIAS)*																	
			80			100			120			140			160			180		
WEIGHT (1000 LB)	OAT		PRESSURE ALTITUDE (1000 FT)																	
	°F	°C	0	2	4	0	2	4	0	2	4	0	2	4	0	2	4	0	2	4
420	40	4	15.9	16.9	17.9	24.0	25.5	27.1	33.4	35.7	37.9	44.0	47.1	50.1	55.6	59.5	63.4			
	60	16	16.5	17.5	18.5	24.9	26.5	28.1	34.7	37.0	39.4	45.7	48.9	52.0	57.7	61.8	65.9			
	80	27	17.0	18.1	19.2	25.8	27.5	29.2	36.0	38.4	40.8	47.4	50.7	53.9	59.9	64.1	68.3			
	100	38	17.5	18.6	19.7	26.5	28.2	30.0	37.0	39.5	42.0	48.8	52.2	55.6	61.7	66.1	70.5			
	120	49	17.7	18.9	20.0	27.0	28.8	30.6	37.8	40.4	42.9	50.0	53.5	57.0	63.3	67.8	72.3			
380	40	4	14.5	15.5	16.4	21.9	23.4	24.8	30.5	32.6	34.6	40.2	42.9	45.7	50.7	54.2	57.8	62.0	66.4	
	60	16	15.1	16.0	17.0	22.8	24.2	25.7	31.7	33.8	35.9	41.7	44.6	47.4	52.7	56.3	60.0	64.4	68.9	
	80	27	15.6	16.6	17.6	23.6	25.1	26.7	32.8	35.0	37.2	43.2	46.2	49.2	54.6	58.4	62.2	66.8	71.5	
	100	38	16.0	17.0	18.0	24.2	25.8	27.4	33.8	36.0	38.3	44.5	47.6	50.6	56.3	60.2	64.2	68.9	73.8	
	120	49	16.2	17.3	18.3	24.6	26.3	27.9	34.4	36.8	39.1	45.5	48.7	51.9	57.7	61.7	65.8	70.7	75.7	
340	40	4	13.2	14.0	14.9	19.9	21.2	22.4	27.6	29.4	31.2	36.2	38.7	41.1	45.6	48.8	52.0	55.7	59.6	63.5
	60	16	13.7	14.6	15.4	20.6	21.9	23.3	28.6	30.5	32.4	37.6	40.2	42.7	47.4	50.7	54.0	57.9	61.9	66.0
	80	27	14.2	15.1	16.0	21.4	22.7	24.1	29.7	31.6	33.6	39.0	41.6	44.3	49.1	52.6	56.0	60.0	64.2	68.5
	100	38	14.5	15.4	16.3	21.9	23.3	24.8	30.5	32.5	34.6	40.1	42.8	45.6	50.6	54.1	57.7	61.9	66.2	70.6
	120	49	14.7	15.7	16.6	22.3	23.7	25.2	31.1	33.2	35.3	41.0	43.8	46.6	51.8	55.5	59.1	63.5	68.0	72.5
300	40	4	11.9	12.6	13.4	17.8	18.9	20.1	24.6	26.2	27.8	32.2	34.3	36.5	40.4	43.2	46.0	49.2	52.6	56.1
	60	16	12.4	13.1	13.9	18.5	19.6	20.8	25.5	27.2	28.9	33.4	35.6	37.9	42.0	44.8	47.7	51.1	54.7	58.2
	80	27	12.8	13.6	14.4	19.1	20.4	21.6	26.4	28.2	29.9	34.6	37.0	39.3	43.5	46.5	49.5	53.0	56.7	60.4
	100	38	13.1	13.9	14.7	19.6	20.9	22.1	27.2	29.0	30.8	35.6	38.0	40.4	44.8	47.9	51.0	54.6	58.4	62.3
	120	49	13.2	14.1	14.9	19.9	21.2	22.5	27.7	29.5	31.4	36.3	38.8	41.3	45.8	49.0	52.2	55.9	59.9	63.8
260	40	4	10.6	11.2	11.9	15.7	16.7	17.7	21.6	23.0	24.4	28.0	29.9	31.8	35.0	37.4	39.8	42.5	45.4	48.3
	60	16	11.0	11.7	12.3	16.3	17.3	18.4	22.4	23.8	25.3	29.1	31.0	33.0	36.4	38.8	41.3	44.1	47.1	50.2
	80	27	11.4	12.1	12.8	16.9	17.9	19.0	23.2	24.7	26.2	30.2	32.2	34.2	37.7	40.3	42.8	45.7	48.9	52.0
	100	38	11.6	12.3	13.0	17.3	18.4	19.5	23.8	25.3	26.9	31.0	33.1	35.1	38.8	41.4	44.1	47.1	50.3	53.6
	120	49	11.8	12.5	13.2	17.5	18.7	19.8	24.2	25.8	27.4	31.6	33.7	35.9	39.6	42.3	45.1	48.2	51.5	54.9
220	40	4	9.3	9.9	10.4	13.6	14.5	15.3	18.5	19.7	20.8	23.8	25.4	26.9	29.5	31.4	33.4	35.5	37.9	40.3
	60	16	9.6	10.2	10.8	14.1	15.0	15.9	19.2	20.4	21.6	24.7	26.3	27.9	30.6	32.6	34.7	36.8	39.3	41.8
	80	27	10.0	10.6	11.2	14.6	15.5	16.4	19.9	21.1	22.4	25.6	27.3	28.9	31.7	33.8	36.0	38.2	40.8	43.3
	100	38	10.2	10.8	11.4	15.0	15.9	16.8	20.4	21.7	23.0	26.3	28.0	29.7	32.6	34.8	37.0	39.3	41.9	44.6
	120	49	10.3	10.9	11.5	15.2	16.1	17.1	20.7	22.0	23.4	26.7	28.5	30.3	33.2	35.5	37.8	40.1	42.9	45.6

***To correct for wind, enter table with the brakes on speed minus one half the headwind or plus 1.5 times the tailwind.**
If ground speed is used for brakes on speed, ignore wind, altitude, and OAT effects.

Adjusted Brake Energy Per Brake (Millions of Foot Pounds)
No Reverse Thrust

		REFERENCE BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS)											
EVENT		5	10	15	20	25	30	35	40	45	50	55	60
RTO MAX MAN		5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0	60.0
LANDING	MAX MAN	1.6	6.6	11.6	16.5	21.3	26.1	30.8	35.5	40.2	44.8	49.5	54.2
	MAX AUTO	2.3	6.6	10.7	14.9	19.1	23.3	27.5	31.8	36.0	40.3	44.7	49.0
	AUTOBRAKE 4	2.5	6.4	10.4	14.3	18.3	22.2	26.1	30.1	34.0	38.0	42.0	46.1
	AUTOBRAKE 3	2.4	6.1	9.8	13.5	17.1	20.8	24.5	28.1	31.8	35.5	39.2	43.0
	AUTOBRAKE 2	2.4	5.8	9.3	12.7	16.0	19.4	22.8	26.2	29.6	33.0	36.4	39.9
	AUTOBRAKE 1	2.3	5.4	8.4	11.5	14.4	17.4	20.3	23.3	26.2	29.2	32.2	35.2

ADVISORY INFORMATION

Recommended Brake Cooling Schedule

Two Engines Reverse Thrust

		REFERENCE BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS)											
EVENT		5	10	15	20	25	30	35	40	45	50	55	60
LANDING	MAX MAN	0.7	5.7	10.5	15.3	19.9	24.5	29.0	33.5	37.9	42.3	46.6	51.0
	MAX AUTO	1.0	4.6	8.2	11.8	15.4	19.0	22.7	26.4	30.1	33.9	37.8	41.7
	AUTOBRAKE 4	0.6	3.8	6.9	10.0	13.2	16.3	19.5	22.7	26.0	29.3	32.6	36.0
	AUTOBRAKE 3	0.0	2.6	5.3	8.0	10.7	13.5	16.2	19.0	21.8	24.7	27.6	30.6
	AUTOBRAKE 2	0.0	1.2	3.5	5.7	8.0	10.3	12.6	15.0	17.3	19.8	22.2	24.8
	AUTOBRAKE 1	0.0	0.7	2.2	3.8	5.3	6.9	8.4	10.0	11.7	13.4	15.1	16.9

Cooling Time (Minutes)

Category "C" and "D" Brakes

	ADJUSTED BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS)									
	14 & BELOW	15	16	18	20	24	28	34	35 TO 42	43 & ABOVE
	BRAKE TEMPERATURE MONITOR SYSTEM INDICATION ON EICAS									
	UP TO 1	1	1	2	2	3	4	5	5 TO 6	7 & ABOVE
INFLIGHT GEAR DOWN	NO SPECIAL PROCEDURE REQUIRED	1	1	2	2	3	4	6	CAUTION	FUSE PLUG MELT ZONE
GROUND		11	15	19	24	34	44	59		

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.
For one brake deactivated, increase brake energy by 15 percent.
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 6 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 10 minutes.
Brake temperature monitor system (BTMS) indication on EICAS may be used 10 to 15 minutes after airplane has come to a complete stop, or inflight with gear retracted, to determine recommended cooling schedule.

ENGINE INOP

Initial Max Continuous EPR

Based on engine bleed for one pack on and APU off

PRESSURE ALTITUDE (FT)		CRUISE MACH NUMBER .72	.76	.80
39000	EPR	1.69	1.69	1.69
	MAX TAT	-14	-11	-10
	EPR CORR	0.09	0.09	0.10
37000	EPR	1.70	1.69	1.69
	MAX TAT	-14	-11	-10
	EPR CORR	0.09	0.09	0.10
35000	EPR	1.70	1.69	1.69
	MAX TAT	-13	-11	-9
	EPR CORR	0.09	0.09	0.10
33000	EPR	1.70	1.70	1.69
	MAX TAT	-9	-8	-5
	EPR CORR	0.09	0.09	0.10
31000	EPR	1.70	1.70	1.68
	MAX TAT	-5	-4	0
	EPR CORR	0.10	0.10	0.11
29000	EPR	1.70	1.69	1.68
	MAX TAT	-2	1	3
	EPR CORR	0.09	0.10	0.10
27000	EPR	1.71	1.70	1.68
	MAX TAT	1	3	7
	EPR CORR	0.10	0.10	0.10

Decrease EPR by the EPR CORR for every 10°C above the MAX TAT shown.

ENGINE INOP

Max Continuous EPR
39000 FT to 22000 FT Pressure Altitudes
Based on engine bleed for one pack on and anti-ice off

PRESSURE ALTITUDE (FT)		KIAS				MACH NUMBER					
		150	200	250	300	.70	.72	.74	.76	.78	.80
39000	EPR		1.72	1.68		1.70	1.69	1.69	1.69	1.69	1.69
	MAX TAT		-17	-9		-14	-14	-12	-11	-10	-10
	EPR CORR		0.09	0.10		0.09	0.09	0.09	0.09	0.10	0.10
37000	EPR		1.73	1.69		1.70	1.70	1.69	1.69	1.69	1.69
	MAX TAT		-18	-10		-14	-14	-12	-11	-10	-10
	EPR CORR		0.08	0.10		0.09	0.09	0.09	0.09	0.10	0.10
35000	EPR	1.76	1.75	1.70		1.70	1.70	1.70	1.69	1.69	1.69
	MAX TAT	-21	-20	-13		-14	-13	-13	-11	-10	-9
	EPR CORR	0.07	0.08	0.09		0.09	0.09	0.09	0.09	0.10	0.10
33000	EPR	1.74	1.76	1.70	1.66	1.70	1.70	1.70	1.70	1.69	1.69
	MAX TAT	-12	-18	-10	-2	-10	-9	-8	-8	-6	-5
	EPR CORR	0.09	0.08	0.09	0.11	0.09	0.09	0.10	0.09	0.10	0.10
31000	EPR	1.75	1.76	1.71	1.68	1.70	1.70	1.70	1.70	1.69	1.68
	MAX TAT	-11	-14	-7	0	-6	-5	-5	-4	-2	0
	EPR CORR	0.09	0.09	0.09	0.10	0.09	0.10	0.10	0.10	0.10	0.11
29000	EPR	1.75	1.77	1.73	1.69	1.71	1.70	1.70	1.69	1.69	1.68
	MAX TAT	-10	-13	-6	1	-4	-2	-1	1	2	3
	EPR CORR	0.09	0.09	0.09	0.10	0.09	0.09	0.10	0.10	0.11	0.10
27000	EPR	1.75	1.78	1.74	1.70	1.71	1.71	1.70	1.70	1.69	1.68
	MAX TAT	-10	-12	-4	3	0	1	3	3	5	7
	EPR CORR	0.09	0.09	0.09	0.10	0.10	0.10	0.10	0.10	0.10	0.10
25000	EPR	1.75	1.77	1.76	1.71	1.71	1.71	1.71	1.70	1.69	1.68
	MAX TAT	-10	-11	-3	4	3	4	5	7	9	10
	EPR CORR	0.09	0.09	0.10	0.09	0.09	0.09	0.10	0.10	0.10	0.10
24000	EPR	1.75	1.75	1.76	1.71	1.71	1.71	1.70	1.69	1.68	1.67
	MAX TAT	-10	-8	-2	4	4	5	7	9	10	12
	EPR CORR	0.09	0.09	0.10	0.09	0.09	0.09	0.10	0.10	0.10	0.10
22000	EPR	1.75	1.74	1.77	1.71	1.70	1.69	1.68	1.67	1.66	1.65
	MAX TAT	-11	-7	-1	6	7	9	11	12	14	16
	EPR CORR	0.08	0.09	0.10	0.09	0.09	0.09	0.09	0.09	0.09	0.10

Decrease EPR by the EPR CORR for every 10°C above the MAX TAT shown.

EPR Adjustments for Engine Bleed

BLEED CONFIGURATION	PRESSURE ALTITUDE (FT)				
	0	10000	20000	30000	40000
PACKS OFF	0.01	0.01	0.01	0.01	0.02
ENGINE ANTI-ICE ON	-0.01	-0.02	-0.03	-0.04	-0.05
ENGINE & WING ANTI-ICE ON	-0.04	-0.06	-0.09	-0.10	-0.13

ENGINE INOP

Max Continuous EPR

20000 FT to Sea Level Pressure Altitudes

Based on engine bleed for one pack on and anti-ice off

PRESSURE ALTITUDE (FT)		KIAS				MACH NUMBER					
		150	200	250	300	.70	.72	.74	.76	.78	.80
20000	EPR	1.75	1.73	1.77	1.72	1.69	1.68	1.67	1.66	1.65	1.63
	MAX TAT	-9	-5	1	7	10	12	14	15	17	19
	EPR CORR	0.09	0.09	0.10	0.09	0.09	0.09	0.09	0.09	0.09	0.09
18000	EPR	1.72	1.70	1.77	1.72	1.66	1.65	1.64	1.63	1.61	
	MAX TAT	-6	-1	4	10	15	17	18	20	22	
	EPR CORR	0.09	0.09	0.09	0.09	0.08	0.08	0.08	0.08	0.08	
16000	EPR	1.68	1.66	1.76	1.71	1.64	1.62	1.61	1.60		
	MAX TAT	-1	2	7	13	19	22	23	24		
	EPR CORR	0.09	0.09	0.09	0.09	0.08	0.08	0.08	0.08		
14000	EPR	1.65	1.62	1.70	1.68	1.59	1.58	1.56			
	MAX TAT	2	5	10	16	24	25	27			
	EPR CORR	0.09	0.09	0.09	0.09	0.07	0.07	0.07			
12000	EPR	1.62	1.58	1.62	1.63	1.53					
	MAX TAT	5	9	13	18	28					
	EPR CORR	0.08	0.09	0.08	0.08	0.07					
10000	EPR	1.58	1.55	1.56	1.57						
	MAX TAT	10	13	16	22						
	EPR CORR	0.08	0.08	0.08	0.08						
5000	EPR	1.51	1.48	1.45	1.44						
	MAX TAT	18	22	25	29						
	EPR CORR	0.07	0.07	0.07	0.06						
1500	EPR	1.45	1.43	1.40	1.36						
	MAX TAT	26	29	31	35						
	EPR CORR	0.06	0.06	0.06	0.06						
0	EPR	141	1.39	1.36	1.32						
	MAX TAT	28	31	34	38						
	EPR CORR	0.06	0.06	0.05	0.05						

Decrease EPR by the EPR CORR for every 10°C above the MAX TAT shown.

EPR Adjustments for Engine Bleed

BLEED CONFIGURATION	PRESSURE ALTITUDE (FT)				
	0	10000	20000	30000	40000
PACKS OFF	0.01	0.01	0.01	0.01	0.02
ENGINE ANTI-ICE ON	-0.01	-0.02	-0.03	-0.04	-0.05
ENGINE & WING ANTI-ICE ON	-0.04	-0.06	-0.09	-0.10	-0.13

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 DRIFT DOWN	LEVEL OFF		ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
420	406	276	18600	17700	16900
400	387	270	19800	18900	18100
380	368	264	21000	20200	19400
360	349	257	22200	21600	20700
340	330	250	23500	23000	22100
320	310	243	24900	24500	23600
300	291	235	26300	26000	25200
280	271	227	27800	27600	26800
260	252	219	29300	29300	28500
240	233	211	31000	30900	30300
220	213	202	32700	32700	32100

Includes APU fuel burn.

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
274	255	239	224	211	200	190	180	172	164	157
546	509	477	448	423	400	380	361	345	329	315
817	762	714	671	634	600	570	542	518	495	474
1086	1014	950	894	845	800	760	724	691	661	633
1356	1266	1187	1117	1055	1000	950	905	864	827	792
1625	1518	1423	1340	1266	1200	1140	1086	1037	992	951
1896	1771	1661	1564	1477	1400	1330	1267	1210	1158	1110
2168	2025	1899	1787	1689	1600	1520	1448	1383	1323	1268
2444	2280	2138	2012	1900	1800	1710	1628	1554	1487	1425

Driftdown/Cruise Fuel and Time

AIR DIST (NM)	FUEL REQUIRED (1000 LB)											TIME (HR:MIN)
	WEIGHT AT START OF DRIFTDOWN (1000 LB)											
	220	240	260	280	300	320	340	360	380	400	420	
200	3.8	4.0	4.3	4.5	4.9	5.1	5.4	5.8	5.9	6.3	6.7	0:33
400	8.3	8.9	9.7	10.3	11.0	11.6	12.3	13.0	13.6	14.4	15.1	1:04
600	12.6	13.6	14.6	15.6	16.7	17.6	18.7	19.8	20.7	21.8	23.0	1:36
800	16.8	18.1	19.5	20.8	22.3	23.6	25.0	26.4	27.6	29.1	30.7	2:07
1000	20.9	22.5	24.3	25.9	27.7	29.4	31.1	32.8	34.4	36.3	38.2	2:37
1200	24.9	26.9	29.0	31.0	33.1	35.0	37.1	39.2	41.1	43.3	45.6	3:08
1400	28.8	31.1	33.6	35.9	38.3	40.6	43.0	45.4	47.7	50.2	52.9	3:40
1600	32.6	35.3	38.1	40.7	43.5	46.1	48.8	51.5	54.1	57.0	60.0	4:12
1800	36.4	39.4	42.5	45.5	48.5	51.5	54.5	57.5	60.4	63.6	67.0	4:44

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 and APU on

WEIGHT (1000 LB)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
420	15700	14600	13300
410	16400	15400	14500
400	17100	16200	15400
390	17700	16900	16100
380	18400	17600	16800
370	19100	18300	17500
360	19900	19000	18200
350	20500	19700	19000
340	21200	20500	19700
330	21900	21300	20500
320	22600	22100	21200
310	23400	22900	22100
300	24100	23700	22900
290	24900	24600	23700
280	25700	25400	24600
270	26500	26200	25500
260	27300	27100	26300
250	28100	28000	27200
240	29000	28900	28100
230	29800	29800	29100
220	30800	30700	30100

With engine anti-ice on, decrease altitude capability by 1400 ft.
With engine and wing anti-ice on, decrease altitude capability by 3200 ft.

ENGINE INOP

MAX CONTINUOUS THRUST

Long Range Cruise Control

WEIGHT (1000 LB)		PRESSURE ALTITUDE (1000 FT)								
		10	14	18	21	23	25	27	29	31
420	EPR	1.35	1.49							
	MACH	.560	.608							
	KIAS	310	314							
	FF/ENG	14754	15755							
400	EPR	1.32	1.45	1.65						
	MACH	.549	.590	.657						
	KIAS	305	304	315						
	FF/ENG	13913	14542	15791						
380	EPR	1.30	1.40	1.58						
	MACH	.540	.574	.634						
	KIAS	299	296	303						
	FF/ENG	13151	13481	14504						
360	EPR	1.27	1.36	1.51						
	MACH	.531	.560	.611						
	KIAS	294	288	292						
	FF/ENG	12433	12543	13214						
340	EPR	1.25	1.32	1.45	1.60					
	MACH	.521	.548	.590	.640					
	KIAS	289	282	282	289					
	FF/ENG	11719	11706	12089	12883					
320	EPR	1.22	1.29	1.40	1.53	1.64				
	MACH	.511	.538	.572	.614	.651				
	KIAS	283	276	272	276	282				
	FF/ENG	11020	10943	11076	11614	12287				
300	EPR	1.20	1.26	1.35	1.46	1.56	1.68			
	MACH	.500	.527	.556	.590	.622	.662			
	KIAS	277	271	265	265	269	276			
	FF/ENG	10340	10232	10169	10511	11012	11691			
280	EPR	1.18	1.24	1.31	1.40	1.48	1.59			
	MACH	.489	.515	.543	.569	.596	.630			
	KIAS	271	265	258	255	257	262			
	FF/ENG	9692	9528	9372	9515	9867	10367			
260	EPR	1.16	1.21	1.28	1.35	1.41	1.50	1.61		
	MACH	.478	.502	.530	.552	.572	.600	.636		
	KIAS	264	258	252	247	247	248	253		
	FF/ENG	9074	8837	8648	8639	8857	9206	9697		
240	EPR	1.14	1.19	1.24	1.30	1.35	1.42	1.51	1.63	
	MACH	.465	.489	.517	.538	.553	.574	.603	.640	
	KIAS	257	251	245	241	238	237	239	244	
	FF/ENG	8440	8199	7955	7858	7952	8190	8519	9004	
220	EPR	1.13	1.16	1.21	1.26	1.30	1.36	1.42	1.52	1.64
	MACH	.447	.476	.502	.523	.537	.553	.574	.604	.642
	KIAS	247	244	238	234	231	228	227	230	234
	FF/ENG	7715	7605	7300	7176	7173	7268	7484	7805	8258

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
291	267	246	229	213	200	190	181	173	166	160
583	535	493	458	427	400	381	363	347	333	320
877	805	741	687	641	600	572	545	521	500	480
1171	1074	989	917	855	800	762	726	694	665	639
1467	1345	1237	1147	1069	1000	953	909	868	831	798
1763	1616	1486	1377	1284	1200	1142	1089	1040	996	956
2061	1888	1736	1608	1498	1400	1333	1270	1213	1161	1114
2359	2160	1985	1838	1712	1600	1522	1451	1385	1325	1272
2659	2434	2235	2069	1927	1800	1712	1631	1557	1489	1429

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT)							
	10		14		18		22	
	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	5.9	0:42	5.3	0:41	4.8	0:40	4.4	0:38
400	12.4	1:20	11.4	1:17	10.6	1:15	10.2	1:11
600	18.8	1:58	17.5	1:54	16.4	1:50	15.9	1:44
800	25.1	2:36	23.5	2:31	22.1	2:26	21.4	2:18
1000	31.3	3:15	29.4	3:08	27.7	3:02	26.9	2:52
1200	37.5	3:54	35.2	3:46	33.3	3:38	32.3	3:26
1400	43.6	4:34	41.0	4:24	38.7	4:14	37.6	4:01
1600	49.6	5:13	46.6	5:02	44.0	4:51	42.8	4:36
1800	55.5	5:53	52.2	5:40	49.3	5:28	47.9	5:12

Fuel Required Adjustment (1000 LB)

REFERENCE FUEL REQUIRED (1000 LB)	WEIGHT AT CHECK POINT (1000 LB)				
	200	250	300	350	400
5	-0.9	-0.4	0.0	0.7	1.3
10	-1.9	-0.9	0.0	1.6	3.0
15	-3.0	-1.4	0.0	2.5	4.8
20	-4.1	-1.9	0.0	3.4	6.6
25	-5.2	-2.4	0.0	4.3	8.3
30	-6.3	-2.9	0.0	5.1	10.1
35	-7.4	-3.4	0.0	6.0	11.9
40	-8.5	-3.9	0.0	6.8	13.7
45	-9.6	-4.4	0.0	7.6	15.5
50	-10.8	-4.9	0.0	8.4	17.2
55	-11.9	-5.5	0.0	9.2	19.0
60	-13.1	-6.0	0.0	9.9	20.8

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
420	EPR	1.19	1.24	1.33	1.49			
	KIAS	259	259	259	259			
	FF/ENG	12870	12960	13360	14350			
400	EPR	1.18	1.22	1.30	1.45	1.70		
	KIAS	252	252	252	253	255		
	FF/ENG	12200	12240	12530	13340	14490		
380	EPR	1.16	1.20	1.28	1.40	1.63		
	KIAS	246	246	246	247	248		
	FF/ENG	11550	11550	11750	12360	13320		
360	EPR	1.15	1.19	1.25	1.36	1.56		
	KIAS	239	239	239	240	241		
	FF/ENG	10890	10880	11010	11420	12200		
340	EPR	1.14	1.17	1.23	1.33	1.50		
	KIAS	231	231	232	233	234		
	FF/ENG	10250	10220	10300	10540	11190		
320	EPR	1.13	1.16	1.21	1.29	1.44	1.70	
	KIAS	225	225	225	226	227	229	
	FF/ENG	9620	9580	9620	9720	10230	11350	
300	EPR	1.11	1.14	1.19	1.26	1.39	1.61	
	KIAS	220	220	220	220	220	221	
	FF/ENG	9000	8960	8980	8990	9320	10240	
280	EPR	1.10	1.13	1.17	1.23	1.34	1.52	
	KIAS	215	215	215	215	215	215	
	FF/ENG	8400	8350	8370	8330	8460	9260	
260	EPR	1.09	1.11	1.15	1.21	1.30	1.45	1.73
	KIAS	210	210	210	210	210	210	210
	FF/ENG	7800	7760	7770	7710	7700	8330	9290
240	EPR	1.08	1.10	1.13	1.18	1.26	1.38	1.62
	KIAS	204	204	204	204	204	204	204
	FF/ENG	7200	7180	7180	7130	7030	7450	8220
220	EPR	1.07	1.08	1.12	1.16	1.22	1.33	1.51
	KIAS	199	199	199	199	199	199	199
	FF/ENG	6630	6590	6600	6560	6430	6650	7300

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

GEAR DOWN

200 KIAS Max Climb EPR

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

TAT (°C)	PRESSURE ALTITUDE (1000 FT)														
	0	5	10	12	14	16	18	20	22	24	26	28	30	32	34
55	1.27														
50	1.29	1.31													
45	1.31	1.33	1.33												
40	1.34	1.36	1.35	1.35	1.35										
35	1.36	1.38	1.38	1.38	1.38	1.38									
30	1.36	1.42	1.41	1.41	1.41	1.41	1.41								
25	1.36	1.44	1.45	1.45	1.45	1.45	1.44	1.44	1.44						
20	1.36	1.44	1.49	1.49	1.49	1.49	1.48	1.48	1.48	1.48					
15	1.36	1.44	1.51	1.53	1.53	1.53	1.53	1.52	1.52	1.52	1.51				
10	1.36	1.44	1.51	1.54	1.57	1.57	1.57	1.57	1.57	1.57	1.56	1.55			
5	1.36	1.44	1.51	1.54	1.57	1.60	1.62	1.62	1.61	1.61	1.61	1.60	1.59	1.57	
0	1.36	1.44	1.51	1.54	1.57	1.60	1.63	1.66	1.66	1.66	1.65	1.64	1.63	1.62	1.59
-5	1.36	1.44	1.51	1.54	1.57	1.60	1.63	1.66	1.69	1.70	1.70	1.69	1.68	1.66	1.64
-10	1.36	1.44	1.51	1.54	1.57	1.60	1.63	1.66	1.69	1.71	1.73	1.73	1.72	1.71	1.68
-15	1.36	1.44	1.51	1.54	1.57	1.60	1.63	1.66	1.69	1.71	1.73	1.75	1.76	1.75	1.72
-20	1.36	1.44	1.51	1.54	1.57	1.60	1.63	1.66	1.69	1.71	1.73	1.75	1.76	1.76	1.75

EPR Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)												
	0	5	10	12	14	18	20	22	24	26	28	30	34
PACKS OFF	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02
ENGINE ANTI-ICE ON	-0.01	-0.02	-0.02	-0.02	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.04	-0.04	-0.04
ENGINE & WING ANTI-ICE ON	-0.02	-0.03	-0.04	-0.04	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	-0.06	-0.07	-0.07

GEAR DOWN

Long Range Cruise Altitude Capability

WEIGHT (1000 LB)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
420	18400	18400	16500
400	20200	20200	18400
380	21800	21800	20300
360	23500	23500	22000
340	25200	25200	23800
320	26900	26900	25700
300	28700	28700	27500
280	30300	30300	29200
260	32100	32000	31000
240	33700	33700	33000
220	35200	35200	34600

GEAR DOWN

Long Range Cruise Control

WEIGHT (1000 LB)		PRESSURE ALTITUDE (1000 FT) 10	14	18	21	23	25	27	29	31	33	35
420	EPR	1.25	1.32	1.44								
	MACH	.473	.507	.546								
	KIAS	261	260	260								
	FF/ENG	10970	11061	11319								
400	EPR	1.23	1.30	1.40								
	MACH	.463	.496	.534								
	KIAS	256	255	254								
	FF/ENG	10409	10438	10609								
380	EPR	1.21	1.27	1.36	1.46							
	MACH	.454	.485	.521	.552							
	KIAS	251	249	248	247							
	FF/ENG	9880	9825	9898	10129							
360	EPR	1.20	1.25	1.33	1.42	1.49						
	MACH	.444	.473	.509	.539	.560						
	KIAS	245	243	241	241	241						
	FF/ENG	9357	9234	9222	9426	9649						
340	EPR	1.18	1.23	1.30	1.38	1.44	1.52					
	MACH	.434	.462	.496	.525	.546	.567					
	KIAS	240	237	235	235	235	234					
	FF/ENG	8839	8678	8596	8731	8944	9178					
320	EPR	1.17	1.21	1.27	1.34	1.39	1.46					
	MACH	.422	.451	.483	.510	.531	.552					
	KIAS	233	231	229	228	228	228					
	FF/ENG	8299	8170	7990	8034	8239	8461					
300	EPR	1.15	1.19	1.25	1.30	1.35	1.41	1.49				
	MACH	.409	.440	.469	.496	.515	.536	.558				
	KIAS	226	225	222	222	221	221	220				
	FF/ENG	7763	7671	7440	7414	7536	7749	7946				
280	EPR	1.14	1.17	1.22	1.27	1.31	1.36	1.43	1.51			
	MACH	.398	.427	.456	.481	.500	.519	.541	.563			
	KIAS	220	218	216	215	214	213	214	213			
	FF/ENG	7263	7163	6937	6845	6900	7038	7238	7431			
260	EPR	1.12	1.16	1.20	1.24	1.28	1.32	1.37	1.44	1.53		
	MACH	.385	.412	.443	.466	.483	.503	.523	.545	.568		
	KIAS	212	211	210	208	207	206	206	206	206		
	FF/ENG	6753	6633	6450	6316	6324	6397	6527	6716	6908		
240	EPR	1.11	1.14	1.18	1.21	1.24	1.28	1.32	1.38	1.45	1.55	
	MACH	.370	.398	.428	.451	.467	.485	.504	.525	.547	.571	
	KIAS	204	204	202	201	200	199	198	198	198	198	
	FF/ENG	6217	6145	5971	5837	5797	5815	5875	6011	6189	6365	
220	EPR	1.10	1.12	1.16	1.19	1.21	1.24	1.28	1.33	1.39	1.46	1.56
	MACH	.355	.383	.411	.436	.451	.467	.485	.505	.526	.549	.573
	KIAS	196	196	194	194	193	191	191	190	190	190	189
	FF/ENG	5722	5651	5473	5377	5327	5294	5300	5354	5490	5653	5817

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
322	288	259	236	217	200	189	179	170	161	154
651	581	521	474	434	400	377	357	338	321	307
984	877	785	712	652	600	566	535	507	483	461
1321	1176	1051	952	871	800	755	713	676	642	613
1663	1477	1318	1192	1089	1000	943	891	844	802	765
2010	1782	1587	1433	1309	1200	1131	1068	1011	961	917
2363	2091	1858	1676	1528	1400	1319	1245	1179	1120	1068
2720	2403	2132	1920	1749	1600	1507	1422	1346	1278	1218
3083	2718	2407	2165	1969	1800	1694	1598	1512	1435	1368
3451	3037	2685	2411	2190	2000	1882	1775	1678	1593	1518

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT)									
	10		14		18		22		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	10.8	0:50	9.8	0:48	8.8	0:46	8.0	0:44	7.4	0:42
400	22.4	1:37	20.6	1:32	18.7	1:28	17.4	1:24	16.6	1:18
600	33.7	2:25	31.2	2:17	28.5	2:11	26.5	2:04	25.5	1:55
800	44.7	3:13	41.5	3:03	38.1	2:54	35.5	2:45	34.2	2:32
1000	55.5	4:03	51.7	3:50	47.5	3:38	44.3	3:27	42.7	3:10
1200	66.0	4:54	61.6	4:38	56.6	4:23	52.8	4:09	50.8	3:48
1400	76.3	5:46	71.3	5:26	65.6	5:08	61.2	4:52	58.8	4:27
1600	86.4	6:39	80.8	6:16	74.5	5:54	69.5	5:35	66.5	5:07
1800	96.3	7:33	90.0	7:06	83.1	6:41	77.5	6:19	74.0	5:47
2000	105.9	8:28	99.1	7:58	91.6	7:29	85.5	7:04	81.3	6:27

Fuel Required Adjustment (1000 LB)

REFERENCE FUEL REQUIRED (1000 LB)	WEIGHT AT CHECK POINT (1000 LB)				
	200	250	300	350	400
10	-1.7	-0.8	0.0	1.4	2.8
20	-3.6	-1.8	0.0	2.9	6.0
30	-5.5	-2.8	0.0	4.5	9.1
40	-7.4	-3.7	0.0	6.0	12.2
50	-9.3	-4.7	0.0	7.5	15.3
60	-11.1	-5.6	0.0	9.1	18.4
70	-12.9	-6.6	0.0	10.6	21.4
80	-14.7	-7.5	0.0	12.1	24.5
90	-16.4	-8.4	0.0	13.7	27.5
100	-18.2	-9.3	0.0	15.2	30.5
110	-19.9	-10.3	0.0	16.7	33.5

Descent at VREF30 + 70

PRESSURE ALTITUDE (1000 FT)	5	10	15	17	19	21	23	25	27	29	31	33	35
DISTANCE (NM)	16	26	36	40	44	48	52	56	60	65	68	72	76
TIME (MINUTES)	7	10	12	13	14	15	16	17	17	18	19	20	20

GEAR DOWN

Holding
Flaps Up

WEIGHT (1000 LB)		PRESSURE ALTITUDE (FT)						
		1500	5000	10000	15000	20000	25000	30000
420	EPR	1.14	1.18	1.24	1.33			
	KIAS	249	249	249	249			
	FF/ENG	10890	10820	10860	11030			
400	EPR	1.13	1.16	1.22	1.30	1.44		
	KIAS	242	242	242	242	242		
	FF/ENG	10320	10230	10240	10320	10640		
380	EPR	1.12	1.15	1.20	1.28	1.40		
	KIAS	236	236	236	236	236		
	FF/ENG	9750	9660	9640	9640	9880		
360	EPR	1.11	1.14	1.18	1.25	1.36		
	KIAS	229	229	229	229	229		
	FF/ENG	9200	9110	9060	9000	9140		
340	EPR	1.10	1.13	1.17	1.23	1.32	1.49	
	KIAS	221	221	221	221	221	221	
	FF/ENG	8620	8540	8470	8390	8390	8980	
320	EPR	1.09	1.12	1.16	1.21	1.29	1.43	
	KIAS	215	215	215	215	215	215	
	FF/ENG	8110	8030	7980	7870	7790	8260	
300	EPR	1.09	1.11	1.14	1.19	1.27	1.39	
	KIAS	210	210	210	210	210	210	
	FF/ENG	7640	7580	7530	7410	7290	7620	
280	EPR	1.08	1.10	1.13	1.17	1.24	1.34	1.53
	KIAS	205	205	205	205	205	205	205
	FF/ENG	7180	7130	7070	6960	6810	7000	7540
260	EPR	1.07	1.09	1.12	1.16	1.22	1.31	1.46
	KIAS	200	200	200	200	200	200	200
	FF/ENG	6720	6660	6620	6510	6340	6430	6870
240	EPR	1.06	1.08	1.10	1.14	1.19	1.27	1.40
	KIAS	194	194	194	194	194	194	194
	FF/ENG	6300	6210	6180	6080	5910	5930	6230
220	EPR	1.06	1.07	1.09	1.13	1.17	1.24	1.35
	KIAS	189	189	189	189	189	189	189
	FF/ENG	5890	5780	5750	5660	5490	5470	5630

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

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GEAR DOWN
ENGINE INOP

Initial Max Continuous EPR

Based on engine bleed for one pack on and APU off

PRESSURE ALTITUDE (FT)		CRUISE MACH NUMBER		
		.40	.50	.60
29000	EPR	1.75	1.78	1.75
	MAX TAT	-10	-15	-8
	EPR CORR	0.09	0.09	0.09
27000	EPR	1.75	1.78	1.76
	MAX TAT	-10	-12	-6
	EPR CORR	0.09	0.09	0.09
25000	EPR	1.75	1.78	1.76
	MAX TAT	-10	-10	-3
	EPR CORR	0.09	0.09	0.09
23000	EPR	1.75	1.78	1.76
	MAX TAT	-11	-6	-1
	EPR CORR	0.08	0.09	0.09
21000	EPR	1.73	1.78	1.75
	MAX TAT	-7	-3	3
	EPR CORR	0.09	0.09	0.09
19000	EPR	1.71	1.78	1.74
	MAX TAT	-4	0	7
	EPR CORR	0.10	0.09	0.09
15000	EPR	1.63	1.76	1.70
	MAX TAT	4	9	15
	EPR CORR	0.09	0.09	0.09
10000	EPR	1.54	1.59	1.54
	MAX TAT	14	20	25
	EPR CORR	0.08	0.08	0.07

Decrease EPR by the EPR CORR for every 10°C above the MAX TAT shown.

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 DRIFT DOWN	LEVEL OFF		ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
380	362	233	4900	3100	
360	344	226	7400	5700	3700
340	326	218	9700	8200	6400
320	306	213	11700	10500	8900
300	288	208	13600	12800	11200
280	270	203	15500	15100	13800
260	250	198	17100	17000	16100
240	231	193	19100	19000	18400
220	212	187	21000	20900	20400

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
340	3300		
330	4800		
320	6400	3700	
310	7900	5500	2700
300	9400	7100	4500
290	10900	8800	6300
280	12300	10500	8100
270	13700	12100	9800
260	15100	13600	11600
250	16500	15000	13400
240	17800	16300	14900
230	19000	17800	16300
220	20200	19100	17700

GEAR DOWN
ENGINE INOP
MAX CONTINUOUS THRUST

Long Range Cruise Control

WEIGHT (1000 LB)		PRESSURE ALTITUDE (1000 FT) 6	8	10	12	14	16	18	20
320	EPR	1.42	1.48						
	MACH	.379	.388						
	KIAS	225	222						
	FF/ENG	16096	16186						
300	EPR	1.39	1.43	1.50					
	MACH	.371	.381	.390					
	KIAS	220	218	215					
	FF/ENG	14960	15019	15130					
280	EPR	1.35	1.39	1.44	1.51	1.60			
	MACH	.362	.372	.381	.391	.405			
	KIAS	215	213	210	208	207			
	FF/ENG	13914	13887	13939	14085	14556			
260	EPR	1.32	1.36	1.40	1.44	1.51	1.61		
	MACH	.352	.363	.372	.382	.392	.407		
	KIAS	209	208	205	203	200	200		
	FF/ENG	12889	12845	12824	12896	13012	13438		
240	EPR	1.29	1.32	1.35	1.40	1.45	1.52	1.62	
	MACH	.341	.351	.362	.372	.382	.396	.412	
	KIAS	202	201	200	197	195	194	194	
	FF/ENG	11880	11827	11789	11788	11798	12047	12471	
220	EPR	1.25	1.28	1.32	1.35	1.39	1.45	1.53	1.64
	MACH	.328	.339	.350	.361	.371	.385	.400	.416
	KIAS	195	194	193	191	189	189	189	189
	FF/ENG	10861	10825	10779	10757	10685	10819	11087	11527

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
166	147	131	119	109	100	94	89	84	79	75
338	299	266	239	218	200	187	175	165	156	148
512	452	400	360	328	300	280	262	246	233	221
686	604	535	481	438	400	374	350	329	310	294
862	758	670	602	547	500	467	437	410	387	367
1038	913	806	724	657	600	560	524	491	463	439
1216	1068	942	845	767	700	653	610	573	540	512
1395	1224	1079	967	877	800	746	697	654	616	584
1575	1381	1216	1089	988	900	839	784	735	693	656
1757	1539	1354	1211	1098	1000	932	870	816	768	728

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT)							
	6		10		14		18	
	FUEL (1000 LB)	TIME (HR:MIN)	FUEL (1000 LB)	TIME (HR:MIN)	FUEL (1000 LB)	TIME (HR:MIN)	FUEL (1000 LB)	TIME (HR:MIN)
100	5.6	0:28	5.1	0:27	4.7	0:26	4.3	0:26
200	11.8	0:53	11.1	0:52	10.8	0:50	10.5	0:48
300	17.9	1:18	17.0	1:16	16.7	1:13	16.5	1:10
400	23.9	1:44	22.8	1:41	22.5	1:37	22.4	1:32
500	29.8	2:10	28.5	2:06	28.2	2:00	28.2	1:55
600	35.7	2:36	34.1	2:30	33.7	2:24	33.9	2:17
700	41.4	3:02	39.7	2:56	39.2	2:49	39.4	2:40
800	47.1	3:29	45.1	3:21	44.5	3:13	44.8	3:03
900	52.8	3:55	50.5	3:47	49.7	3:38	50.0	3:27
1000	58.3	4:22	55.8	4:12	54.8	4:02	55.2	3:50

Fuel Required Adjustment (1000 LB)

REFERENCE FUEL REQUIRED (1000 LB)	WEIGHT AT CHECK POINT (1000 LB)				
	200	250	300	350	400
5	-1.0	-0.5	0.0	0.7	1.3
10	-2.0	-1.0	0.0	1.5	2.9
15	-3.1	-1.6	0.0	2.3	4.4
20	-4.2	-2.1	0.0	3.1	6.0
25	-5.3	-2.7	0.0	4.0	7.6
30	-6.3	-3.2	0.0	4.8	9.2
35	-7.4	-3.7	0.0	5.7	10.9
40	-8.5	-4.3	0.0	6.5	12.6
45	-9.5	-4.8	0.0	7.4	14.3
50	-10.6	-5.3	0.0	8.3	16.0
55	-11.6	-5.8	0.0	9.2	17.7
60	-12.7	-6.4	0.0	10.1	19.5

Includes APU fuel burn.

GEAR DOWN
ENGINE INOP

MAX CONTINUOUS THRUST

Holding
Flaps Up

WEIGHT (1000 LB)		PRESSURE ALTITUDE (FT)				
		1500	5000	10000	15000	20000
360	EPR	1.37				
	KIAS	229				
	FF/ENG	18020				
340	EPR	1.34	1.42			
	KIAS	221	221			
	FF/ENG	16760	17100			
320	EPR	1.31	1.38			
	KIAS	215	215			
	FF/ENG	15670	15850			
300	EPR	1.28	1.34	1.48		
	KIAS	210	210	210		
	FF/ENG	14690	14780	15420		
280	EPR	1.26	1.31	1.42		
	KIAS	205	205	205		
	FF/ENG	13730	13770	14180		
260	EPR	1.23	1.28	1.38	1.55	
	KIAS	200	200	200	200	
	FF/ENG	12790	12790	13000	13860	
240	EPR	1.21	1.26	1.34	1.48	
	KIAS	194	194	194	194	
	FF/ENG	11890	11850	11960	12470	
220	EPR	1.19	1.23	1.30	1.42	1.64
	KIAS	189	189	189	189	189
	FF/ENG	11010	10960	11000	11250	12100

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 EPR 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 EPR

This table shows Max Climb EPR for a 250/290/.78 climb speed schedule, normal engine bleed for packs on and anti-ice off. Enter the table with airport pressure altitude and TAT and read EPR. EPR adjustments are shown for packs off and anti-ice operation.

VREF

This table contains flaps 30, 25 and 20 reference speeds for a given weight.

Advisory Information

Normal Configuration Landing Distance

Tables are provided as advisory information for normal configuration landing distances on dry runways and slippery runways with good, medium, and poor reported braking action. These values are actual landing distances and do not include the 1.67 regulatory factor. Therefore, they cannot be used to determine the dispatch required landing field length.

To use these tables, determine the reference landing distance for the selected braking configuration. Then adjust the reference distance for landing weight, altitude, wind, slope, temperature, approach speed, and the number of operative thrust reversers to obtain the actual landing distance.

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

Use of the autobrake system commands the airplane to a constant deceleration rate. In some conditions, such as a runway with "poor" braking action, the airplane may not be able to achieve these deceleration rates. In these cases, runway slope and inoperative reversers influence the stopping distance. Since it cannot be determined quickly when this becomes a factor, it is appropriate to add the effects of slope and inoperative reversers when using the autobrake system.

Non-normal Configuration Landing Distance

Advisory information is provided to support non-normal configurations that affect 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, temperature, and speed conditions as well as thrust reverser configuration. Each adjustment is independently added to the reference landing distance. Landing distance includes the effects 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 landing at short time intervals or a rejected takeoff.

Enter the Recommended Brake Cooling Schedule table with the airplane weight, the brakes on speed adjusted for wind and 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.

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 Thrust) 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 or brake temperature monitor system (BTMS) indication on EICAS. Times are provided for ground cooling and inflight gear down cooling.

If brake temperature monitor indication on EICAS is available, the hottest brake indication 10 to 15 minutes after the airplane has come to a complete stop, or inflight with gear retracted, may be used to determine the recommended cooling schedule by entering at the bottom of the chart. The brake temperature light illuminates when the hottest brake is registering 5 on the EICAS indication and extinguishes as the hottest brake cools with an EICAS indication of 4.

Engine Inoperative

Initial Max Continuous EPR

The Initial Max Continuous EPR setting for use following an engine failure is shown. The table shows a range of Cruise Mach numbers to provide a target EPR setting at the start of driftdown. Also shown is the maximum TAT at which the limit EPR can be set. Once driftdown is established, the Max Continuous EPR table should be used to determine EPR for the given conditions.

Max Continuous EPR

Power setting is based on one engine operating with one A/C pack operating and all anti-ice bleeds off. Enter the table with pressure altitude and IAS or Mach to read EPR.

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. The cruise segment is at a level off altitude which is based on 100 ft/min residual rate of climb.

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 are 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 EPR, 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 .78/290/250 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 Fuel Required Adjustment table with the fuel required for the reference weight and the actual weight at checkpoint. Read fuel and time required for the actual weight.

Holding

Target EPR, 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 EPR, IAS and fuel flow per engine.

Gear Down

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

NOTE: The Flight Management Computer System (FMCS) does not contain special provisions for operation with landing gear extended. As a result, the FMCS will generate inaccurate enroute speed schedules, display non-conservative predictions of fuel burn, estimated time of arrival (ETA), maximum altitude, and compute overly shallow descent path. To obtain accurate ETA predictions, gear down cruise speed and altitude should be entered on the CLB and CRZ pages. Gear down cruise speed should also be entered on the DES page and a STEP SIZE of zero should be entered on the PERF INIT or CRZ page. Use of the VNAV during descent under these circumstances is not recommended.

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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General

Non-Normal Maneuvers and Flight Patterns are included for training and review purposes.

Non-Normal Maneuvers

Flight crews are expected to do non-normal maneuvers from memory.

Flight Patterns

Flight patterns show procedures for some all-engine and engine-inoperative situations.

Flight patterns do not include all procedural items but show required/recommended:

- configuration changes
- thrust changes
- Mode Control Panel (MCP) changes
- pitch mode and roll mode changes
- checklist calls.

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Approach to Stall Recovery

The following is immediately accomplished at the first indication of stall buffet or stick shaker.

<table>
<tr><th>Pilot Flying</th><th>Pilot Monitoring</th></tr>
<tr><td>• Advance thrust levers to maximum thrust*
• Smoothly adjust pitch attitude** to avoid ground contact or obstacles
• Level the wings (do not change flaps or landing gear configuration)
• Retract the speedbrakes</td><td rowspan="2">• Verify maximum thrust
• Monitor altitude and airspeed
• Call out any trend toward terrain contact
• Verify all required actions have been completed and call out any omissions</td></tr>
<tr><td>When ground contact is no longer a factor:
• Adjust pitch attitude to accelerate while minimizing altitude loss
• Return to a speed appropriate for the configuration</td></tr>
</table>

Note: * If an approach to stall is encountered with the autopilot engaged, apply maximum thrust and allow the airplane to return to the normal airspeed.

Note: ** At high altitude, it may be necessary to descend to accelerate.

Note: If autopilot response is not acceptable, it should be disengaged.

Rejected Takeoff

The captain has the sole responsibility for the decision to reject the takeoff. The decision must be made in time to start the rejected takeoff maneuver by V1. If the decision is to reject the takeoff, the captain must clearly announce “REJECT,” immediately start the rejected takeoff maneuver, and assume control of the airplane. If the first officer is making the takeoff, the first officer must maintain control of the airplane until the captain makes a positive input to the controls.

Prior to 80 knots the takeoff should be rejected for any of the following:

- activation of the master caution
- system failure(s)
- unusual noise or vibration

- tire failure
- abnormally slow acceleration
- takeoff configuration warning
- fire or fire warning
- engine failure
- if a side window opens
- if the airplane is unsafe or unable to fly.
- predictive windshear warning

Above 80 knots and prior to V1, the takeoff should be rejected for any of the following:

- fire or fire warning
- engine failure
- if the airplane is unsafe or unable to fly.
- predictive windshear warning

During the takeoff, the crew member observing the non-normal situation will immediately call it out as clearly as possible.

Captain	First Officer
Without delay: Simultaneously close the thrust levers, disengage the autothrottles, and apply maximum manual wheel brakes or verify operation of RTO autobrakes. If RTO autobrakes is selected, monitor system performance and apply manual wheel brakes if the autobrakes disarm or deceleration is not adequate.	Verify actions as follows: Thrust levers closed. Autothrottle disengaged. Maximum brakes applied.
Raise SPEEDBRAKE lever. Apply the maximum amount of reverse thrust consistent with conditions. Continue maximum braking until certain the airplane will stop on the runway.	Verify speedbrake lever UP and call “SPEEDBRAKES UP.” If speedbrake lever not UP call “SPEEDBRAKES NOT UP.” Reverse thrust applied. Call out any omitted action items.
Field length permitting: Initiate movement of the reverse thrust levers to reach the reverse idle detent by taxi speed.	Call out 60 knots. Communicate the reject decision to the control tower and cabin as soon as practical.

Captain	First Officer
When the airplane is stopped, perform procedures as required. Review Brake Cooling Schedule for brake cooling time and precautions (refer to the Performance Inflight chapter). Consider the following: • The possibility of wheel fuse plugs melting • The need to clear the runway • The requirement for remote parking • Wind direction in case of fire • Alerting fire equipment • Not setting the parking brake unless passenger evacuation is necessary • Advising the ground crew of the hot brake hazard • Advising passengers of the need to remain seated or evacuate • Completion of Non–Normal checklist (if appropriate) for conditions which caused the RTO	

Terrain Avoidance

Ground Proximity Caution

Accomplish the following maneuver for any of these aural alerts*:

- CAUTION OBSTACLE
- CAUTION TERRAIN
- TERRAIN
- DON’T SINK
- GLIDESLOPE
- SINK RATE
- TOO LOW FLAPS
- TOO LOW GEAR
- TOO LOW TERRAIN
- BANK ANGLE

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

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

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

Note: If an obstacle or 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: *As installed, some repeat.

Ground Proximity Warning

Accomplish the following maneuver for any of these conditions:

- activation of the “PULL UP” warning
- activation of the “OBSTACLE OBSTACLE PULL UP” warning
- activation of the “TERRAIN TERRAIN 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 or stick shaker or initial buffet.	• Verify 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 the 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 positive terrain separation. Smooth, steady control will avoid a pitch attitude overshoot and stall.

Note: Do not use flight director commands.

Note: * Maximum thrust can be obtained by advancing the thrust levers to the takeoff or go-around limit. On airplanes with EEC's operating normally, the pilot may advance the thrust levers full forward. 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 an obstacle or terrain 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 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 20. 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 20 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 the actions may be necessary once recovery is underway. 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 the 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

Predictive Windshear (PWS)

PWS Cautions

For predictive windshear caution alert: (“MONITOR RADAR DISPLAY” aural)

Pilot Flying	Pilot Monitoring
• Maneuver as required to avoid the windshear.	

PWS Warnings

Predictive windshear warning during takeoff roll: (“WINDSHEAR AHEAD, WINDSHEAR AHEAD” aural)

- Prior to V1, reject takeoff.
- After V1, perform the Windshear Escape Maneuver.

Predictive windshear warning during approach: (“GO–AROUND, WINDSHEAR AHEAD” aural)

- perform Windshear Escape Maneuver or, at pilot’s discretion, perform a normal go–around.

Windshear Indications

The following are indications the airplane is encountering a windshear:

- Unacceptable flight path deviations; recognized as uncontrolled changes from normal steady state flight conditions below 1,000 feet AGL, in excess of any of the following:
  - 15 knots indicated airspeed
  - 500 FPM vertical speed
  - 5 degrees pitch attitude
  - 1 dot displacement from the glideslope
  - unusual thrust lever position for a significant period of time.
- Windshear Immediate-Alert Warning (two-tone siren followed by “WINDSHEAR,WINDSHEAR,WINDSHEAR”)

Windshear Encounter

Windshear encountered during takeoff roll:

- If windshear is encountered prior to V1, there may not be sufficient runway remaining to stop if an RTO is initiated at V1. At VR, rotate at a normal rate toward a 15 degree pitch attitude. Once airborne, perform the Windshear Escape Maneuver.
- If windshear is encountered near the normal rotation speed and airspeed suddenly decreases, there may not be sufficient runway left to accelerate back to normal takeoff speed. If there is insufficient runway left to stop, initiate a normal rotation at least 2,000 feet before the end of the runway even if airspeed is low. Higher than normal attitudes may be required to lift off in the remaining runway. Ensure maximum thrust is set.

Windshear encountered in flight:

- perform the Windshear Escape Maneuver.

Windshear Escape Maneuver With Flight Director Guidance

Pilot Flying	Pilot Monitoring
MANUAL FLIGHT • Disconnect autopilot. • Push either go–around 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 GA guidance (if available). AUTOMATIC FLIGHT • Press either go–around switch.** • Verify GA mode annunciation. • Verify thrust advances to GA power. • Retract speedbrakes. • Monitor system performance***.	• Verify maximum* thrust. • Verify all required actions have been completed and call out any omissions.
• Do not change gear or flap 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 positive terrain separation. Smooth, steady control will avoid a pitch attitude overshoot and stall.

Note: * Maximum thrust can be obtained by advancing the thrust levers to the takeoff or go-around limit. On airplanes with EEC's operating normally, the pilot may advance the thrust levers full forward. If terrain contact is imminent, advance thrust levers full forward.

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

WARNING: * Severe windshear may exceed the performance capability of the AFDS. The pilot flying must be prepared to disconnect the autopilot and autothrottle and fly manually.**

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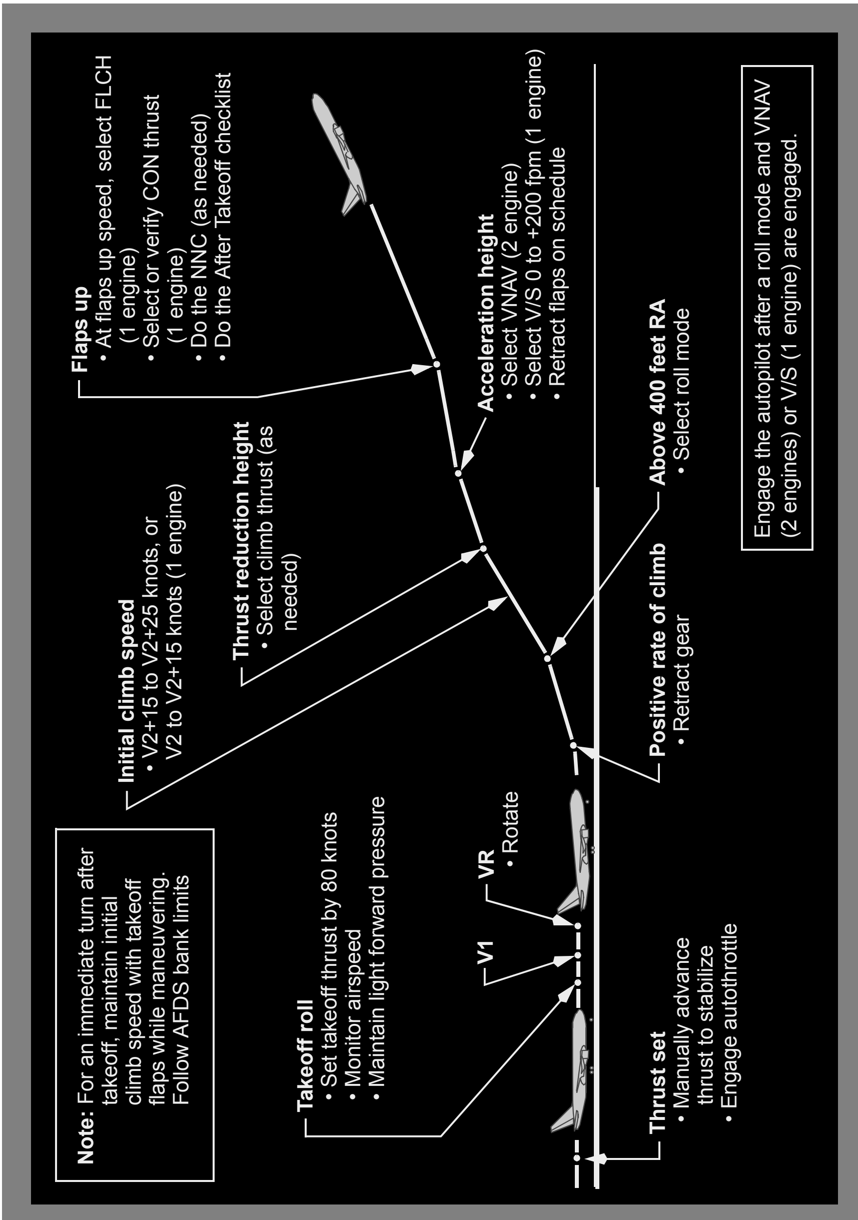
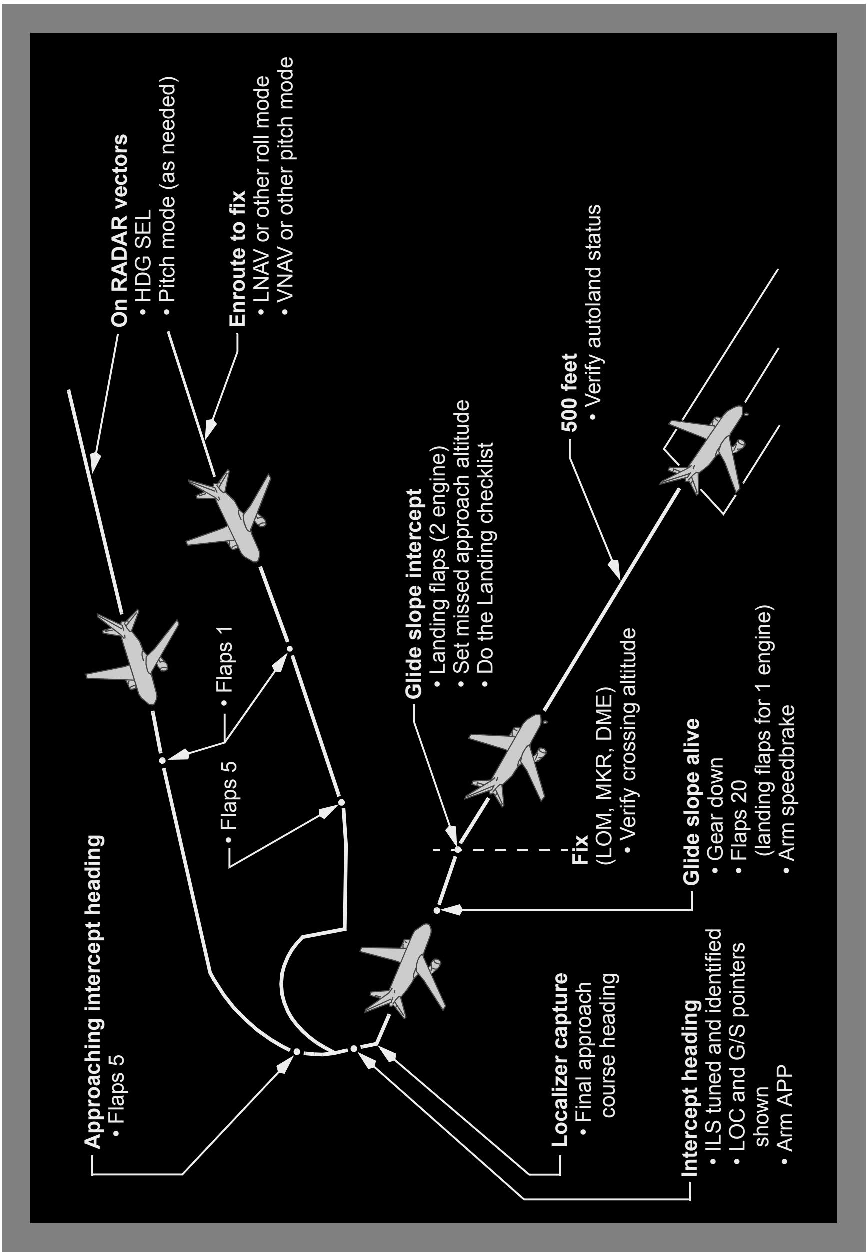
Maneuvers — Chapter Man

Flight Patterns — Section 2

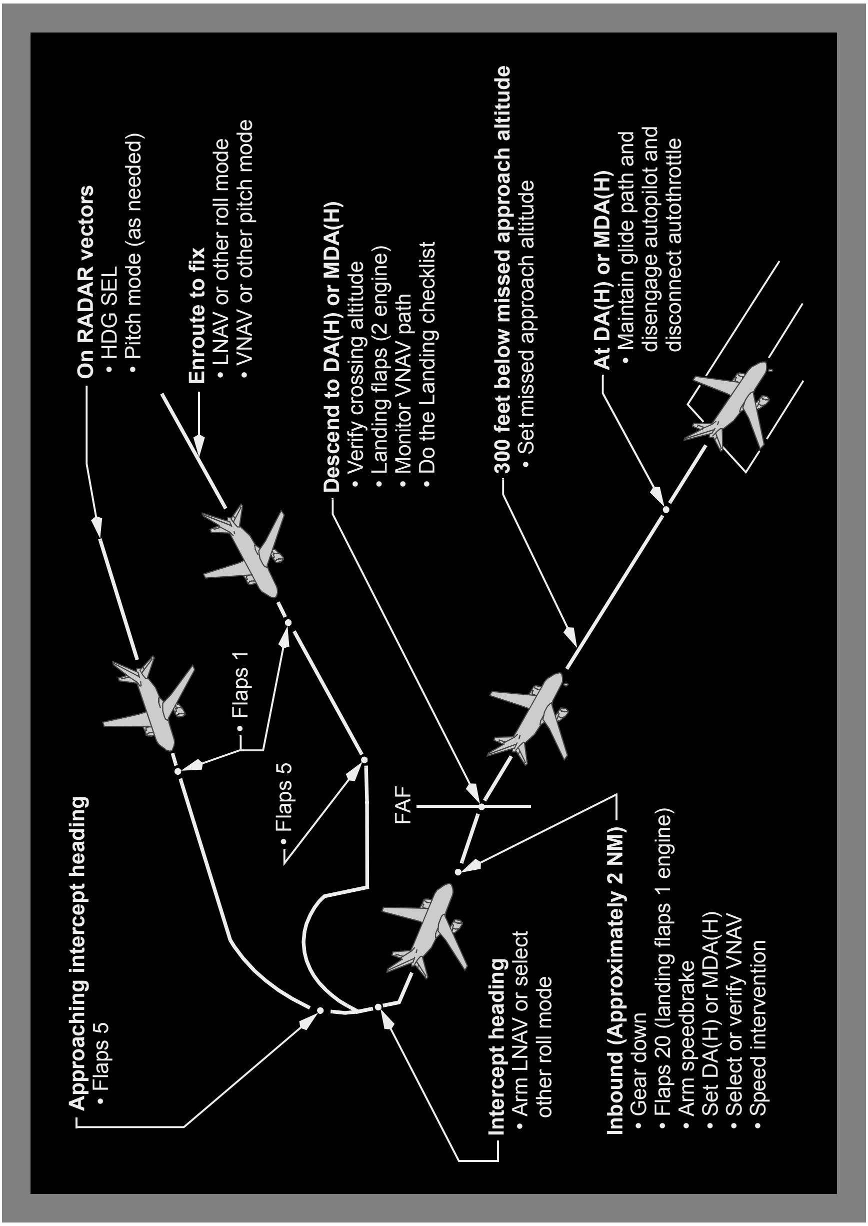
Takeoff



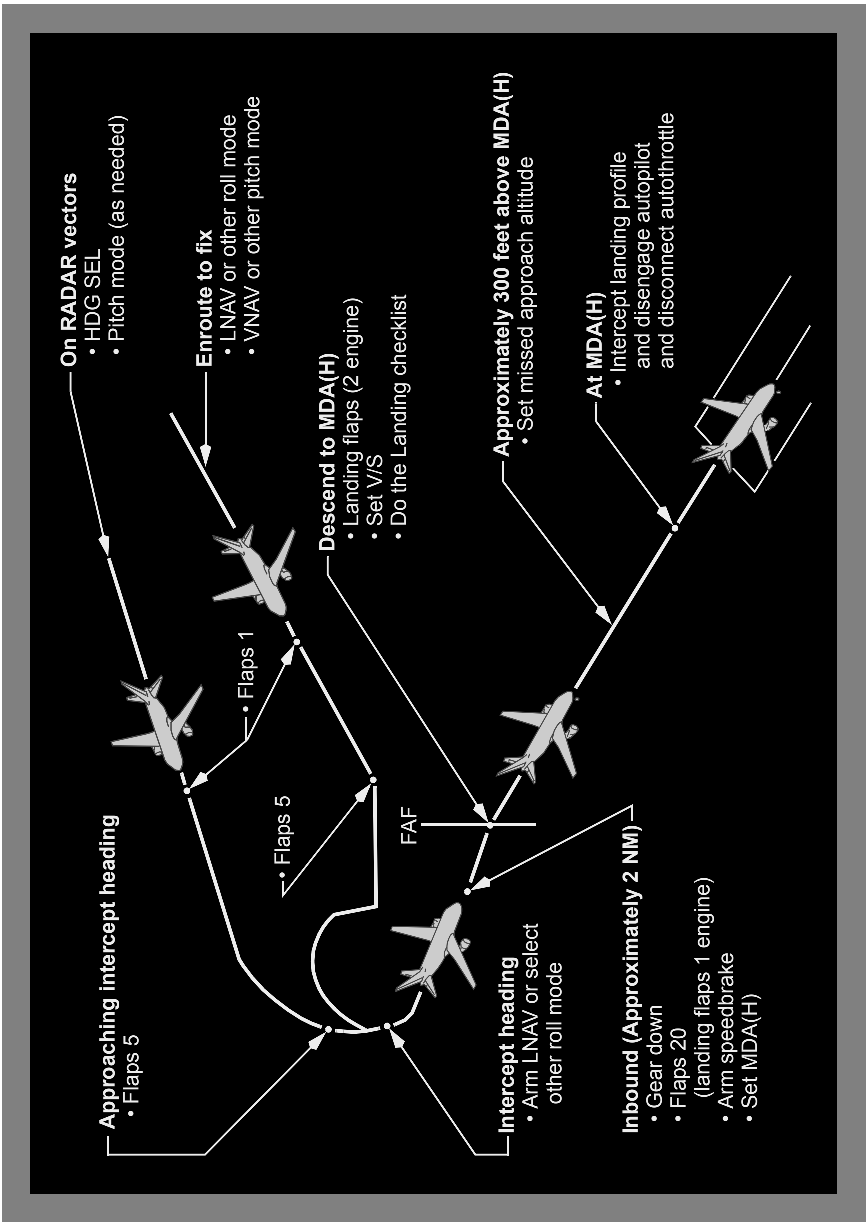
ILS Approach



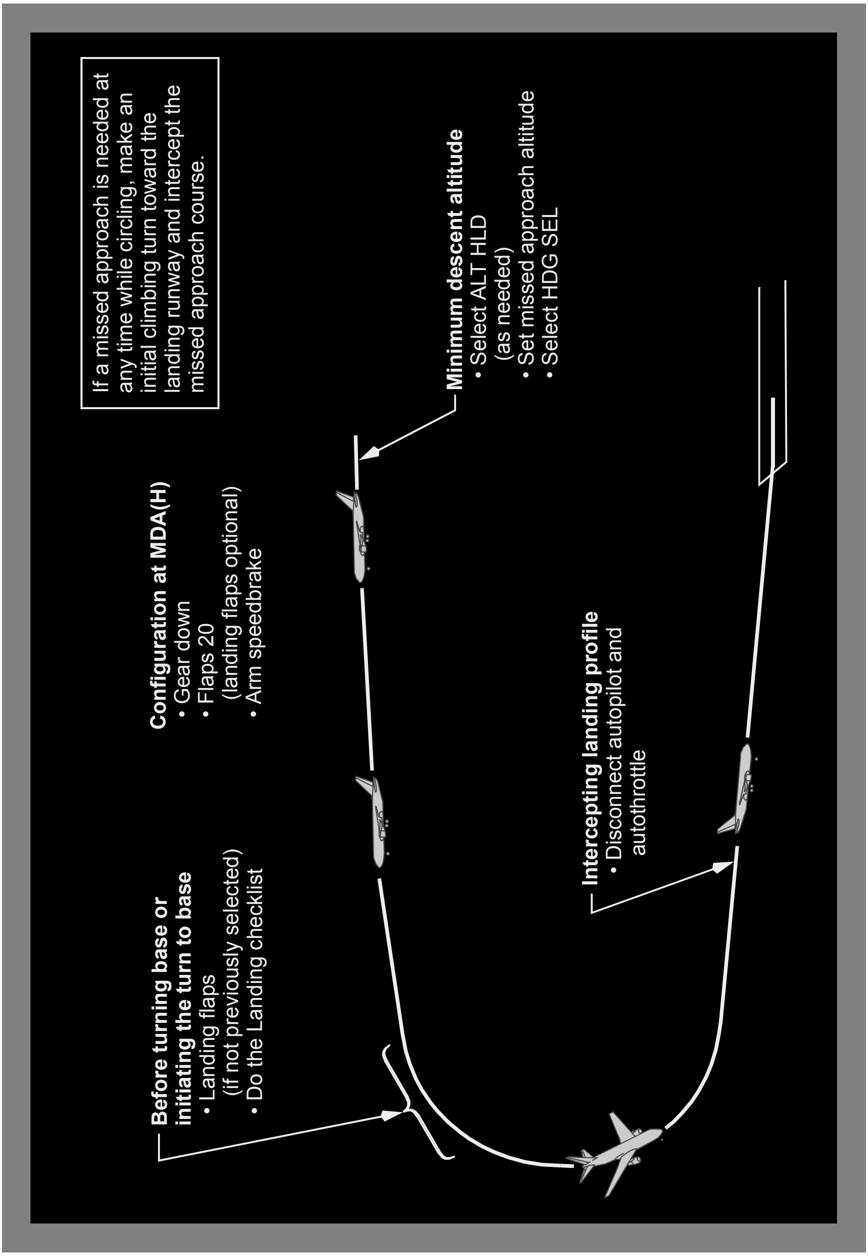
Instrument Approach Using VNAV



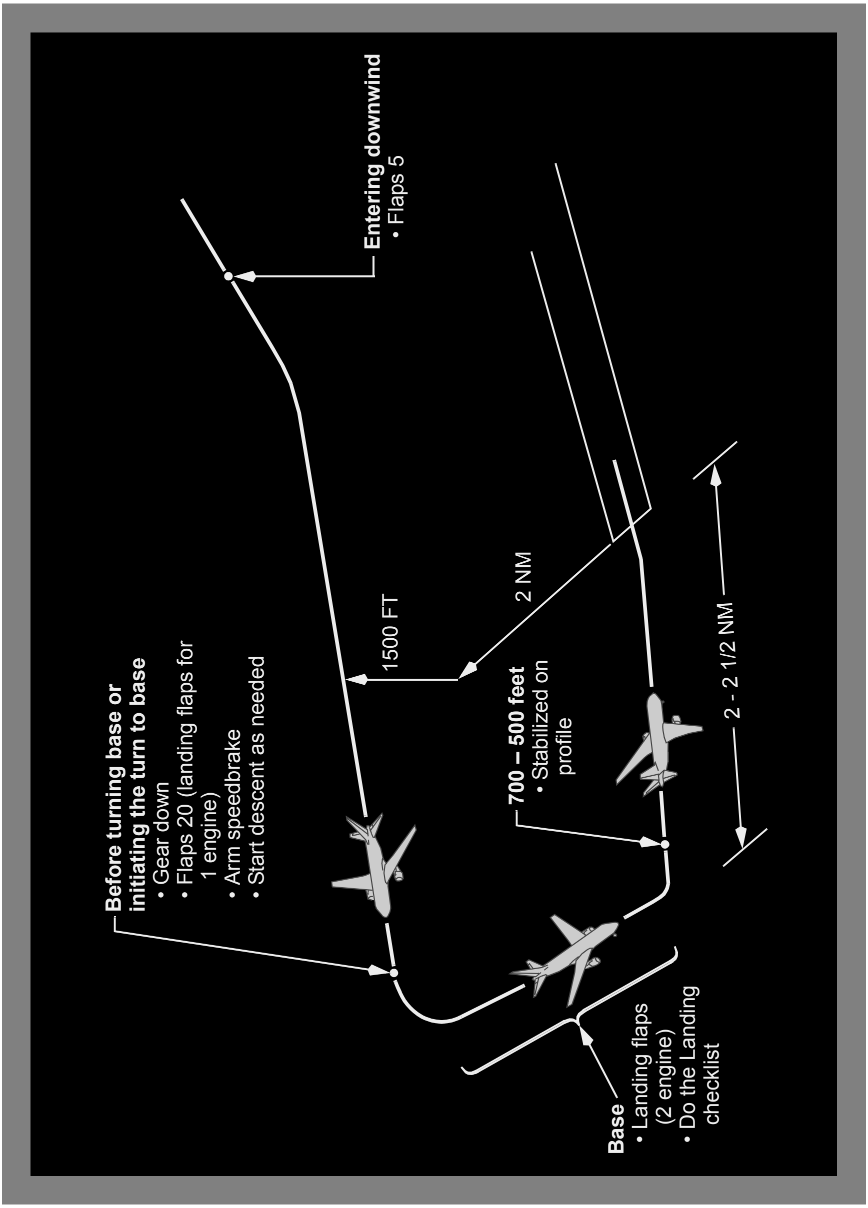
Instrument Approach Using V/S



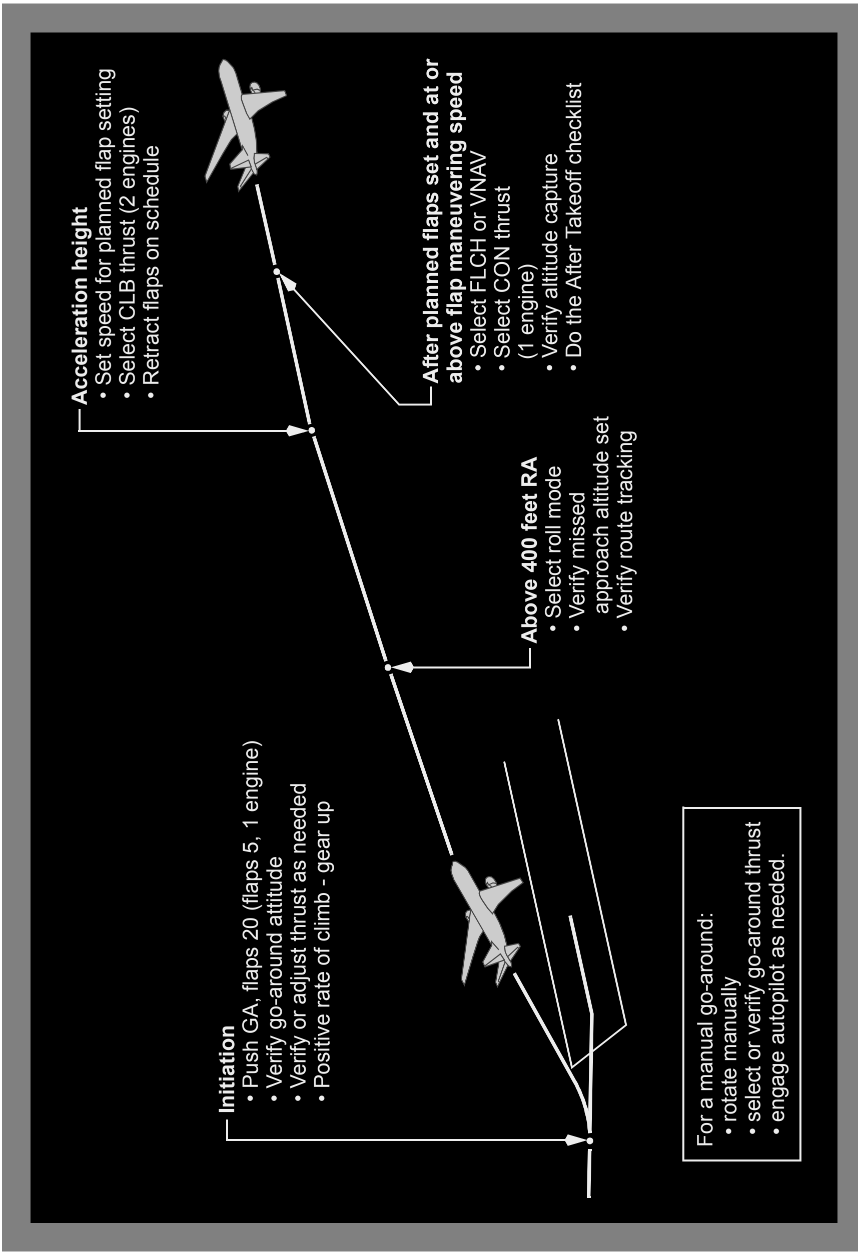
Circling Approach



Visual Traffic Pattern



Go–Around and Missed Approach



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Checklist Instructions — Chapter CI

Table of Contents — Section 0

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General

The airplanes listed in the table below are covered in the Quick Reference Handbook. The numbers are used to distinguish data peculiar to one or more, but not all of the airplanes. Where data applies to all airplanes listed, no reference is made to individual airplane numbers.

The table permits flight crew correlation of configuration differences by Registry Number in alpha/numeric order within an operator's fleet for airplanes covered in this manual. Configuration data reflects the airplane as delivered configuration and is updated for service bulletin incorporations in conformance with the policy stated in the introduction section of this chapter.

Registry number is supplied by the national regulatory agency. Serial and tabulation numbers are supplied by Boeing.

Registry Number	Serial Number	Tabulation Number
TBC-1	00000	BC001
TBC-2	00005	BC002

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Checklist Instructions — Chapter CI
Revision Record — Section RR

Revision Transmittal Letter

To: All holders of The Boeing Company 767 Flight Crew Operations Manual (FCOM), Boeing Document Number D632T001-300.

Subject: Flight Crew Operations Manual Revision.

CAUTION. Before inserting this FCOM revision check for the presence of the Evacuation Checklist. If the Evacuation Checklist is part of this QRH revision, this QRH has been completely reprinted for customer convenience due to the large number of changed pages.

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

Revision Record

No.	Revision Date	Date Filed
0	February 14, 2007	
2	February 18, 2008	
4	February 19, 2009	
6	February 15, 2010	

No.	Revision Date	Date Filed
1	August 17, 2007	
3	August 21, 2008	
5	August 19, 2009	

General

The Boeing Company issues flight crew operations manual revisions to provide new or revised procedures and information. Formal revisions also incorporate appropriate information from previously issued flight crew operations manual bulletins.

The revision date is the approximate date the manual is mailed to the customer and is effective upon receipt.

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 material have revision bars and highlights associated with the changed text or illustration. Revision bars associated with revised effectivity due to additions, deletions of airplanes or changes to previous registration numbers will not have highlights. Changes associated with redirect instructions will also have revision bars without highlights.

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 0 - Miscellaneous

Tail Strike

0.3 - Deleted "on takeoff" from the condition statement to cover the small chance of getting a tail strike on go-around.

Section 7 - Engines, APU

Engine In–flight Start

7.20 - Added step to turn the PACK off to ensure adequate bleed air supply to the wing anti-ice system.

OIL FILTER

7.27 - Added "affected side" and "Confirm" for cross-model standardization.

REVERSER UNLOCKED

7.29 - Added "affected side" for cross-model standardization.

Section 8 - Fire Protection

CARGO FIRE

8.14 - Removed Task Divider Symbol for cross-model standardization.

Section 9 - Flight Controls

LEADING EDGE SLAT ASYMMETRY

9.9 - Removed invalid reference to Autothrottle disconnecting.

9.9 - Changed for commonality between checklists.

RUDDER RATIO

9.15 - Removed the word "attempt" to standardize wording with other procedures that restrict the use of Autoland.

Section 10 - Flight Instruments, Displays

ALTITUDE DISAGREE

10.6 - Revised RVSM guidance in the ALTITUDE DISAGREE procedure.

Section 12 - Fuel

Engine Fuel Leak

12.2,5 - Format change, no change to technical content.

FUEL CONFIGURATION

12.9 - Format change, no change to technical content.

FUEL PUMP

12.14 - Format change, no change to technical content.

Section 13 - Hydraulics

HYDRAULIC SYSTEM PRESSURE (C only)

13.7 - Changed for commonality between checklists.

HYDRAULIC SYSTEM PRESSURE (L and C)

13.17 - Changed for commonality between checklists.

HYDRAULIC SYSTEM PRESSURE (R and C)

13.27 - Changed for commonality between checklists.

Section 14 - Landing Gear

DRAG BRACE

14.8 - The words EXTEND OR EXTENDED were capitalized and airspeed was changed to read 270K/.82M".

14.8 - Decision choice changed to gear light.

14.8 - Decision choices changed to gear light. is extinguished.

14.8 - Decision choices changed to gear light stays illuminated.

14.9 - Reinserted missing Speedbrake Step to landing checklist.

GEAR DISAGREE

14.10 - Changed to read 270K/.82M".

14.11 - Changed precaution to read "Observe the gear EXTEND OR EXTENDED speed of 250K/.75M".

GEAR DOORS

14.13 - The words EXTEND OR EXTENDED were capitalized and airspeed was changed to read 270K/.82M".

SIDE BRACE

14.16 - The words EXTEND and EXTENDED were capitalized.

14.16 - Step changed from precaution to instruction.

14.16 - Decision choice changed to gear light is extinguished.

14.16 - Decision choice changed to gear light is illuminated.

Chapter PI-QRH - Performance Inflight - QRH

Section 11 - Advisory Information

Normal Configuration Landing Distance

PI-QRH.11.1-2 - Changed header to say APP SPD ADJ instead of VREF ADJ for clarification.

Section 21 - Advisory Information

Normal Configuration Landing Distance

PI-QRH.21.1-2 - Changed header to say APP SPD ADJ instead of VREF ADJ for clarification.

Chapter Man - Maneuvers

Section 1 - Introduction

Ground Proximity Warning

Man.1.5 - Changed procedure from "Disengage autopilot" to "Disconnect autopilot" for Boeing standardization.

Chapter CI - Checklist Instructions

Section 2 - Non-Normal Checklists

Non–Normal Checklist Operation

CI.2.2 - Added information on flight crew troubleshooting for cross model standardization.

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Checklist Instructions — Chapter CI
QRH List of Effective Pages — Section LEP

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Man.1.6-14	August 19, 2009
Man.2.1-8	February 18, 2008
Checklist Instructions (tab)	
* CI.TOC.0.1-2	February 15, 2010
* CI.ModID.1-2	February 15, 2010
* CI.RR.1-6	February 15, 2010
* CI.LEP.1-4	February 15, 2010
CI.1.1	February 18, 2008
CI.1.2	August 21, 2008
CI.2.1	February 19, 2009
* CI.2.2-6	February 15, 2010
CI.2.7-8	August 21, 2008
Evacuation	
Back Cover.1-2	February 18, 2008

* = Revised, Added, or Deleted

Introduction

This introduction gives guidelines for use of the Normal Checklist (NC).

The NC is organized by phase of flight.

The NC is used to verify that critical items have been done.

Normal Checklist Operation

Normal checklists are used after doing all respective procedural items.

The following table shows which pilot calls for the checklist and which pilot reads the checklist. Both pilots visually verify that each item is in the needed configuration or that the step is done. The far right column shows which pilot gives the response. This is different than the normal procedures where the far right column can show which pilot does the step.

Checklist	Call	Read	Verify	Respond
PREFLIGHT	Captain	First officer	Both	Area of responsibility
BEFORE START	Captain	First officer	Both	Area of responsibility
BEFORE TAXI	Captain	First officer	Both	Area of responsibility
BEFORE TAKEOFF	Pilot flying	Pilot monitoring	Both	Pilot flying
AFTER TAKEOFF	Pilot flying	Pilot monitoring	Both	Pilot monitoring
DESCENT	Pilot flying	Pilot monitoring	Both	Area of responsibility
APPROACH	Pilot flying	Pilot monitoring	Both	Area of responsibility
LANDING	Pilot flying	Pilot monitoring	Both	Pilot flying
SHUTDOWN	Captain	First officer	Both	Area of responsibility
SECURE	Captain	First officer	Both	Area of responsibility

If the airplane configuration does not agree with the needed configuration:

- stop the checklist
- complete the respective procedure steps
- continue the checklist

If it becomes apparent that an entire procedure was not done:

- stop the checklist
- complete the entire procedure
- do the checklist from the start

Try to do checklists before or after high work load times. The crew may need to stop a checklist for a short time to do other tasks. If the interruption is short, continue the checklist with the next step. If a pilot is not sure where the checklist was stopped, do the checklist from the start. If the checklist is stopped for a long time, also do the checklist from the start.

After completion of each checklist, the pilot reading the checklist calls, "________ CHECKLIST COMPLETE."

Checklist Content

The checklist has the minimum items needed to operate the airplane safely.

Normal checklists have items that meet any of the following criteria:

- items essential to safety of flight that are not monitored by an alerting system, or
- items essential to safety of flight that are monitored by an alerting system but if not done, would likely result in a catastrophic event if the alerting system fails, or
- items needed to meet regulatory requirements, or
- items needed to maintain fleet commonality between the 737, 747-400, 757, 767, and 777, or
- items that enhance safety of flight and are not monitored by an alerting system (for example autobrakes), 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, "FUEL CONTROL switches...CUTOFF" refers to the position of the switches.

Introduction

The non-normal checklists chapter contains checklists used by the flight crew to cope with non–normal situations. The checklists are grouped in sections which match the system description chapters in Volume 2.

Most checklists correspond to an EICAS alert message. The EICAS alert message indicates a non-normal condition and is the cue to select and do the associated checklist.

Checklists without an EICAS alert message (such as Ditching Preparation) 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 EICAS alert message. 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 AUTOBRAKES) are annunciated by an EICAS alert message 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)
- 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 an EICAS alert message shows or a limit is exceeded.

Non–normal checklists also assume:

- During engine start and before takeoff, the associated non–normal checklist is done if an EICAS alert message is shown or 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.
- Aural alerts are silenced and the system is reset by the flight crew as soon as the cause of the alert is recognized.
- The EICAS message list is cancelled after all checklists are complete or on hold so that future messages are more noticeable.
- The EMERGENCY position of the oxygen regulator is used when needed to supply positive pressure in the masks and goggles to remove contaminants. The 100% position of the oxygen regulator is used when positive pressure is not needed but contamination of the flight deck air exists. The Normal position of the oxygen regulator is used if prolonged use is needed and the situation allows. Normal boom microphone operation is restored when oxygen is no longer in use.
- Indicator lights are tested to verify suspected faults.
- Flight crew reset of a tripped fuel pump or fuel pump control circuit breaker is prohibited. In flight, flight crew reset of any other tripped circuit breaker is not recommended. However, these other tripped circuit breakers 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 any other 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 circuit breakers to clear a non-normal situation is not recommended, unless directed by a non-normal checklist.

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 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
- messages (if applicable)
- 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
- a fuel control switch
- an engine or APU fire switch, or a cargo fire arm switch
- a generator drive disconnect switch.

This does not apply to the Dual Engine Failure checklist.

With the airplane stationary on the ground:

- the captain and the first officer take action based on preflight and postflight areas of responsibility.

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 procedures 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 and the condition is not shown on EICAS. 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.

Consequential EICAS alert messages can show as a result of a primary failure condition (such as RUDDER RATIO as a result of HYDRAULIC SYSTEM PRESSURE (L Only)) or as a result of doing a non–normal checklist (such as L PACK OFF or R PACK OFF as a result of doing the Smoke, Fire or Fumes checklist). The flight crew should do the checklists for consequential EICAS alert messages, unless the statement "Do not accomplish the following checklists:" is included. All consequential EICAS alert messages may not show while doing the primary checklist, depending on operational circumstances.

After completion of the non–normal checklist, normal procedures are used to configure the airplane for each phase of flight.

When there are no deferred items, the DESCENT, APPROACH and LANDING normal checklists are used to verify that the configuration is correct for each phase of flight.

When there are deferred items, the non-normal checklist will include the item "**Checklist Complete Except Deferred Items.**" The pilot flying is to be made aware when there are deferred items. These items are included in the Deferred Items section of the checklist and may be delayed until the usual point during descent, approach or landing.

The deferred items are read aloud by the pilot monitoring. The pilot flying or the pilot monitoring takes action based on each crewmember's area of responsibility. After moving the control, the crewmember taking the action also states the response.

When there are deferred items, the Deferred Items section of the non-normal checklist will include the Descent, Approach and Landing normal checklists. These checklists should be used instead of the usual DESCENT, APPROACH and LANDING normal checklists. If a normal checklist item is changed as a result of the non-normal situation, the changed response is printed in **bold** type. The pilot flying or the pilot monitoring responds to the deferred normal checklist items based on each crewmember's area of responsibility. However, during the deferred Landing normal checklist, the pilot flying responds to all deferred normal checklist items.

Each checklist has a checklist complete symbol at the end. The following symbol indicates that the checklist is complete:

■ ■ ■ ■

The checklist complete symbol can also be in the body of the checklist. This only occurs when a checklist divides into two or more paths. Each path can have a checklist complete symbol at the end. The flight crew does not need to continue reading the checklist after the checklist complete symbol.

After completion of each non–normal checklist, the pilot monitoring states "___ CHECKLIST COMPLETE."

Additional information at the end of the checklist is not required to be read.

The flight crew must be aware that checklists cannot be created for all conceivable situations and are not intended to replace good judgment. In some situations, at the captain's discretion, deviation from a checklist may be needed.

Non–Normal Checklist Legend

Redirection Symbol

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The redirection symbol is used in two ways:

- In the Table of Contents of a system section, to direct the flight crew to a different system section.
- In a non-normal checklist, with the word "Go to", to direct the flight crew to a different checklist or to a different step in the current checklist.

Separator Symbol

The separator symbol is used in two ways:

- In the Table of Contents of a system section, to separate the Quick Action Index checklists from the checklists that are not in the Quick Action Index.
- In a non-normal checklist, to separate the memory items from the reference items.

Task Divider Symbol

The task divider symbol is used to indicate the end of one task and the beginning of another task.

Decision Symbol

Choose one:

The decision symbol is used to identify possible choices.

Precaution Symbol

The precaution symbol is used to identify information the flight crew must consider before taking the action.

Intentionally
Blank

Evacuation Checklist is on the reverse side of this page.

Evacuation

Condition: Evacuation is needed.

1 Parking brake . . . . Set

2 Cabin altitude MODE SELECT . . . . MAN

3 CABIN ALTITUDE
MANUAL control . . . . Hold in CLIMB until the outflow valve is fully open

4 FUEL CONTROL switches (both) . . . . CUT OFF

5 Advise the cabin to evacuate.

6 Advise the tower.

7 Engine and APU
fire switches (all) . . . . Override and pull

8 **If** an engine or APU fire warning occurs:

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

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