



767

Quick Reference Handbook

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Y

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Normal Checklists

Chapter NC

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

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



767 Flight Crew Operations Manual

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

Miscellaneous

Section 0

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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

VP-BOQ through VP-BRL, VQ-BRA
 GND PROX/CONFIG GEAR OVRD switch OVRD

VP-BDI, VP-BMC, VP-BWW through VQ-BPT
 GND PROX GEAR OVRD switch OVRD

▼ Continued on next page ▼



▼ Ditching Preparation continued ▼

VP-BDI, VP-BMC, VP-BWW through VQ-BPT
GND PROX TERR OVRD switch OVRD

⋮ **VP-BOQ**
⋮ Ground proximity TERR system
⋮ override switch OVRD

PACK control selectors (both) OFF

Cabin altitude MODE SELECT MAN

CABIN ALTITUDE
MANUAL control Hold in DESCEND until
the outflow valve indication
shows 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**

▼ Continued on next page ▼



▼ Ditching Preparation continued ▼

Flaps. 30



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Non-Normal Checklists

Chapter NNC

Airplane Gen., Emer. Equip., Doors, Windows

Section 1

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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.
Continue normal operation.


◆ 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.

►► **Go to step 5**

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

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

►► **Go to step 5**

5 **Checklist Complete Except Deferred Items**

▼ **Continued on next page** ▼

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▼ ACCESS DOOR(S) continued ▼

Deferred Items

Descent Checklist

- Pressurization **LDG ALT 9,500 feet**
- Recall Checked
- Autobrake ____
- Landing data VREF____, Minimums____
- Approach briefing Completed

Approach Checklist

- Altimeters ____

Landing Checklist

- Speedbrake ARMED
- Landing gear Down
- Flaps ____



**AUTO
UNLK**

AUTOMATIC UNLOCK

**VP-BMC, VP-BOQ, VP-BOZ through VQ-BMQ, VQ-BOG,
VQ-BPT
(SB Adds VP-BDI, VP-BOY, VQ-BRA when security door
installed.)**

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



Automatic Unlock

VQ-BMU

**AUTO
UNLK**


Condition: The correct emergency access code is entered.

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

- 1 DOOR LOCK CONTROLLER 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**

2 Choose one:

- ◆ Pressurization is **normal**:
The door is in a safe configuration.
Continue normal operation.
■ ■ ■ ■
- ◆ Pressurization is **not** normal:
▶▶ **Go to step 3**

3 PASS SIGNS selectors ON

4 LDG ALT selector Set 9,500 feet

▼ Continued on next page ▼

▼ CARGO DOOR(S) continued ▼**5 Choose one:****◆ Occurrence is on **takeoff or initial climb**:**

Do not exceed 10,000 feet.

▶▶ Go to step 6

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

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

▶▶ Go to step 6

6 Checklist Complete Except Deferred Items**▼ Continued on next page ▼**



▼CARGO DOOR(S) continued ▼

Deferred Items

Descent Checklist

- Pressurization LDG ALT 9,500 feet
- Recall Checked
- Autobrake ____
- Landing data VREF____, Minimums____
- Approach briefing Completed

Approach Checklist

- Altimeters ____

Landing Checklist

- Speedbrake ARMED
- Landing gear Down
- Flaps ____



ON

ELT ON

VP-BDI, VP-BOQ, VP-BOY

Message: ELT ON

Condition: The emergency locator transmitter is on.



**EMER
DOORS**

EMERGENCY DOOR(S)

VP-BMC, VP-BOY through VP-BRL, VQ-BOG

Messages: EMER DOORS

L EMER DOOR

R EMER DOOR

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 door is in a safe configuration.
Continue normal operation.

▶▶ **Go to step 2**

◆ Pressurization is **not** normal:

▶▶ **Go to step 3**

2 Choose one:

◆ WING SLIDE deployment is **suspected**:

▶▶ **Go to the WING SLIDE checklist on
page 1.21**



◆ WING SLIDE deployment is **not** suspected:



3 PASS SIGNS selectors. ON

▼ Continued on next page ▼



▼ **EMERGENCY DOOR(S) continued** ▼

4 LDG ALT selector Set 9,500 feet

5 Choose one:

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

Do not exceed 10,000 feet.

▶▶ **Go to step 6**

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

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

▶▶ **Go to step 6**

6 Choose one:

◆ WING SLIDE deployment is **suspected**:

▶▶ **Go to the WING SLIDE checklist on page 1.21**



◆ WING SLIDE deployment is **not** suspected:

▶▶ **Go to step 7**

7 Checklist Complete Except Deferred Items

Deferred Items

Descent Checklist

Pressurization **LDG ALT 9,500 feet**

Recall Checked

Autobrake ____

▼ **Continued on next page** ▼

▼ EMERGENCY DOOR(S) continued ▼

Landing data VREF____, Minimums____

Approach briefing Completed

Approach Checklist

Altimeters ____

Landing Checklist

Speedbrake ARMED

Landing gear Down

Flaps ____





EMER
DOORS

EMERGENCY DOOR(S)

VP-BDI, VP-BOQ, VP-BWW through VQ-BMU, VQ-BPT,
VQ-BRA

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 door is in a safe configuration.
Continue normal operation.

■ ■ ■ ■

◆ 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 ▼

▼ EMERGENCY DOOR(S) continued ▼

4 Choose one:

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

Do not exceed 10,000 feet.

▶▶ **Go to step 5**

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

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

▶▶ **Go to step 5**

5 Checklist Complete Except Deferred Items

▼ Continued on next page ▼

▼ EMERGENCY DOOR(S) continued ▼

Deferred Items

Descent Checklist

Pressurization **LDG ALT 9,500 feet**

Recall Checked

Autobrake

Landing data VREF , Minimums

Approach briefing Completed

Approach Checklist

Altimeters

Landing Checklist

Speedbrake ARMED

Landing gear Down

Flaps



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 ENT DOOR R AFT ENT DOOR
 L CTR ENT DOOR R CTR ENT DOOR
 L FWD ENT DOOR R FWD ENT DOOR

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

1 Choose one:

◆ Pressurization is **normal**:

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



◆ Pressurization is **not** normal:

►► **Go to step 2**

2 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.

▶▶ **Go to step 5**

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

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

▶▶ **Go to step 5**

5 Checklist Complete Except Deferred Items

Deferred Items

Descent Checklist

- Pressurization **LDG ALT 9,500 feet**
- Recall Checked
- Autobrake ____
- Landing data VREF____, Minimums____
- Approach briefing Completed

Approach Checklist

- Altimeters ____

Landing Checklist

- Speedbrake ARMED

▼ Continued on next page ▼

▼ ENTRY DOOR(S) continued ▼

Landing gear Down

Flaps ____


**LOCK
FAIL**
LOCK FAIL

**VP-BMC, VP-BOQ, VP-BOZ through VQ-BMQ, VQ-BOG,
VQ-BPT**

**(SB Adds VP-BDI, VP-BOY, VQ-BRA when security door
installed.)**

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.



LOW CREW OXYGEN

VP-BWW through VQ-BMQ, VQ-BPT

Messages: LOW CREW OXYGEN

Condition: Crew oxygen pressure is low.

**ON****PASSENGER OXYGEN ON**

Messages: PASS OXYGEN ON

Condition: The passenger oxygen system is on.





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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**

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.

▼ Window Damage continued ▼

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.



**EMER
DOORS**
WING SLIDE
VP-BMC, VP-BOY through VP-BRL, VQ-BOG

Messages: EMER DOORS

L WING SLIDE

R WING SLIDE

Condition: One or both wing slide doors are not closed and secure.

1 Choose one:

◆ Visual or aural observation does **not confirm** that the overwing ramp slide is deployed and is still attached to the airplane:



◆ Visual or aural observation **confirms** that the overwing ramp slide is deployed and is still attached to the airplane:

►► Go to step 2

2 Minor damage to the trailing edge flap, aft fuselage, and empennage may occur.

3 **If** needed to minimize slide oscillations and subsequent airplane damage:

Operate at a reduced airspeed.

4 If performance allows, use Flaps 20 and VREF 20 for landing.

▼ Continued on next page ▼



▼WING SLIDE continued ▼

5 Choose one:

◆ Flaps 20 and VREF 20 **can** be used for landing:
GND PROX FLAP OVRD switch OVRD

▶▶ **Go to step 6**

◆ Flaps 20 and VREF 20 **cannot** be used for landing:
Use normal flaps and speeds for landing.
■ ■ ■ ■

6 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 ▼



▼WING SLIDE continued▼

Landing gear Down

Flaps. **20**



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BLEED DUCT LEAK 2.3

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EQUIPMENT SMOKE ►► 8.26

**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

▼ Continued on next page ▼

▼ CABIN ALTITUDE or Rapid Depressurization continued ▼**VP-BOQ**

Caution! Speedbrakes will autostow to the 50 % flight detent if airspeed exceeds 320 knots. Do not override autostow function unless airspeed is less than 315 knots.

**V
A
L
V
E****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 PACK control selector (affected side) Off
- 3 ISLN switch (affected side) Off

VP-BDI through VP-BRL, VQ-BMU, VQ-BOG, VQ-BRA

- 4 WING ANTI-ICE switch Off

This prevents possible asymmetrical ice buildup on the wings.

VP-BWW through VQ-BMQ, VQ-BPT

- 5 WING ANTI ICE selector OFF

This prevents possible asymmetrical ice buildup on the wings.

- 6 Avoid icing conditions.

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

- 7 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.





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TK

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

Inoperative Items

Aft cargo heat

Bulk cargo heat

Air-driven demand pump

Additional time will be required for landing gear retraction and flap extension or retraction.

- 3 Choose one:

◆ DUCT LEAK light **extinguishes**:

▶▶ **Go to step 4**

◆ DUCT LEAK light **stays illuminated**:

▶▶ **Go to step 5**

- 4 Choose one:

◆ L and R DUCT PRESS are **at or above** 10 PSI:



◆ L or R DUCT PRESS is **below** 10 PSI:

▶▶ **Go to step 5**

▼ Continued on next page ▼

▼ **BODY DUCT LEAK continued** ▼

- 5 ENG bleed air switch (L or R) Off

This step decreases the amount of bleed air entering the body duct.

- 6 PACK control selector (same side) Off

VP-BDI through VP-BRL, VQ-BMU, VQ-BOG, VQ-BRA

- 7 WING ANTI-ICE switch Off

This step prevents possible asymmetrical ice buildup on the wings.

VP-BWW through VQ-BMQ, VQ-BPT

- 8 WING ANTI-ICE selector OFF

This step prevents possible asymmetrical ice buildup on the wings.

- 9 Avoid icing conditions.

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

- 10 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 Move to CLIMB or DESCEND
as needed to control
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 the
outflow valve indication
shows fully open to
depressurize the airplane

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

■ ■ ■ ■

INOP
CARGO AIR CONDITIONING
VQ-BMU

Messages: FWD CARGO A/C

Condition: Cargo air conditioning is inoperative.

- 1 **If** the forward cargo compartment temperature becomes unacceptable:

FWD CARGO A/C switch Off


INOP
CARGO AIR CONDITIONING
VP-BWW through VQ-BMQ, VQ-BPT

Messages: FWD CARGO A/C

Condition: Cargo air conditioning is inoperative.

- 1 **If** the forward cargo compartment temperature becomes unacceptable:

FWD CARGO A/C switch Off





INOP

CARGO AIR CONDITIONING
CONTROL

VQ-BMU

Messages: CARGO A/C CONT

Condition: Cargo air conditioning temperature control is inoperative.

- 1 FWD CARGO A/C switch Off
- ■ ■ ■

INOP

CARGO AIR CONDITIONING
CONTROL

VP-BWW through VQ-BMQ, VQ-BPT

Messages: CARGO A/C CONT

Condition: Cargo air conditioning temperature control is inoperative.

- 1 FWD CARGO A/C switch Off
- ■ ■ ■

**F
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CARGO BACKUP
VP-BWW through VQ-BMU, VQ-BPT

Messages: FWD CGO BACKUP

Condition: Cargo air conditioning is in the backup mode.

- 1 FWD CARGO A/C temperature control Adjust as necessary to maintain appropriate forward cargo compartment temperature


OVHT
CARGO FLOOR OVERHEAT
VP-BWW through VQ-BMU, VQ-BPT

Messages: CGO FLOOR OVHT

Condition: A cargo compartment floor overheat occurs.

- 1 FWD CARGO HEAT switch Off



**F
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T**
CARGO GROUND EXHAUST VALVES
VP-BWW through VQ-BMU, VQ-BPT

Messages: CGO GND EX VALS

Condition: The ground exhaust valves are failed open.

1 Check the cabin altitude and rate.

2 Choose one:

 ◆ Pressurization is **normal**:

 ◆ Pressurization is **not normal**:

 ►► **Go to step 3**

3 PASS SIGNS selectors ON

4 Choose one:

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

 Do **not** exceed 12,000 feet.

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

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


OVHT
CARGO OVERHEAT

Messages: AFT CARGO OVHT BULK CARGO OVHT
 VP-BDI through
 VP-BRL, VQ-BOG,
 VQ-BRA
 FWD CARGO OVHT

Condition: A cargo compartment overheat occurs.

1 Choose one:

◆ Cargo heat is **needed**:

■ ■ ■ ■

◆ Cargo heat is **not needed**:

CARGO HEAT switch Off

■ ■ ■ ■

**O
F
F**

ENGINE BLEED OFF

Messages: L ENG BLEED OFF R ENG BLEED OFF

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

VP-BWW through VQ-BMQ, VQ-BPT

- 1 WING ANTI-ICE selector OFF

VP-BDI, VP-BOQ, VP-BRL through VQ-BRA

- 2 Thrust reverser on the affected side may be inoperative.
- 3 PACK control selector (affected side). OFF
- 4 **If** wing anti-ice is needed:

ISLN switch (affected side) On

VP-BWW through VQ-BMQ, VQ-BPT

WING ANTI-ICE selector AUTO

When wing anti-ice is no longer needed:

VP-BWW through VQ-BMQ, VQ-BPT

WING ANTI-ICE selector OFF

L and R ISLN switches Off

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

PACK OFF





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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

VP-BWW through VQ-BMQ, VQ-BPT

5 WING ANTI ICE selector OFF

6 PACK control selector (affected side). OFF

7 **If** wing anti-ice needed:

ISLN switch (affected side) On

VP-BWW through VQ-BMQ, VQ-BPT

WING ANTI-ICE selector AUTO

When wing anti-ice no longer needed:**VP-BWW through VQ-BMQ, VQ-BPT**

WING ANTI-ICE selector OFF

▼ **Continued on next page** ▼

▼ENGINE BLEED OVERHEAT continued ▼

L and R ISLN switches Off

VP-BDI, VP-BOQ, VP-BRL through VQ-BRA

- 8 Thrust reverser on the affected side is inoperative.
- 9 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 PACK control selector (affected side). OFF

VP-BWW through VQ-BMQ, VQ-BPT

3 WING ANTI-ICE selector OFF

4 Choose one:

◆ BLEED light **stays illuminated**:

Affected engine anti-ice is inoperative.

Avoid icing conditions.

▶▶ **Go to step 6**◆ BLEED light **extinguishes**:▶▶ **Go to step 5**5 **If** wing anti-ice needed:

ISLN switch (affected side) On

VP-BWW through VQ-BMQ, VQ-BPT

WING ANTI-ICE selector ON

When wing anti-ice no longer needed:**VP-BWW through VQ-BMQ, VQ-BPT**

WING ANTI-ICE selector OFF

L and R ISLN switches Off

▼ Continued on next page ▼

▼ ENGINE HPSOV continued ▼

6 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 PACK control selector (affected side) OFF

VP-BWW through VQ-BMQ, VQ-BPT

3 WING ANTI-ICE selector OFF

4 **If** wing anti-ice needed:

ISLN switch (affected side) On

VP-BWW through VQ-BMQ, VQ-BPT

WING ANTI-ICE selector AUTO

When wing anti-ice no longer needed:

VP-BWW through VQ-BMQ, VQ-BPT

WING ANTI-ICE selector OFF

L and R ISLN switches Off

5 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.





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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.

After STBY is selected, the OVHT light and FWD EQPT OVHT message are inhibited for 5 minutes.

3 Choose one:

◆ OVHT light **stays extinguished**:◆ OVHT light **illuminates again**:▶▶ **Go to step 4**

4 Choose one:

◆ On the **ground**:

Airflow is insufficient and may result in the loss of flight instruments.

◆ In **flight**:

EQUIP COOLING selector OVRD

▶▶ **Go to step 5**

▼ Continued on next page ▼

▼ **EQUIPMENT OVERHEAT** continued ▼

5 **Wait** 30 minutes.

6 EQUIP COOLING selector AUTO

7 Choose one:

◆ OVHT light is **extinguished**:



◆ OVHT light is **illuminated**:

EQUIP COOLING selector STBY

►► **Go to step 8**

8 **Wait** 5 minutes.

After STBY is selected, the OVHT light and FWD EQPT OVHT message are inhibited for 5 minutes.

9 Choose one:

◆ OVHT light **stays extinguished**:



◆ OVHT light is **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 shutdown occurs.

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.

Descend at VMO/MMO.

VP-BOQ

Caution! Speedbrakes will autostow to the 50 % flight detent if airspeed exceeds 320 knots. Do not override autostow function unless airspeed is less than 315 knots.

▼ Continued on next page ▼

▼ **PACK OFF continued** ▼

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 Choose one:

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



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

►► **Go to step 6**

6 **When** at level off, maintain airspeed at or less than 290 knots to ensure fresh air circulation

7 Choose one:

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

►► **Go to step 8**

◆ Airplane altitude is above 10,000 feet:

Don the oxygen masks.

Establish crew communications.

►► **Go to step 8**

8 CABIN ALTITUDE MODE SELECT MAN

9 CABIN ALTITUDE
MANUAL control Hold in CLIMB until the
outflow valve indication
shows fully open

▼ **Continued on next page** ▼

▼ **PACK OFF continued** ▼

10 SHOULDER HEATERS and
FOOT HEATERS switches (all) OFF

11 Minimize flight deck lighting intensity.

12 Open the flight deck door.

13 Install flight deck sunvisors during daylight
operations.

14 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.

15 Plan to land at nearest suitable airport.

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

CABIN AUTOMATIC INOPERATIVE





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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 PACK control selector (affected side). OFF
 - 3 **VP-BDI through VP-BRL, VQ-BMU, VQ-BOG, VQ-BRA**
WING ANTI-ICE switch Off
- This prevents possible asymmetrical ice buildup on the wings.

- VP-BWW through VQ-BMQ, VQ-BPT**
- 4 WING ANTI-ICE selector OFF
- This prevents possible asymmetrical ice buildup on the wings.

- 5 Avoid icing conditions.
- VP-BDI, VP-BOQ, VP-BRL through VQ-BRA**
- 6 Thrust reverser on the affected side is inoperative.
 - 7 Do **not** accomplish the following checklist:
- ENGINE BLEED OFF
- PACK 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 static probe heat is failed.

- 1 Avoid icing conditions. Flight in icing conditions may result in erroneous flight instrument indications.
- 2 **If** icing conditions exist, icing conditions are anticipated, or the captain's and first officer's airspeed or Mach indications disagree:

Autopilot disengage switch Push

Left AIR DATA source select switch ALTN

Airplane does not meet RVSM airspace entry requirements. Flight instrument indications based on air data use a single source.

R autopilot is available. L and C autopilots are unreliable.

**VP-BDI through VP-BOQ, VP-BRL, VQ-BOG,
VQ-BRA**

Select R transponder.

VP-BOY, VP-BOZ

Select transponder 2.





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VALVE**ENGINE ANTI-ICE****VP-BDI through VP-BRL, VQ-BMU, VQ-BOG, VQ-BRA**

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**:**VP-BMC through VP-BRL, VQ-BMU, VQ-BRA**▶▶ **Go to step 6****VP-BDI, VQ-BOG**▶▶ **Go to step 7**

2 ENG bleed air switch (affected side) Off

VP-BMC through VP-BRL, VQ-BMU, VQ-BRA

3 ENGINE ANTI-ICE switch

(affected side) Off, then ON

VP-BDI, VQ-BOG

4 ENG ANTI-ICE switch

(affected side) Off, then ON

▼ **Continued on next page** ▼

▼ENGINE ANTI-ICE continued ▼

5 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



VP-BMC through VP-BRL, VQ-BMU, VQ-BRA

6 ENGINE ANTI-ICE switch (affected engine) . . . ON

VP-BDI, VQ-BOG

7 ENG ANTI-ICE switch (affected engine) ON

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

Avoid high thrust settings.



VALVE**ENGINE ANTI-ICE****VP-BWW through VQ-BMQ, VQ-BPT**

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 selector is **ON**:▶▶ **Go to step 3**◆ Engine anti ice selector is **OFF**:

ENGINE ANTI ICE selector
(affected side) ON

▶▶ **Go to step 2**◆ Engine anti ice selector is **AUTO**:▶▶ **Go to step 6****2 Choose one:**◆ Total air temperature (TAT) is **at or below** 10°C:

■ ■ ■ ■

◆ Total air temperature (TAT) is **above** 10°C:

Avoid high thrust settings.

■ ■ ■ ■

3 ENG bleed air switch (affected side) Off**▼ Continued on next page ▼**

▼ENGINE ANTI-ICE continued ▼

4 ENGINE ANTI ICE selector
(affected side) OFF, then ON

5 Choose one:

◆ VALVE light **extinguishes:**

ENGINE bleed air switch (affected side) ON



◆ VALVE light **stays illuminated:**

Avoid icing conditions.

Leave the ENGINE ANTI ICE selector ON.

ENGINE bleed air switch (affected side) ON



6 ENGINE ANTI ICE selector (affected side) ON

7 Choose one:

◆ VALVE light **extinguishes:**

▶▶ **Go to step 8**

◆ VALVE light **stays illuminated:**

▶▶ **Go to step 9**

▼ Continued on next page ▼

▼ENGINE ANTI-ICE continued▼

8 Choose one:

◆Total air temperature (TAT) is **at or below** 10°C:



◆Total air temperature (TAT) is **above** 10°C:

Avoid high thrust settings.



9 ENG bleed air switch (affected side) Off

10 ENGINE ANTI ICE selector
(affected side) OFF, then ON

11 Choose one:

◆VALVE light **extinguishes**:

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



◆VALVE light **stays illuminated**:

Avoid icing conditions.

Leave the ENGINE ANTI ICE selector ON.

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



**F O
PITOT**
FIRST / OFFICER PITOT

Messages: F/O PITOT

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

- 1 Avoid icing conditions. Flight in icing conditions may result in erroneous flight instrument indications.
- 2 **If** icing conditions exist, icing conditions are anticipated, or the captain's and first officer's airspeed or Mach indications disagree:

Autopilot disengage switch Push

Right AIR DATA source select switch ALTN

Airplane does not meet RVSM airspace entry requirements. Flight instrument indications based on air data use a single source.

L and C autopilots are available. R autopilot is unreliable.

VP-BDI through VP-BOQ, VP-BRL, VQ-BOG, VQ-BRA

Select L transponder.

VP-BOY, VP-BOZ

Select transponder 1.



Ice Crystal Icing

VP-BDI, VP-BOQ, VP-BRL through VQ-BRA

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

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

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

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

Note: TAT probe icing can cause the N1 bugs to decrease while flying at a constant altitude and airspeed.

Caution! Do not use engine or wing anti-ice when TAT is above 10°C.

- I VP-BDI, VP-BOQ, VP-BRL, VQ-BMU, VQ-BOG, VQ-BRA**
- 1 ENGINE ANTI-ICE switches (both) ON
- VP-BWW through VQ-BMQ, VQ-BPT**
- 2 ENGINE ANTI-ICE selectors (both) ON

▼ Continued on next page ▼

▼ Ice Crystal Icing continued ▼

Note: At or below 22,000 feet, turn on wing anti-ice.

3 Minimize time above amber and red weather radar returns. If conditions allow, exit the ice crystal icing conditions.

4 Choose one:

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

►► **Go to step 7**

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

►► **Go to step 5**

5 A/T ARM switch OFF

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

7 When in ice crystal icing conditions, the following can be unreliable:

- N1 bug and reference N1 display
- TAS, TAT, SAT, ECON SPD, and LRC

8 **When** ice crystal icing conditions are no longer present:

Use engine and wing anti-ice normally.

The autothrottle can be re-engaged, if needed.



▼ Continued on next page ▼

▼ Ice Crystal Icing continued ▼**Additional Information**

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

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

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



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Ice Crystal Icing

VP-BMC, VP-BOY, VP-BOZ

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

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

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

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

Note: TAT probe icing can cause one or more of the following non-normal engine indications:

- Maximum EPR lines (amber) or EPR bugs decrease while flying at constant altitude and airspeed
- EPR indications are not aligned
- Unable to achieve maximum continuous thrust or maximum climb thrust

▼ Continued on next page ▼

▼ Ice Crystal Icing continued ▼

- 1 Minimize time above amber and red weather radar returns. If conditions allow, exit the ice crystal icing conditions.
- 2 Choose one:
 - ◆ TAT **or** engine indications are **normal**:
 - ▶▶ **Go to step 14**
 - ◆ TAT indication stays near 0°C **and** engine indications are **not** normal:
 - ▶▶ **Go to step 3**
- 3 A/T ARM switch OFF
- 4 Thrust levers (both) . . . Set to maintain airspeed and airplane flight path
- 5 Choose one:
 - ◆ Airspeed and airplane flight path **can** be maintained with manual thrust:
 - ▶▶ **Go to step 14**
 - ◆ Airspeed and airplane flight path **cannot** be maintained with manual thrust:
 - ▶▶ **Go to step 6**
- 6 Thrust levers (both) Retard to mid position
This prevents exceeding thrust limits.
- 7 L ELEC ENG CONT switch ALTN
- 8 R ELEC ENG CONT switch ALTN

▼ Continued on next page ▼

▼ Ice Crystal Icing continued ▼

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

ENGINE EEC MODE

10 Maximum thrust limiting is not available. N1 can be used to set thrust.

11 The autothrottle is not available.

12 The ENG LIM PROT message can show due to incorrect maximum EPR line. Set thrust to maintain the needed airspeed and airplane flight path. Maintain EGT below the amber band.

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

ENGINE LIMIT PROTECTION

14 When in ice crystal icing conditions, the following can be unreliable:

- EPR bug and reference EPR
- Maximum EPR line (amber)
- TAS, TAT, SAT, ECON SPD, and LRC

15 **When** ice crystal icing conditions are no longer present:

ELEC ENG CONT switches (both) NORM

Autothrottle is available and can be re-engaged, if needed.

**▼ Continued on next page ▼**

▼ Ice Crystal Icing continued ▼

Additional Information

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

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

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

ICE DET
ICE DETECTOR

VP-BWW through VQ-BMQ, VQ-BPT

Messages: ICE DET

Condition: The ice detector is failed.

- 1 Operate the engine and wing anti-ice systems manually.





ICE DETECTOR OFF

VP-BDI, VQ-BOG

Messages: ICE DET OFF

Condition: Ice is not detected.



ICING

ICE DETECTOR ON

VP-BDI, VQ-BOG

Messages: ICE DET ON

Condition: Ice is detected.



ICING

ICING ENGINE

VP-BWW through VQ-BMQ, VQ-BPT

Messages: ICING ENGINE

Condition: Ice is detected and an engine anti-ice valve is closed.

1 ENGINE ANTI ICE selector ON



ICING
ICING WING

VP-BWW through VQ-BMQ, VQ-BPT

Messages: ICING WING

Condition: Ice is detected and a wing anti-ice valve is closed.

- 1 WING ANTI ICE selector ON


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
 ■ ■ ■ ■



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VALVE**WING ANTI-ICE****VP-BDI through VP-BRL, VQ-BMU, VQ-BOG, VQ-BRA**

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
 overheating.



VALVE

WING ANTI-ICE

VP-BWW through VQ-BMQ, VQ-BPT

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

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

- 1 WING ANTI-ICE selector ON
- 2 Choose one:

◆ VALVE light **stays illuminated**:

WING ANTI ICE selector OFF

Avoid icing conditions.

■ ■ ■ ■

◆ VALVE light **extinguishes**:

▶▶ Go to step 3

3 Checklist Complete Except Deferred Items

Deferred Items

Descent Checklist

- Pressurization LDG ALT ____
- Recall Checked
- Autobrake ____
- Landing data VREF____, Minimums_____
- Approach briefing Completed

▼ Continued on next page ▼

▼ WING ANTI-ICE continued ▼

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.



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Non-Normal Checklists

Chapter NNC

Automatic Flight

Section 4

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**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.





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Non-Normal Checklists
Communications

Chapter NNC
Section 5

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DATALINK LOST

VP-BDI, VP-BMC, VP-BWW, VP-BWX, VQ-BOG, VQ-BPT |

Message: DATALINK LOST

Condition: The datalink is temporarily lost.



DATALINK SYSTEM

VP-BDI, VP-BMC, VP-BWW, VP-BWX, VQ-BOG, VQ-BPT |

Message: DATALINK SYS

Condition: The datalink system is failed.



RADIO TRANSMIT

(SB Adds VQ-BMU with updated EICAS software.)

Message: RADIO TRANSMIT

Condition: A VHF or HF radio transmits for 30 seconds or more.



Radio Transmit Continuous (Stuck Microphone Switch)

Condition: A radio transmits continuously without crew input.

Objective: To identify and isolate the stuck microphone.

VP-BDI, VP-BWW through VQ-BMQ, VQ-BPT

- 1 FLT microphone selector switches (all) On

This deselects radios and stops radio transmissions.

VP-BMC through VP-BRL, VQ-BMU, VQ-BOG, VQ-BRA

- 2 INT microphone selector switches (all) On

This deselects radios and stops radio transmissions.

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

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





Non-Normal Checklists
Electrical

Chapter NNC
Section 6

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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 per flight



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 per flight


- L BUS TIE switch OFF, then AUTO
- Attempt only one reset per flight


- 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

VP-BDI, VP-BOY through VP-BRL, VQ-BRA

All autopilots inop

VP-BMC, VP-BOQ, VP-BWW through VQ-BPT

Left and Center autopilot 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 ▼

VP-BDI, VP-BOQ, VP-BRL through VQ-BRA

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

VP-BWW through VQ-BMQ, VQ-BPT

Auto wing anti-ice inop

Auto engine anti-ice 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 ____



APU BAT DISCH APU BATTERY DISCHARGE

VP-BDI, VP-BWW through VQ-BMQ, VQ-BPT, VQ-BRA

Messages: APU BAT DISCH

Condition: An APU battery discharge occurs.

- 1 The APU battery can provide power to the standby bus for a minimum of 90 minutes.



OFF

APU GENERATOR OFF

Messages: APU GEN OFF

Condition: The generator control breaker is open.

- 1  **Attempt only one reset per flight**
 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



**O
F
F**

GENERATOR OFF

Messages: L GEN OFF

R GEN OFF

Condition: The generator control breaker is open.

Attempt only one reset per flight

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.



**D
I
S
C
H****MAIN BATTERY DISCHARGE****VP-BMC through VP-BRL, VQ-BMU, VQ-BOG**

Messages: MAIN BAT DISCH

Condition: A main battery discharge occurs.

- 1 The main battery can provide power to the standby bus for a minimum of 30 minutes.

**MAIN BAT
DISCH****MAIN BATTERY DISCHARGE****VP-BDI, VP-BWW through VQ-BMQ, VQ-BPT, VQ-BRA**

Messages: MAIN BAT DISCH

Condition: A main battery discharge occurs.

- 1 The main battery can provide power to the standby bus for a minimum of 90 minutes.



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STANDBY BUS OFF

VP-BDI through VQ-BPT (SB Deletes VQ-BRA)

Message: STANDBY BUS OFF

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

- AC standby bus
- DC standby bus
- Battery bus

1 STBY POWER selector BAT

2 Choose one:

◆ Standby power bus OFF light is **illuminated**:

STBY POWER selector AUTO

▶▶ **Go to step 3**

◆ Standby power bus OFF light is **not illuminated**:

STBY POWER selector AUTO

▶▶ **Go to step 11**

3 Alternate stabilizer trim may be inoperative.

4 Wing and engine anti-ice may be inoperative.

5 Passenger address, flight, and cabin interphone systems may be inoperative.

▼ Continued on next page ▼

▼ STANDBY BUS OFF continued ▼

- 6 Forward and aft fuel crossfeed valves may be inoperative.

Engine thrust may need to be varied to maintain fuel balance.

- 7 Cabin altitude and differential pressure indicators may be inoperative.

Cabin altitude control AUTO 1 or AUTO 2 mode operates normally.

- 8 Left thrust reverser may be inoperative.

- 9 Left VHF communication system may be inoperative.

- 10 Do the checklist for each consequential EICAS alert message as soon as practical.



- 11 Plan to land with the standby buses powered normally.

- 12 Alternate stabilizer trim may be inoperative.

- 13 Passenger address, flight, and cabin interphone systems may be inoperative.

- 14 Wing and engine anti-ice may be inoperative.

- 15 Forward and aft fuel crossfeed valves may be inoperative.

Engine thrust may need to be varied to maintain fuel balance.

▼ Continued on next page ▼

▼ **STANDBY BUS OFF** continued ▼

16 Cabin altitude and differential pressure indicators may be inoperative.

Cabin altitude control AUTO 1 or AUTO 2 mode operates normally.

17 Left VHF communication system may be inoperative.

VP-BMC through VQ-BPT

18 **When** within approximately 30 minutes of landing:

STBY POWER selector BAT

▶▶ **Go to step 20**

VP-BDI, VQ-BRA

19 **When** within approximately 90 minutes of landing:

STBY POWER selector BAT

▶▶ **Go to step 20**

▼ **Continued on next page** ▼

▼STANDBY BUS OFF continued▼

20 Choose one:

◆ Standby power bus OFF light is **illuminated**:

Left thrust reverser may be inoperative.

Do the checklist for each consequential
EICAS alert message prior to landing.



◆ Standby power bus OFF light is **not illuminated**:

Power to all equipment on the standby
buses is available.

Continue normal operation.

**I**

STANDBY BUS OFF

(SB Adds VQ-BRA when battery charger wiring modification is complete.)

Message: STANDBY BUS OFF

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

- AC standby bus
- DC standby bus
- Battery bus

Objective: To identify the inoperative bus(es) and the associated inoperative items.

1 STBY POWER selector BAT

2 Choose one:

◆ Standby power bus OFF light **extinguishes:**

Continue normal operation.



◆ Standby power bus OFF light **stays illuminated:**

At least one bus is unpowered.

▶▶ **Go to step 3**

▼ Continued on next page ▼

▼ **STANDBY BUS OFF** continued ▼

3 Choose one:

◆ **AFT FUEL X-FEED and FWD FUEL X-FEED** messages are **shown**:

The battery bus is unpowered. The standby DC bus and the standby AC bus are also unpowered.

▶▶ **Go to step 4**

◆ **AFT FUEL X-FEED and FWD FUEL X-FEED** messages are **not shown**:

The battery bus is powered.

▶▶ **Go to step 12**

4 Avoid icing conditions.

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

6 Do **not** use autobrakes.

7 Do **not** arm speedbrake lever.

8 Use flaps 20 and VREF 20 for landing.

The battery bus is unpowered. The standby DC bus and the standby AC bus are also unpowered.
Inoperative Items

Wing anti-ice inop

Avoid icing conditions.

Left engine anti-ice inop

Avoid icing conditions.

▼ **Continued on next page** ▼

▼ **STANDBY BUS OFF continued** ▼**Electronic engine control normal mode inop**

Engines operate in alternate control mode.

Aileron lockout inop**Rudder trim inop****Alternate stabilizer trim inop****Center fuel pumps inop**

Center tank fuel is unavailable.

Fuel crossfeed valves inop

Vary engine thrust as needed to maintain fuel balance as conditions allow.

Left VHF communication system inop**Left VOR inop****Right ADF inop****Left RDMI inop****Passenger address, flight and cabin interphone systems inop****Cabin altitude and differential pressure indicators inop**

Cabin altitude control AUTO1 or AUTO2 mode operates normally.

▼ **Continued on next page** ▼

▼ **STANDBY BUS OFF continued** ▼

Leading edge slats primary extension inop

Alternate leading edge slat extension is available. Flaps 1 is indicated regardless of actual slat position until trailing edge flap position is greater than 1. Trailing edge flap operation is normal.

Inboard wheel antiskid inop
Autobrakes inop

Manual braking is needed.

Automatic speedbrake inop

Manual speedbrake extension after landing is needed.

Left and right thrust reverser inop

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

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

LEADING EDGE SLAT DISAGREE

EQUIPMENT VALVE

REVERSER ISOLATION VALVE

11 Do the checklist for each consequential EICAS alert message as soon as practicable.

►► **Go to step 18**

▼ **Continued on next page** ▼

▼ **STANDBY BUS OFF** continued ▼

12 Choose one:

◆ Rudder trim is **operative**:

Standby DC bus is powered. Standby AC bus is unpowered.

▶▶ **Go to step 13**

◆ Rudder trim **not operative**:

Standby DC bus is unpowered. Standby AC bus may be unpowered.

▶▶ **Go to step 14**

13 Do the checklist for each consequential EICAS alert message as soon as practicable.

The standby AC bus is unpowered Inoperative Items

Cabin altitude and differential pressure indicators inoperative.

Cabin altitude control AUTO1 or AUTO2 mode operates normally.



14 Use flaps 20 and VREF 20 for landing.

The standby DC bus is unpowered. The standby AC bus may also be unpowered.

Inoperative Items

Left engine anti-ice inop

Avoid icing conditions.

▼ **Continued on next page** ▼

▼ **STANDBY BUS OFF** continued ▼

Electronic engine control normal mode inop

Engines operate in alternate control mode.

Aileron lockout inop

Rudder trim inop

Left VHF communication system inop

Left VOR inop

Right ADF inop

Left RDMI inop

Cabin altitude and differential pressure indicators may be inop

Cabin altitude control AUTO1 or AUTO2 mode operates normally.

Leading edge slats primary extension inop

Alternate leading edge slat extension is available. Flaps 1 is indicated regardless of actual slat position until trailing edge flap position is greater than 1. Trailing edge flap operation is normal.

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 checklist:

LEADING EDGE SLAT DISAGREE

17 Do the checklist for each consequential EICAS alert message as soon as practicable.

18 Checklist Complete Except Deferred Items

▼ **Continued on next page** ▼



▼STANDBY BUS OFF continued▼

Deferred Items

Descent Checklist

- Pressurization LDG ALT___
- Recall Checked
- Autobrake ___ or
OFF if Battery Bus is unpowered
- Landing data VREF 20, Minimums___
- Approach briefing Completed

Approach Checklist

- Altimeters ___

Alternate Leading Edge Slat Extension

- ALTN FLAPS selector Position to agree
with FLAP selector
- LE ALTN FLAPS arm switch ALTN
- ALTN FLAPS selector Extend or retract leading
edge slats as needed
- FLAP lever Extend or retract trailing
edge flaps as needed

Landing Checklist

- Speedbrake ARMED or
DOWN if Battery Bus is unpowered
- Landing gear Down

▼ Continued on next page ▼

▼STANDBY BUS OFF continued▼

Flaps 20



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**:


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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 **AUTO**:

▶▶ **Go to step 3**

◆ ENG START selector in **GRD**:

Motor the engine for 30 seconds.

ENG START selector
(affected side) AUTO



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:

FUEL CONTROL
switch (affected engine)...Confirm . . . CUTOFF,
then RUN

If engine appears stalled again **or** EGT
approaches the Standby Engine Indicator
placard limit, repeat 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.

▼ Continued on next page ▼

▼ Dual Engine Failure continued ▼

PW4000:

Above 35,000 feet use 240 knots.

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

20,000 feet and below use 200 knots minimum.

VP-BOQ

Caution! Speedbrakes autostow to the 50 % flight detent if airspeed exceeds 320 knots. Do not override autostow function unless airspeed is less than 315 knots.

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

Note: Cabin altitude warning can occur during descent.

7 Choose one:

◆ APU is **available**:

▶▶ **Go to step 8**

◆ APU is **not** available:

▶▶ **Go to step 9**

Do not wait for a successful engine start before starting the APU.

8  APU selector START, then ON

▼ Continued on next page ▼

▼ Dual Engine Failure continued ▼

9 Choose one:

◆ **Either or both engines started:**

▶▶ **Go to step 13**

◆ **Both engines stay failed:**

▶▶ **Go to step 10**

10 Thrust levers (both) Idle

11 Engines can accelerate to idle very slowly, especially at high altitude. If N2 is steadily increasing, and EGT stays within limits, do not interrupt the start.

The time from fuel control switch to RUN to EGT increase can be as long as two minutes.

12  Fuel CONTROL switches (both) CUTOFF for approximately 30 seconds, then RUN

Repeat until an engine start is achieved.

13 Activate the FMC route.

14 Enter the FMC performance data.

15 Choose one:

◆ **Any ALIGN light is illuminated:**

▶▶ **Go to step 16**

◆ **All ALIGN lights are extinguished:**

▶▶ **Go to step 18**

▼ Continued on next page ▼

▼ Dual Engine Failure continued ▼

Action is irreversible. Do this step only for the affected IRS.

- 16  IRS MODE selector (affected IRS) ATT
- 17 Enter heading on IRS control panel or POS INIT page of FMC.

Note: Cabin altitude warning can occur during descent.

- 18 Choose one:

◆ **Both engines are started:**



◆ **An engine stays failed:**

VQ-BMQ, VQ-BPT

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

VP-BDI through VP-BWX, VQ-BMU, VQ-BOG, VQ-BRA

►► **Go to the Engine Failure or Shutdown checklist on page 7.18**





Engine Limit or Surge or Stall

Condition: One or more of these occur:

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

- 1 A/T ARM switch OFF
- 2 Thrust lever
(affected side) . . . Confirm Retard until
engine indications
stay within limits or
the thrust lever is at idle
-
- 3 ENG START selector (affected side). FLT

▼ Continued on next page ▼

▼ Engine Limit or Surge or Stall continued ▼

VQ-BMQ, VQ-BPT

4 Choose one:

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

▶▶ Go to step 6

◆ Engine 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 7.14



VP-BDI through VP-BWX, VQ-BMU, VQ-BOG, VQ-BRA |

5 Choose one:

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

▶▶ Go to step 6

◆ Engine 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 7.18



▼ Continued on next page ▼

▼ Engine Limit or Surge or Stall continued ▼

Check that RPM and EGT follow thrust lever movement.

6  Thrust lever (affected side) . . . Advance slowly

7 Choose one:

◆ Engine acceleration is **normal**:

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



◆ Engine acceleration is **not** normal:

►► **Go to step 8**

▼ Continued on next page ▼

▼ Engine Limit or Surge or Stall continued ▼

8 Choose one:

◆ EGT is **normal**:

▶▶ **Go to step 9**

◆ EGT is **not** normal:

VQ-BMQ, VQ-BPT

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 7.14**

VP-BDI through VP-BWX, VQ-BMU, VQ-BOG, VQ-BRA

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 7.18**



9 ENG bleed air switch (affected side) Off

10 Choose one:

◆ Engine **responds**:

▶▶ **Go to step 11**

◆ Engine does **not** respond:

Continue engine operation at idle.

▶▶ **Go to step 11**

▼ Continued on next page ▼

▼ Engine Limit or Surge or Stall continued ▼

11 ENG bleed air switch (affected side) 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 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)

VP-BDI, VP-BOQ, VP-BRL through VQ-BRA

Messages: ENGINE CONTROLS R ENG CONTROL
 L ENG CONTROL

Condition: An EEC system fault occurs.



ENGINE CONTROL

VP-BMC, VP-BOY, VP-BOZ

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
- VP-BDI, VP-BOQ, VP-BRL through VQ-BRA**
- 5 A/T ARM switch (if needed) ARM

The autothrottle provides maximum thrust limiting.

- 6 Observe thrust limits.





Intentionally
Blank

Engine Failure or Shutdown

VQ-BMQ, VQ-BPT

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 **available**:
 - ▶▶ **Go to step 6**
 - ◆APU is **not** available:
 - ▶▶ **Go to step 7**
- 6 APU selector START, then ON
- 7 Transponder mode selector TA ONLY
- 8 WING ANTI ICE selector OFF
- 9 Plan to land at the nearest suitable airport.
- 10 **If** wing anti-ice required:
 - PACK control selector (affected side) OFF

▼ Continued on next page ▼

▼ Engine Failure or Shutdown continued ▼

ISLN switch (affected side) On

WING ANTI ICE selector AUTO

When wing anti-ice no longer required:

WING ANTI ICE selector OFF

L and R ISLN switches Off

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

12 Choose one:

◆ Restart **is** needed:

▶▶ **Go to the Engine In-Flight Start checklist on page 7.30**

◆ Restart is **not** needed:

▶▶ **Go to step 13**

▼ Continued on next page ▼

▼ Engine Failure or Shutdown continued ▼

13 Choose one:

◆ Automatic landing:

Use flaps 30 and VREF 30, **or** flaps 25 and VREF 25 for landing.

Use flaps 20 for go-around.

▶▶ Go to step 14

◆ Manual landing:

GND PROX FLAP OVRD switch OVRD

Use flaps 20 and VREF 20 for landing.

Use flaps 5 for go-around.

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

▶▶ Go to step 14

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 ____

▼ Continued on next page ▼

▼ Engine Failure or Shutdown continued ▼

Landing data **VREF**____, Minimums____
VREF 30 or VREF 25
for automatic landing,
VREF 20 for manual landing

Approach briefing Completed

Approach Checklist

Altimeters ____

Landing Checklist

Speedbrake ARMED

Landing gear Down

Flaps ____
30 or 25 for automatic landing
20 for manual landing



Engine Failure or Shutdown

VP-BDI through VP-BWX, VQ-BMU, VQ-BOG, VQ-BRA

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 **available**:
 - ▶▶ **Go to step 6**
 - ◆ APU is **not** available:
 - VP-BOQ through VP-BOZ**
 - ▶▶ **Go to step 7**
 - VP-BDI, VP-BMC, VP-BRL through VP-BWX,
VQ-BMU, VQ-BOG, VQ-BRA**
 - ▶▶ **Go to step 8**
- 6 APU selector START, then ON
VP-BOQ through VP-BOZ
- 7 Transponder mode selector TA

▼ Continued on next page ▼

▼ Engine Failure or Shutdown continued ▼

VP-BDI, VP-BMC, VP-BRL through VP-BWX, VQ-BMU, VQ-BOG, VQ-BRA

8 Transponder mode selector TA ONLY

VP-BWW, VP-BWX

9 WING ANTI ICE selector OFF

10 Plan to land at the nearest suitable airport.

11 **If** wing anti-ice required:

PACK control selector (affected side) OFF

ISLN switch (affected side) On

VP-BWW, VP-BWX

WING ANTI ICE selector AUTO

When wing anti-ice no longer required:

VP-BWW, VP-BWX

WING ANTI ICE selector OFF

L and R ISLN switches Off

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

13 Choose one:

◆ Restart **is** needed:

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



◆ Restart is **not** needed:

▶▶ **Go to step 14**

▼ Continued on next page ▼



▼ Engine Failure or Shutdown continued ▼

- 14 GND PROX FLAP OVRD switch OVRD
- 15 Use flaps 20 and VREF 20 for landing.
- 16 Use flaps 5 for go-around.
- 17 Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter.
- 18 Do **not** accomplish the following checklists:
 - ENGINE SHUTDOWN
 - PACK OFF

19 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 Failure or Shutdown continued** ▼

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 engine fuel filter.

1 Choose one:

- ◆ Only **one** ENG FUEL FILTER message, left or right, has shown during the flight:

Note: Erratic engine operation and flameout may occur on the affected engine due to fuel contamination



- ◆ ENG FUEL FILTER messages for **both** engines show or have shown at any time during the flight (either separately or at the same time):

►► **Go to step 2**

2 Plan to land at the nearest suitable airport.

Note: Erratic engine operation and flameout may occur on either or both engines due to fuel contamination.



**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.



Intentionally
Blank

Engine In-Flight Start

VP-BDI through VP-BWX, VQ-BMU, VQ-BOG, VQ-BRA

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

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

- 1 Check altitude and airspeed. Starts are not assured outside the EICAS envelope.
- 2 Engine can accelerate to idle very slowly, especially at high altitude. If N2 is steadily increasing, and EGT stays within limits, do not interrupt the start.
- 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
- 5 CF6-80 engines:

FUEL CONTROL switch (affected side) RUN

▼ Continued on next page ▼

▼ Engine In-Flight Start continued ▼

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 22**

- ◆ 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 (affected side) . . . RUN

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 22**

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

▶▶ **Go to step 13**

▼ Continued on next page ▼

▼ Engine In-Flight Start continued ▼

- 7 PACK control selector (affected side) OFF
- 8 ISLN switch (affected side) On
- 9 Ignition selector BOTH
- 10 ENG START selector (affected side) GND
- 11 CF6-80 engines:

When N2 exceeds minimum fuel on command bug:

FUEL CONTROL
switch (affected side) 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 22**

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

▶▶ **Go to step 13**

▼ Continued on next page ▼

▼ Engine In-Flight Start continued ▼

12 PW4000 engines:

When N2 exceeds minimum fuel on command bug:

FUEL CONTROL switch
(affected side) RUN

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 22**

◆ 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 **starts** and runs normally:

▶▶ **Go to step 14**

◆ Engine **fails** to start:

▶▶ **Go to step 20**

▼ Continued on next page ▼

▼ Engine In-Flight Start continued ▼

- 14 ENG START selector (affected side). AUTO
- 15 PACK control selectors (both). AUTO
- 16 L and R ISLN switches. Off

VP-BWW, VP-BWX

- 17 WING ANTI ICE selector AUTO
- 18 Transponder mode selector TA/RA
- 19 GND PROX FLAP OVRD switch Off



- 20 FUEL CONTROL switch
(affected side) Confirm CUTOFF
- 21 ENG START selector
(affected side) AUTO
- 22 Plan to land at the nearest suitable airport.
- 23 **If** wing anti-ice needed:

- PACK control selector (affected side) OFF
- ISLN switch (affected side) On

VP-BWW, VP-BWX

- WING ANTI ICE selector AUTO

When wing anti-ice no longer needed:

VP-BWW, VP-BWX

- WING ANTI ICE selector OFF
- L and R ISLN switches Off

- 24 Use flaps 20 and VREF 20 for landing.

▼ Continued on next page ▼

▼ Engine In-Flight Start continued ▼

- 25 Use flaps 5 for go-around.
- 26 Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter.
- 27 Do **not** accomplish the following checklists:
ENGINE SHUTDOWN
PACK OFF

28 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. **20**



Engine In-Flight Start**VQ-BMQ, VQ-BPT**

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

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

- 1 Check altitude and airspeed. Starts are not assured outside the EICAS envelope.
- 2 Engine can accelerate to idle very slowly, especially at high altitude. If N2 is steadily increasing, and EGT stays within limits, do not interrupt the start.
- 3 Choose one:
 - ◆ X-BLD is **shown**:
▶▶ **Go to step 6**
 - ◆ X-BLD is **not shown**:
▶▶ **Go to step 4**
- 4 ENG START selector (affected side). FLT
- 5 CF6-80 engines:
FUEL CONTROL switch (affected side) . . . RUN

▼ Continued on next page ▼

▼ Engine In-Flight Start continued ▼

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 20**

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

▶▶ **Go to step 11**

- 6 PACK control selector (affected side) OFF
- 7 ISLN switch (affected side) On
- 8 Ignition selector BOTH
- 9 ENG START selector (affected side) GND
- 10 CF6-80 engines:

When N2 exceeds minimum fuel on command bug:

FUEL CONTROL switch
(affected side) RUN

▼ Continued on next page ▼

▼ Engine In-Flight Start continued ▼

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 20

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

▶▶ Go to step 11

11 Choose one:

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

▶▶ Go to step 12

- ◆ Engine **fails** to start:

▶▶ Go to step 18

12 ENG START selector (affected side). AUTO

13 L and R PACK control selectors. AUTO

14 L and R ISLN switches. Off

15 WING ANTI ICE selector AUTO

16 Transponder mode selector TA/RA

▼ Continued on next page ▼

▼ Engine In-Flight Start continued ▼

17 GND PROX FLAP OVRD switch Off


18 FUEL CONTROL switch
(affected side) Confirm CUTOFF

19 ENG START selector
(affected side) AUTO

20 Plan to land at the nearest suitable airport

21 **If** wing anti-ice needed:

PACK control selector (affected side) OFF

ISLN switch (affected side) On

WING ANTI ICE selector AUTO

When wing anti-ice no longer needed:

WING ANTI ICE selector OFF

L and R ISLN switches Off

▼ Continued on next page ▼

▼ Engine In-Flight Start continued ▼

22 Choose one:

◆ Automatic landing:

GND PROX FLAP OVRD switch Off

Use flaps 30 and VREF 30, **or** flaps 25 and VREF 25 for landing.

Use flaps 20 for go-around.

►► **Go to step 23**

◆ Manual landing:

Use flaps 20 and VREF 20 for landing.

Use flaps 5 for go-around.

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

►► **Go to step 23**

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

ENGINE SHUTDOWN

PACK OFF

24 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization LDG ALT ____

Recall Checked

▼ Continued on next page ▼

▼ Engine In-Flight Start continued ▼

Autobrake ____

Landing data VREF____, Minimums____
VREF 30 or VREF 25
for automatic landing
VREF 20 for manual landing

Approach briefing Completed

Approach Checklist

Altimeters ____

Landing Checklist

Speedbrake ARMED

Landing gear Down

Flaps ____
30 or 25 for automatic landing
20 for manual landing


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.

VQ-BMQ, VQ-BPT

- 1 Choose one:

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

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



◆ Oil pressure indication **normal:**

Operate engine normally.



▼ Continued on next page ▼

▼ **ENGINE OIL PRESSURE** continued ▼

VP-BDI through VP-BWX, VQ-BMU, VQ-BOG, VQ-BRA |

2 Choose one:

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

▶▶ **Go to the Engine Failure or Shutdown checklist on page 7.18**



◆ Oil pressure indication **normal:**

Operate engine normally.



Engine Oil Temperature

VP-BDI, VP-BOQ, VP-BRL through VQ-BRA

Condition: The oil temperature is high.

1 Choose one:

◆ Oil temperature is in the amber band:

A/T ARM switch OFF

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

▶▶▶ Go to step 2

◆ Oil temperature is at red line limit:

VQ-BMQ, VQ-BPT

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

**VP-BDI, VP-BOQ, VP-BRL through VP-BWX,
VQ-BMU, VQ-BOG, VQ-BRA**

**▶▶ Go to the Engine Failure or Shutdown
checklist on page 7.18**



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

VQ-BMQ, VQ-BPT

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

▼ Continued on next page ▼

▼ Engine Oil Temperature continued ▼

**VP-BDI, VP-BOQ, VP-BRL through VP-BWX,
VQ-BMU, VQ-BOG, VQ-BRA**

**▶▶ Go to the Engine Failure or Shutdown
checklist on page 7.18**



Engine Oil Temperature

VP-BMC, VP-BOY, VP-BOZ

Condition: The oil temperature is high.

1 Choose one:

◆ Oil temperature is in the amber band:

A/T ARM switch OFF

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

►► Go to step 2

◆ Oil temperature is at red line limit:

**►► Go to the Engine Failure or Shutdown
checklist on page 7.18**



2 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 7.18**



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

VP-BDI, VP-BOQ, VP-BRL through VQ-BRA

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**:

VQ-BMQ, VQ-BPT

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



**VP-BDI, VP-BOQ, VP-BRL through VP-BWX,
VQ-BMU, VQ-BOG, VQ-BRA**

**▶▶ Go to the Engine Failure or
Shutdown checklist on page 7.18**



OIL FILTER**VP-BMC**

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.



Intentionally
Blank

REVERSER UNLOCKED

VP-BDI through VP-BRL, VQ-BMU, VQ-BOG, VQ-BRA

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

- 1 Reverse thrust lever
(affected side) 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

▼ Continued on next page ▼

▼ REVERSER UNLOCKED continued ▼

- 8 APU selector START, then ON
- 9 GND PROX FLAP OVRD switch OVRD
VP-BOQ through VP-BOZ
- 10 Transponder mode selector TA
**VP-BDI, VP-BMC, VP-BRL, VQ-BMU, VQ-BOG,
VQ-BRA**
- 11 Transponder mode selector TA ONLY
- 12 Plan to land at the nearest suitable airport.
- 13 **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
- 14 Use trailing edge flaps 20 and VREF 30 + 30 for landing.
- 15 Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter.
- 16 Do **not** accomplish the following checklists:
 ENGINE SHUTDOWN
 PACK OFF

17 Checklist Complete Except Deferred Items

▼ Continued on next page ▼



▼ REVERSER UNLOCKED continued ▼

Deferred Items

Descent Checklist

- Pressurization LDG ALT ____
- Recall Checked
- Autobrake ____
- Landing data **VREF 30 + 30**____, Minimums____
- 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

▼ Continued on next page ▼

▼ REVERSER UNLOCKED continued ▼

Landing gear Down

Flaps **20**

REVERSER UNLOCKED

VP-BWW through VQ-BMQ, VQ-BPT

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

- 1 Reverse thrust lever
(affected side) Verify in the
full down position

- 2 Choose one:
 - ◆ With **yaw, loss of airspeed, or buffet:**

▶▶ **Go to step 3**
 - ◆ With **no** yaw, loss of airspeed, or buffet:

Operate engine normally.

■ ■ ■ ■

- 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**

▼ Continued on next page ▼

▼ REVERSER UNLOCKED continued ▼

- 8 APU selector START, then ON
- 9 GND PROX FLAP OVRD switch OVRD
- 10 Transponder mode selector TA ONLY
- 11 WING ANTI ICE selector OFF
- 12 Plan to land at the nearest suitable airport.

13 **If** wing anti-ice needed:

- PACK control selector (affected side) OFF
- ISLN switch (affected side) On
- WING ANTI ICE selector AUTO

When wing anti-ice no longer needed:

- WING ANTI ICE selector OFF
- L and R ISLN switches Off

- 14 Use trailing edge flaps 20 and VREF 30 + 30 for landing.
- 15 Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter.
- 16 Do **not** accomplish the following checklists:
 - ENGINE SHUTDOWN
 - PACK OFF

17 **Checklist Complete Except Deferred Items**

▼ Continued on next page ▼



▼ REVERSER UNLOCKED continued ▼

Deferred Items

Descent Checklist

- Pressurization LDG ALT ____
- Recall Checked
- Autobrake ____
- Landing data **VREF 30 + 30**____, Minimums____
- 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

▼ Continued on next page ▼

▼ REVERSER UNLOCKED continued ▼

Landing gear Down

Flaps **20**

VALVE**STARTER CUTOUT****VP-BDI through VP-BRL, VQ-BMU, VQ-BOG, VQ-BRA**

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.

▼ Continued on next page ▼

▼ STARTER CUTOUT continued ▼

- 8 Avoid icing conditions.
- 9 Do **not** accomplish the following checklists:

ENGINE BLEED OFF

PACK OFF



VALVE**STARTER CUTOUT****VP-BWW through VQ-BMQ, VQ-BPT**

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 is **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 selector OFF

This prevents possible asymmetrical ice buildup
on the wings.

▼ Continued on next page ▼

▼ STARTER CUTOUT continued ▼

- 8 Avoid icing conditions.
- 9 Do **not** accomplish the following checklists:

ENGINE BLEED OFF

ICING WING

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

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

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

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

- 5 ENG START selectors (both) FLT
- 6 RECIRC FAN switches (both) Off

VP-BDI through VP-BRL, VQ-BMU, VQ-BOG, VQ-BRA

- 7 ENGINE ANTI-ICE switches (both) ON

VP-BWW through VQ-BMQ, VQ-BPT

- 8 ENG ANTI ICE selectors (both) ON

▼ Continued on next page ▼

▼ Volcanic Ash continued ▼

VP-BDI through VP-BRL, VQ-BMU, VQ-BOG, VQ-BRA
9 WING ANTI-ICE switch ON

VP-BWW through VQ-BMQ, VQ-BPT
10 WING ANTI ICE selector ON

11 Choose one:

◆ APU is **not available**:

▶▶ **Go to step 13**

◆ APU is **available**:

▶▶ **Go to step 12**

12 APU selector START, then ON

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

13 Engines can accelerate to idle very slowly, especially at high altitude. If N2 is steadily increasing, and EGT stays within limits, do not interrupt the start.

▼ Continued on next page ▼

▼ Volcanic Ash continued ▼

14 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 15**

15 Plan to land at the nearest suitable airport.

16 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**

VP-BDI through VP-BWX, VQ-BMU, VQ-BOG, VQ-BRA

Messages: L ENGINE FIRE

R ENGINE FIRE

Condition: One or more of these occur:

- Engine fire warning
- Airframe vibrations with abnormal 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

(affected side) Rotate to the stop and
hold for 1 second

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

Engine fire switch

(affected side) Rotate to
the other stop and
hold for 1 second

▼ Continued on next page ▼

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

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

▶▶ **Go to step 8**

◆ APU is **not** available:

VP-BOQ through VP-BOZ

▶▶ **Go to step 9**

VP-BDI, VP-BMC, VP-BRL through VP-BWX,
VQ-BMU, VQ-BOG, VQ-BRA

▶▶ **Go to step 10**

- 8 APU selector START, then ON
VP-BOQ through VP-BOZ
- 9 Transponder mode selector TA
VP-BDI, VP-BMC, VP-BRL through VP-BWX, VQ-BMU,
VQ-BOG, VQ-BRA
- 10 Transponder mode selector TA ONLY
VP-BWW, VP-BWX
- 11 WING ANTI ICE selector OFF

▼ **Continued on next page ▼**

▼ ENGINE FIRE or Engine Severe Damage or Separation continued ▼

12 Plan to land at the nearest suitable airport.

13 **If** wing anti-ice required:

PACK control selector (affected side) OFF

ISLN switch (affected side) On

VP-BWW, VP-BWX

WING ANTI ICE selector AUTO

When wing anti-ice no longer required:

VP-BWW, VP-BWX

WING ANTI ICE selector OFF

L and R ISLN switches Off

14 GND PROX FLAP OVRD switch OVRD

15 Use flaps 20 and VREF 20 for landing.

16 Use flaps 5 for go-around.

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

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

ENGINE BOTTLE

ENGINE SHUTDOWN

PACK OFF

19 Checklist Complete Except Deferred Items

▼ Continued on next page ▼

▼ ENGINE FIRE or Engine Severe Damage or Separation 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**



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

VQ-BMQ, VQ-BPT

Messages: L ENGINE FIRE

R ENGINE FIRE

Condition: One or more of these occur:

- Engine fire warning
- Airframe vibrations with abnormal 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
(affected side) Rotate to the stop and
hold for 1 second

▼ Continued on next page ▼

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

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

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

- 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 **available**:
▶▶ **Go to step 8**

◆ APU is **not** available:
▶▶ **Go to step 9**

- 8 APU selector START, then ON

- 9 Transponder mode selector TA ONLY

- 10 WING ANTI ICE selector OFF

▼ **Continued on next page** ▼

▼ ENGINE FIRE or Engine Severe Damage or Separation continued ▼

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

WING ANTI ICE selector AUTO

When wing anti-ice no longer required:

WING ANTI ICE selector OFF

L and R ISLN switches Off

13 Choose one:

◆ Automatic landing:

Use flaps 30 and VREF 30, **or** flaps 25 and VREF 25 for landing.

Use flaps 20 for go-around.

►► **Go to step 14**

◆ Manual landing:

GND PROX FLAP OVRD switch OVRD

Use flaps 20 and VREF 20 for landing.

Use flaps 5 for go-around.

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

►► **Go to step 14**

▼ Continued on next page ▼

▼ ENGINE FIRE or Engine Severe Damage or Separation continued ▼

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

ENGINE BOTTLE

ENGINE SHUTDOWN

PACK OFF

15 Checklist Complete Except Deferred Items**▼ Continued on next page ▼**



▼ENGINE FIRE or Engine Severe Damage or Separation continued▼

Deferred Items

Descent Checklist

- Pressurization LDG ALT ____
- Recall Checked
- Autobrake ____
- Landing data VREF____, Minimums____
VREF 30 or VREF 25
for automatic landing,
VREF 20 for manual landing
- Approach briefing Completed

Approach Checklist

- Altimeters ____

Landing Checklist

- Speedbrake ARMED
- Landing gear Down
- Flaps ____
30 or 25 for automatic landing
20 for manual landing





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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 **available**:
 - ▶▶ **Go to step 4**
 - ◆ Bleed air is **not** available:
 - Advise the tower.
 - ■ ■ ■
- 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 occur.

- 1 Diversion may be needed.
- 2 Don oxygen masks, as needed.
- 3 Don smoke goggles, as needed.
- 4 Establish crew and cabin communications.

VP-BOQ, VP-BOY, VQ-BOG, VQ-BRA

- 5 Advise the cabin crew to turn off main IFE power switch.
- 6 Advise cabin crew that main cabin lighting will be turned off.
- 7 UTILITY BUS switches (both) Off
- 8 APU bleed air switch Off
- 9 **Anytime** the smoke or fumes become the greatest threat:

**►► Go to the Smoke or Fumes Removal
checklist on page 8.28**

▼ Continued on next page ▼

▼ Smoke, Fire or Fumes continued ▼

10 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 11**

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

▶▶ **Go to step 12**

11 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 8.28, if needed**



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

▶▶ **Go to step 12**

12 EQUIP COOLING selector. STBY

▼ Continued on next page ▼

▼ Smoke, Fire or Fumes continued ▼

- 13 Initiate a diversion to the nearest suitable airport while continuing the checklist.
- 14 Consider an immediate landing if the smoke, fire or fumes situation becomes uncontrollable.
- 15 Do **not** delay landing in an attempt to complete all of the following steps.
- 16 L and R ISLN switches. Off
- 17 R PACK control selector OFF
- 18 **Wait** 2 minutes unless the smoke or fumes are increasing. This allows time for the smoke or fumes to clear.
- 19 Choose one:
 - ◆ Smoke or fumes do **not continue** or are **not increasing**:
 - ▶▶ **Go to step 26**
 - ◆ Smoke or fumes **continue** or are **increasing**:
 - ▶▶ **Go to step 20**
- 20 R PACK control selector AUTO
- 21 L PACK control selector OFF
- 22 **Wait** 2 minutes unless the smoke or fumes are increasing. This allows time for the smoke or fumes to clear.

▼ Continued on next page ▼

▼ Smoke, Fire or Fumes continued ▼

23 Choose one:

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

▶▶ **Go to step 26**

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

▶▶ **Go to step 24**

24 L PACK control selector AUTO

25 Consider an immediate landing.

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

UTILITY BUS OFF

PACK OFF

RECIRCULATION FAN

▶▶ **Go to the Smoke or Fumes Removal checklist on page 8.28, 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 Choose one:

◆ On the **ground**:

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



◆ In flight

►► Go to step 4

4 EQUIP COOLING selector OVRD

5 Choose one:

◆ **Forward** cargo fire:

FWD CARGO HEAT switch Off

▶▶ **Go to step 6**

◆ **Aft** cargo fire:

AFT and BULK
CARGO HEAT switches Off

▶▶ **Go to step 6**

6 FLT DK COMPT TEMP control Full cool

7 Choose one:

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

LDG ALT selector Set 7,500 feet

CABIN ALTITUDE
AUTO RATE control MAX

▶▶ **Go to step 8**

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

▶▶ **Go to step 8**

8 PACK control selector (either) OFF

▼ Continued on next page ▼

▼ CARGO FIRE continued ▼

9 Choose one:

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

Descend to 35,000 feet or below.

▶▶ **Go to step 10**

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

▶▶ **Go to step 10**

10 Plan to land at the nearest suitable airport.

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

CARGO BOTTLE

PACK OFF

RECIRCULATION FAN

12 Checklist Complete Except Deferred Items

Deferred Items

When leaving cruise altitude for landing

LDG ALT selector Set landing
field elevation

Descent Checklist

Pressurization LDG ALT ____

Recall Checked

Autobrake ____

Landing data VREF____, Minimums____

▼ Continued on next page ▼

▼ **CARGO FIRE continued ▼**

Approach briefing Completed

Approach Checklist

Altimeters ____

Warning! Inform ground personnel NOT to open 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

VP-BDI through VP-BRL, VQ-BMU, VQ-BOG, VQ-BRA

**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 PACK control selector (affected side). OFF
- 3 A/T ARM switch OFF
- 4 Thrust lever
(affected side) . . . Confirm . . . Retard slowly until
ENG OVHT light extinguishes
or thrust lever is at idle
- 5 Choose one:

◆ ENG OVHT light **extinguishes**:

▶▶ **Go to step 6**

◆ ENG OVHT light **stays illuminated**:

▶▶ **Go to the Engine Failure or
Shutdown checklist on page 7.18**



- 6 Run the engine at a thrust setting that keeps the
ENG OVHT light extinguished.
- 7 **If** wing anti-ice needed:
ISLN switch (affected side) On

▼ **Continued on next page** ▼

▼ENGINE OVERHEAT continued▼

When wing anti-ice no longer needed:

L and R ISLN switches Off

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

ENGINE BLEED OFF

PACK OFF



ENGINE OVERHEAT

VP-BWW through VQ-BMQ, VQ-BPT

**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 PACK control selector (affected side). OFF
- 3 A/T ARM switch OFF
- 4 Thrust lever
(affected side) . . . Confirm . . . Retard slowly until
ENG OVHT light extinguishes
or thrust lever is at idle

5 Choose one:

◆ ENG OVHT light is **not illuminated**:

▶▶ **Go to step 6**

◆ ENG OVHT light is **illuminated**:

VQ-BMQ, VQ-BPT

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



VP-BWW, VP-BWX

▶▶ **Go to the Engine Failure or
Shutdown checklist on page 7.18**



▼ Continued on next page ▼

▼ENGINE OVERHEAT continued▼

- 6 Run the engine at thrust setting that keeps ENG OVHT light extinguished.
- 7 WING ANTI ICE selector OFF
- 8 **If** wing anti-ice needed:
ISLN switch (affected side) On
WING ANTI ICE selector AUTO
When wing anti-ice no longer needed:
WING ANTI ICE selector OFF
L and R ISLN switches Off
- 9 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 **Wait** 1 minute.

The SMOKE light will extinguish when smoke clears.

3 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



**LAV
SMOKE****LAVATORY SMOKE****VP-BOQ**

Messages: LAVATORY SMOKE

Condition: Smoke is detected in a lavatory.



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
- 7 Choose one:

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

▶▶ **Go to the Smoke, Fire or Fumes
checklist on page 8.14 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

▼ Continued on next page ▼

▼ Smoke or Fumes Removal continued ▼**CABIN ALTITUDE**

MANUAL control Hold in CLIMB until
the outflow valve indication
shows 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 8.14 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





Non-Normal Checklists

Chapter NNC

Flight Controls

Section 9

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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 **As indicated**



AUTO SPDBRK

AUTO SPEEDBRAKE

VP-BDI, VP-BMC, VP-BOY through VQ-BRA

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 ___





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**AUTO
SPDBRK****AUTO SPEEDBRAKE****VP-BOQ**

Messages: AUTO SPEEDBRAKE

Condition: An automatic speedbrake or load alleviation system fault occurs.

Note: Limit airspeed to 320 KIAS. Speedbrakes may be used in flight.

- 1 Do **not** arm the speedbrake lever.
- 2 Manually extend speedbrakes after landing.
Increased force may be required to deploy speedbrakes to full UP.
- 3 **Checklist Complete Except Deferred Items**

▼ Continued on next page ▼

▼ **AUTO SPEEDBRAKE continued ▼**

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.

▼ Continued on next page ▼

▼ Jammed or Restricted Flight Controls continued ▼**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.



**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 14**
 - ◆ 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
- 6 **Wait** 30 seconds.

▼ Continued on next page ▼

▼ LEADING EDGE SLAT ASYMMETRY continued ▼

7 Choose one:

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

▶▶ **Go to step 8**

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

Do **not** accomplish the following checklist:

TRAILING EDGE FLAP DISAGREE

▶▶ **Go to step 9**

8 Choose one:

◆ Trailing edge flap movement **is indicated**:

▶▶ **Go to step 14**

◆ Trailing edge flap movement **is not indicated**:

▶▶ **Go to step 9**

9 ALTN FLAPS selector Position to agree with FLAP lever

Do not arm the LE ALTN FLAPS arm switch

10  TE ALTN FLAPS arm switch ALTN

11 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.

▼ Continued on next page ▼

▼ LEADING EDGE SLAT ASYMMETRY continued ▼

12 Choose one:

◆ TE FLAP DISAGREE message is **not** shown:▶▶ **Go to step 14**◆ TE FLAP DISAGREE message is **shown**:Do **not** accomplish the following checklist:

TRAILING EDGE FLAP DISAGREE

▶▶ **Go to step 13**

13 Choose one:

◆ Indicated flap position is **less than 5**:▶▶ **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 14**◆ Indicated flap position is **20**:Use current flaps and VREF 30 + 30 for
landing.▶▶ **Go to step 14****▼ Continued on next page ▼**

▼ **LEADING EDGE SLAT ASYMMETRY** continued ▼

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

15 Checklist Complete Except Deferred Items

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 15**◆ 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 9.10**



◆ 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 15**

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

Do **not** accomplish the following checklist:

TRAILING EDGE FLAP DISAGREE

▶▶ **Go to step 12**

▼ **Continued on next page** ▼



▼ LEADING EDGE SLAT DISAGREE continued ▼

- 12 ALTN FLAPS selector Position to agree with FLAP lever
- 13 TE ALTN FLAPS arm switch ALTN
- 14 ALTN FLAPS selector Extend or retract trailing edge flaps as needed
- 15 Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter.

16 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.





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**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 arm 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 3**◆ Indicated flap position **between 5 and 20**:

Use VREF 30 + 20 for landing.

▶▶ **Go to step 3**◆ Indicated flap position **5 or less**:

Use VREF 30 + 30 for landing.

Note: Tail clearance is reduced on landing.
▶▶ **Go to step 3**

▼ Continued on next page ▼

▼TRAILING EDGE FLAP ASYMMETRY continued▼

- 3 Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter.
- 4 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization LDG ALT____

Recall Checked

Autobrake ____

Landing data VREF____, Minimums____
**VREF 20, or 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 9.20**

◆ 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

Do **not** accomplish the following checklist:

LE SLAT DISAGREE

▶▶ **Go to step 9**

▼ Continued on next page ▼



▼ TRAILING EDGE FLAP DISAGREE continued ▼

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

10 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**





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**UNSCHED
STAB TRIM****UNSCHEDULED STABILIZER TRIM**

Message: UNSCHD STAB TRIM

Condition: One of the following occurs:

- Stabilizer movement occurs without a signal to trim
- The alternate stabilizer trim switches are used with an autopilot engaged

- 1 STAB TRIM CUT OUT switches
(both) CUT OUT
- 2 Higher than normal control column force may be needed to prevent unwanted pitch change.
- 3 Autopilot disengage switch Push

Immediately move the switch back to CUTOUT if unscheduled movement occurs

- 4  C STAB TRIM CUT OUT switch NORM
- 5 Choose one:

◆ Stabilizer movement is **normal**:

Continue normal operation.

Stabilizer trim moves at half rate.

Center and right autopilots are available.

▶▶ **Go to step 8**

◆ **Unscheduled stabilizer** movement occurs:

C STAB TRIM CUT OUT switch . . CUT OUT

▶▶ **Go to step 6**

▼ Continued on next page ▼

▼ **UNSCHEDULED STABILIZER TRIM** continued ▼

Immediately move the switch back to CUTOUT if unscheduled movement occurs

6  L STAB TRIM CUT OUT switch NORM

7 Choose one:

◆ Stabilizer movement is **normal**:

Continue normal operation.

Stabilizer trim moves at half rate.

Center and left autopilots are available.

▶▶ **Go to step 8**

◆ **Unscheduled stabilizer** movement occurs:

L STAB TRIM CUT OUT switch . . . CUT OUT

▶▶ **Go to step 8**

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
- None of the IRS's are aligned

1 YAW DAMPER switch Off

■ ■ ■ ■



Non-Normal Checklists

Chapter NNC

Flight Instruments, Displays

Section 10

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Airspeed Unreliable..... 10.1

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Airspeed Unreliable

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

Objective: To identify a reliable airspeed indication, if possible, or to continue the flight using the Unreliable Airspeed table in the Performance Inflight chapter.

- 1 Autopilot (if engaged) Disengage
 - 2 Autothrottle (if engaged) Disengage
 - 3 F/D switches (both) OFF
 - 4 Set the following gear up pitch attitude and thrust:

Flaps extended	10° and 80% N1
Flaps up	4° and 75% N1
- - - - -
- 5 The following are **reliable**:
 - Attitude
 - N1
 - Ground speed
 - Radio altitude

Note: Stick shaker and overspeed warning alerts may sound erroneously or simultaneously.

Note: The Pitch Limit Indicator, and Angle of Attack indicator (as installed) are unreliable.

▼ Continued on next page ▼



▼ **Airspeed Unreliable continued** ▼

- 6

Refer to the Flight with Unreliable Airspeed table in the Performance Inflight chapter and set the pitch attitude and thrust setting for the current airplane configuration and phase of flight.
- 7

When in trim and stabilized, cross check the captain, first officer and standby airspeed indicators. An airspeed indication that differs by more than 30 knots or .03 mach from the airspeed shown in the table should be considered **unreliable**.
- 8

Choose one:

◆ Reliable airspeed indication can be **determined**:

Use the most reliable airspeed source for the remainder of the flight.

AIR DATA switch
(unreliable side) ALTN

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

►► **Go to step 9**

◆ Reliable airspeed indication can **not** be determined:

►► **Go to step 11**

9

Flight director switch (reliable side) ON

10

Autopilot (reliable side) Engage
- Note:** Do not re-engage the autothrottle.

▼ **Continued on next page** ▼

▼ **Airspeed Unreliable continued** ▼

▶▶ **Go to step 12**

- 11 Set pitch attitude and thrust from the Flight with Unreliable Airspeed table in the Performance Inflight chapter for the airplane configuration and phase of flight, as needed.

Note: Maintain visual conditions if possible.

Establish landing configuration early.

Radio altitude reference is available below 2,500 feet.

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

- 12 Use flaps 20 and VREF 20 for landing.

- 13 GND PROX FLAP OVRD switch OVRD

14 **Checklist Complete Except Deferred Items**

▼ **Continued on next page** ▼



▼ Airspeed Unreliable continued ▼

Deferred Items

Descent Checklist

- Pressurization LDG ALT___
- Recall Checked
- Autobrake ___
- Landing data **VREF20___, Minimums___**
- Approach briefing Completed

Approach Checklist

- Altimeters ___

Landing Checklist

- Speedbrake ARMED
- Landing gear Down
- Flaps **20**

▼ 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

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 Maintain visual conditions if possible.
- 4 **Checklist Complete Except Deferred Items**

Deferred Items

Review before descent:

Establish landing configuration early.

Radio altitude reference is available below 2500 feet.

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



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.



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Non-Normal Checklists

Chapter NNC

Flight Management, Navigation

Section 11

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**XPNDR
FAIL**
ATC FAULT
VP-BOQ

Messages: ATC FAULT

Condition: A transponder fault occurs.

- 1 Transponder selector Select opposite transponder


ATC FAULT
VP-BDI, VP-BMC, VP-BOY through VQ-BRA

Messages: ATC FAULT

Condition: A transponder fault occurs.

- 1 Transponder selector Select opposite transponder



FMC FAIL

VP-BDI through VP-BOZ, VP-BWW through VQ-BRA

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 5**

2 NAV SOURCE selector FMC-L or FMC-R

Select the operative FMC.

VQ-BRA

3 Set both HSI range selectors to the same position.

4 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.



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

6 Captain's NAV SOURCE selector CDU-L

7 First Officer's NAV SOURCE selector CDU-R

▼ **Continued on next page** ▼

▼FMC FAIL continued ▼

- 8 Route modifications must be entered into both CDUs. Enter any new waypoints by latitude and longitude.
- 9 Manually tune navigation radios.
- 10 Refer to Performance Inflight chapter for VREF speed and other applicable performance information.





FMC FAIL

VP-BRL

Messages: L FMC FAIL R FMC FAIL

Condition: An FMC is failed.

- 1 FMC switch ALTN
- 2 Both HSI range selectors Set to the same position
- 3 Choose one:
 - ◆**Left** FMC is failed:
 - Use right autopilot.
 - ▶▶ **Go to step 4**
 - ◆**Right** FMC is failed:
 - Use left or center autopilot.
 - ▶▶ **Go to step 4**
- 4 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.



FMC
FMC MESSAGE

Messages: FMC MESSAGE

Condition: An alert message is in the FMC scratchpad.

VQ-BMQ, VQ-BPT

1 Choose one:

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

►► **Go to the Fuel Leak Engine checklist on page 12.7**



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

Take action as needed per the message.

VP-BDI through VP-BWX, VQ-BMU, VQ-BOG, VQ-BRA

2 Choose one:

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

►► **Go to the Fuel Leak Engine checklist on page 12.14**



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

Take action as needed per the message.



GPS**VP-BDI, VP-BMC, VP-BOY, VP-BWW through VQ-BPT**

Messages: L GPS

R GPS

GPS

Condition: One or both GPS receivers are failed.

**VP-BMC, VP-BOY, VQ-BMQ through VQ-BPT
(SB Deletes VP-BDI when incorporated.)**

1 Choose one:

◆ **L GPS or R GPS** message is shown:

The indicated GPS has failed.

◆ **GPS** message is shown:

Both GPSs have failed.



▼ Continued on next page ▼

▼GPS continued▼

VP-BWW, VP-BWX
(SB Adds VP-BDI when ADS-B capability is installed.)

2 Choose one:

◆ **L GPS** message is shown:

The left GPS has failed.

If ADS-B Out is needed, verify or switch to the right transponder.


◆ **R GPS** message is shown:

The right GPS has failed.

If ADS-B Out is needed, verify or switch to the left transponder.


◆ **GPS** message is shown:

Both GPSs have failed.

ADS-B Out position is degraded. If needed, notify ATC.


DC FAIL
IRS DC FAIL

Messages: L IRS DC FAIL
C IRS DC FAIL

R 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

VP-BDI, VP-BMC, VP-BOY, VP-BRL through VQ-BPT

Messages: UNABLE RNP

Condition: The actual navigation performance is not sufficient.

1 Choose one:

◆ On the **ground**:

Message may show with GPS disabled.



◆ In **flight**:

►► Go to step 2

2 Choose one:

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

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



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

Verify position.



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Non-Normal Checklists

Chapter NNC

Fuel

Section 12

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**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 If an engine has low fuel flow and unusual engine indications, a fuel imbalance may show due to engine damage instead of a fuel leak.
- 2 The FUEL CONFIG message may be caused by an engine fuel leak, center pump switches off incorrectly, an imbalance, or low fuel.
- 3 A fuel leak should be suspected if one or more of the following are true:

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

An engine has excessive fuel flow.

On PROGRESS page 2, the totalizer is less than the calculated fuel.

The TOTALIZER fuel is the sum of the individual tank quantities.

The CALCULATED fuel is the totalizer value at engine start minus fuel used.

Fuel used is calculated using the engine fuel flow sensors.

▼ Continued on next page ▼

▼ FUEL CONFIGURATION continued ▼
VP-BDI through VP-BWX, VQ-BMU, VQ-BOG, VQ-BRA
4 Choose one:
◆ Engine fuel leak indicated:
**▶▶ Go to the Fuel Leak Engine
checklist on page 12.14**

◆ Engine fuel leak not indicated:
FWD and AFT FUEL XFEED switches . . . On
▶▶ Go to step 6
VQ-BMQ, VQ-BPT
5 Choose one:
◆ Engine fuel leak indicated:
**▶▶ Go to the Fuel Leak Engine
checklist on page 12.7**

◆ Engine fuel leak not indicated:
FWD and AFT FUEL XFEED switches . . . On
▶▶ Go to step 6
6 FWD and AFT PUMP switches (low tank) Off
**This ensures fuel from the high tank feeds both
engines.**
7 When fuel balancing complete:
All FWD and AFT PUMP switches. ON
▼ Continued on next page ▼

▼ FUEL CONFIGURATION continued ▼

FWD and AFT FUEL XFEED switches Off

8 Choose one:

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

▶▶ **Go to the LOW FUEL checklist on page 12.26**



◆ 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.



Fuel Leak Engine

VQ-BMQ, VQ-BPT

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 FWD and AFT 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 500 kilograms 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**

◆ Left and right main tank quantities **decrease at the same rate**:

▶▶ **Go to step 8**

▼ Continued on next page ▼

▼ Fuel Leak Engine continued ▼

8 Resume normal fuel management procedures.

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 PROGRESS PAGE 2 SELECT

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

▼ Continued on next page ▼

▼ Fuel Leak Engine continued ▼

13 Fuel PUMP switches (all) ON

This ensures all fuel is available.

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 Transponder mode selector TA ONLY

23 WING ANTI ICE selector OFF

24 Plan to land at the nearest suitable airport.

▼ Continued on next page ▼



▼ Fuel Leak Engine continued ▼

25 **If** wing anti-ice needed:

- PACK control selector (affected side) OFF
- ISLN switch (affected side) On
- WING ANTI ICE selector AUTO

When wing anti-ice no longer needed:

- WING ANTI ICE selector OFF
- 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.

▼ Continued on next page ▼

▼ Fuel Leak Engine continued ▼

30 Choose one:

◆ Automatic landing:

Use flaps 30 and VREF 30, **or** flaps 25 and VREF 25 for landing.

Use flaps 20 for go-around.

►► **Go to step 31**

◆ Manual landing:

GND PROX FLAP OVRD switch OVRD

Use flaps 20 and VREF 20 for landing.

Use flaps 5 for go-around.

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

►► **Go to step 31**

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

ENGINE SHUTDOWN

PACK OFF

▼ Continued on next page ▼



▼Fuel Leak Engine continued▼

32 Choose one:

◆LOW FUEL message **not** shown:
▶▶Go to step 37

◆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 33

33 Fuel PUMP switches (all) ON
This ensures all fuel is available.

34 Plan to land at nearest suitable airport.

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

36 Do **not** accomplish the following checklist:
LOW FUEL

37 Checklist Complete Except Deferred Items

Deferred Items

Descent Checklist

Pressurization LDG ALT ____
Recall Checked
Autobrake ____

▼ Continued on next page ▼

▼ Fuel Leak Engine continued ▼

Landing data VREF____, Minimums____
VREF 30 or VREF 25
for automatic landing, or
VREF 20 for manual landing

Approach briefing Completed

Approach Checklist

Altimeters ____

Landing Checklist

Speedbrake ARMED

Landing gear Down

Flaps. ____
30 or 25 for automatic landing, or
20 for manual landing



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 Leak Engine

VP-BDI through VP-BWX, VQ-BMU, VQ-BOG, VQ-BRA

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 FWD and AFT 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 500 kilograms 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**

▼ Continued on next page ▼

▼ Fuel Leak Engine continued ▼

8 Resume normal fuel management procedures.

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**

▼ Continued on next page ▼

▼Fuel Leak Engine continued▼

13 Fuel PUMP switches (all) ON

This ensures all fuel is available.

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:
VP-BOQ through VP-BOZ

▶▶Go to step 22
VP-BDI, VP-BMC, VP-BRL through VP-BWX,
VQ-BMU, VQ-BOG, VQ-BRA

▶▶Go to step 23

21 APU selector START, then ON

▼ Continued on next page ▼

▼ Fuel Leak Engine continued ▼

VP-BOQ through VP-BOZ

22 Transponder mode selector TA

VP-BDI, VP-BMC, VP-BRL through VP-BWX, VQ-BMU, VQ-BOG, VQ-BRA

23 Transponder mode selector TA ONLY

VP-BWW, VP-BWX

24 WING ANTI ICE selector OFF

25 Plan to land at the nearest suitable airport.

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

PACK control selector (affected side) OFF

ISLN switch (affected side) On

VP-BWW, VP-BWX

WING ANTI ICE selector AUTO

When wing anti-ice no longer needed:

VP-BWW, VP-BWX

WING ANTI ICE selector OFF

L and R ISLN switches Off

▼ Continued on next page ▼

▼ Fuel Leak Engine continued ▼

27 Choose one:

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

►► **Go to step 30**

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

►► **Go to step 28**

28 PROGRESS PAGE 2 SELECT

29 TOTALIZER Select USE for TOTALIZER
to determine fuel remaining

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

31 GND PROX FLAP OVRD switch OVRD

32 Use flaps 20 and VREF 20 for landing.

33 Use flaps 5 for go-around.

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

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

ENGINE SHUTDOWN

PACK OFF

▼ Continued on next page ▼

▼ Fuel Leak Engine continued ▼

36 Choose one:

◆ LOW FUEL message **not** shown:

▶▶ **Go to step 41**

◆ 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 37**

37 Fuel PUMP switches (all) ON

This ensures all fuel is available.

38 Plan to land at nearest suitable airport.

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

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

LOW FUEL

41 Checklist Complete Except Deferred Items

▼ Continued on next page ▼



▼Fuel Leak Engine 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 ▼

▼ Fuel Leak Engine 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

PRESS**FUEL PUMP**

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

Condition: The pump pressure is low.

- 1 Verify fuel quantity in each tank.
Low fuel pump pressure may be an indication of low fuel quantity.
- 2 Verify fuel pumps are on for any tank that has usable fuel.
- 3 Do not reset any tripped fuel pump circuit breaker or fuel pump control circuit breaker.

▼ Continued on next page ▼

▼ **FUEL PUMP** continued ▼

4 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 5**

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

C L and C R PUMP switches Off

FWD and AFT

FUEL XFEED switches. Off

▶▶ **Go to step 8**

5 PUMP switch (affected pump). Off

6 FWD and AFT FUEL XFEED switches On

7 **When** center tank fuel depleted:

Remaining C PUMP switch Off

FWD and AFT FUEL XFEED switches Off



8 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 FWD and AFT FUEL XFEED switches 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 Temperature Low

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.



**FUEL
CONFIG****LOW FUEL**

Messages: LOW FUEL

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

- 1 Avoid high nose up attitude. Make thrust changes slowly and smoothly. This reduces the possibility of uncovering fuel pumps.
- 2 The LOW FUEL message may be caused by an engine fuel leak or low fuel.
- 3 A fuel leak should be suspected if one or more of the following are true:

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

An engine has excessive fuel flow.

One main tank is abnormally low compared to the other main tank and to the expected fuel remaining in the tanks.

On PROGRESS page 2, the totalizer is less than the calculated fuel.

The TOTALIZER fuel is the sum of the individual fuel quantities.

The CALCULATED fuel in the totalizer value at engine start minus fuel used.

Fuel used is calculated using the engine fuel flow sensors.

▼ Continued on next page ▼

▼ **LOW FUEL** continued ▼

VQ-BMQ, VQ-BPT

4 Choose one:

◆ **Indication** of engine fuel leak:

▶▶ **Go to the Fuel Leak Engine
checklist on page 12.7**

◆ **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 6**
VP-BDI through VP-BWX, VQ-BMU, VQ-BOG, VQ-BRA |

5 Choose one:

◆ **Indication** of engine fuel leak:

▶▶ **Go to the Fuel Leak Engine
checklist on page 12.14**

◆ **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 6**

▼ **Continued on next page** ▼



▼LOW FUEL continued▼

6 Fuel PUMP switches (all) ON

This ensures all fuel is available.

7 Plan to land at nearest suitable airport.

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





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

VP-BDI through VP-BOQ, VP-BRL through VQ-BRA

Messages: C HYD QTY
L HYD QTY

R HYD QTY

Condition: The hydraulic quantity is low.


RSVR

HYDRAULIC QUANTITY

VP-BOY, VP-BOZ

Messages: C HYD QTY
L HYD QTY

R 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

Left Autopilot is available.

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

▼ **Continued on next page** ▼



▼HYDRAULIC SYSTEM PRESSURE (C only) continued▼

11 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 ___

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.

▼ Continued on next page ▼

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

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

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

▼ **Continued on next page** ▼



▼HYDRAULIC SYSTEM PRESSURE (C only) continued▼

TAILSKID

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

▼ Continued on next page ▼

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

- 4 L ENG HYD PRIMARY PUMP switch Off
- 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

VP-BMC, VP-BOY, VP-BOZ

Left thrust reverser inop

- 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** ▼

VP-BMC, VP-BOY, VP-BOZ
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 Manual deployment is needed.
▼ 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.

VP-BMC, VP-BOY, VP-BOZ
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** ▼

Landing data **VREF 30 + 20__**,
Minimums

Approach briefing Completed

Altimeters

ALTN FLAPS selector Set to agree
with flap lever

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

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

VP-BMC, VP-BOY, VP-BOZ

Left and Right thrust reversers inop

▼ Continued on next page ▼



▼ HYDRAULIC SYSTEM PRESSURE (L and R) continued ▼

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

▼ Continued on next page ▼

▼ HYDRAULIC SYSTEM PRESSURE (L and R) continued ▼**Landing Checklist**

Speedbrake ARMED

Landing gear Down

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 Manually extend speedbrakes after landing.
- 12 Use flaps 20 and VREF 30 + 20 for landing.
- 13 Do **not** autoland.

Inoperative Items

Right and Center autopilots inop Left autopilot is available.
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

▼ **Continued on next page** ▼

▼ **HYDRAULIC SYSTEM PRESSURE (R and C) continued ▼**
VP-BMC, VP-BOY, VP-BOZ
Right thrust reverser inop

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

▼ **Continued on next page ▼**



▼ HYDRAULIC SYSTEM PRESSURE (R and C) continued ▼

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

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



ALTN GEAR EXTEND switch DN

After gear down lights illuminate:

Landing gear lever DN

▼ Continued on next page ▼

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

RESERVE BKS & STRG switch ON

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.





Non-Normal Checklists

Chapter NNC

Landing Gear

Section 14

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Intentionally
Blank

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 ___





Intentionally
Blank

ANTISKID

ANTISKID

VP-BDI through VP-BOY, VP-BRL through VQ-BRA

Messages: ANTISKID

Condition: An antiskid system fault occurs.

- 1 Braking effectiveness may be reduced.
- 2 AUTO BRAKES selector OFF
The autobrake system is inoperative.
- 3 Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter.
- 4 **Checklist Complete Except Deferred Items**

▼ Continued on next page ▼

▼ ANTISKID continued ▼

Deferred Items

LANDING PROCEDURE REVIEW

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

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

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

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 ____



ANTISKID

ANTISKID

VP-BOZ

Messages: ANTISKID

Condition: An antiskid system fault occurs.

- 1 ANTISKID switch ON
- 2 Braking effectiveness may be reduced.
- 3 AUTO BRAKES selector OFF
- The autobrake system is inoperative.
- 4 Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter.
- 5 **Checklist Complete Except Deferred Items**

Deferred Items

LANDING PROCEDURE REVIEW

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

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

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

Descent Checklist

Pressurization LDG ALT ____

▼ Continued on next page ▼

▼ ANTISKID continued ▼

Recall Checked
Autobrake **OFF**
Landing data VREF____, Minimums____
Approach briefing Completed

Approach Checklist

Altimeters ____

Landing Checklist

Speedbrake ARMED
Landing gear Down
Flaps ____





ANTISKID

ANTISKID OFF

Messages: ANTISKID OFF

Condition: The antiskid system power is off.

- 1 Braking effectiveness may be reduced.
- 2 AUTO BRAKES selector OFF
The autobrake system is inoperative.
- 3 Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter.
- 4 **Checklist Complete Except Deferred Items**

Deferred Items

LANDING PROCEDURE REVIEW

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

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

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

Descent Checklist

Pressurization LDG ALT__

Recall Checked

Autobrake **OFF**

▼ Continued on next page ▼

▼ ANTISKID OFF continued ▼

Landing data VREF____, Minimums____

Approach briefing Completed

Approach Checklist

Altimeters ____

Landing Checklist

Speedbrake ARMED

Landing gear Down

Flaps ____





**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

▶▶Go to step 3

3 Checklist Complete Except Deferred Items

Deferred Items

Descent Checklist

- Pressurization LDG ALT___
- Recall Checked
- Autobrake **OFF**
- Landing data VREF___, Minimums___
- Approach briefing Completed

▼ Continued on next page ▼

▼ AUTOBRAKES continued ▼

Approach Checklist

Altimeters _____

Landing Checklist

Speedbrake ARMED

Landing gear Down

Flaps _____





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**

Deferred Items

Descent Checklist

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

▼ Continued on next page ▼

▼ BRAKE SOURCE continued ▼

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.

VP-BOQ through VP-BRL, VQ-BRA

6 GND PROX/CONFIG GEAR OVRD switch . . . OVRD

VP-BDI, VP-BMC, VP-BWW through VQ-BPT

7 GND PROX GEAR OVRD switch OVRD

▼ **Continued on next page** ▼

▼DRAG BRACE continued▼

8 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

Landing Checklist

Speedbrake **DOWN**
Landing gear Down
Flaps **30**



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.

▼ Continued on next page ▼

▼ **GEAR DISAGREE** continued ▼

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 is **OFF**:

▶▶ **Go to step 2**

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

▶▶ **Go to step 5**

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

VP-BOQ through VP-BRL, VQ-BRA

GND PROX/CONFIG

GEAR OVRD switch OVRD

VP-BDI, VP-BMC, VP-BWW through VQ-BPT

GND PROX GEAR OVRD switch OVRD

Accomplish normal landing.


▼ **Continued on next page** ▼



▼ GEAR DISAGREE continued ▼

2 Choose one:

◆ Landing gear lever **moved** to the UP position after takeoff:

▶▶ **Go to step 3**

◆ Landing gear lever did **not** move to the UP position after takeoff:

▶▶ **Go to the Gear Lever Will Not Move Up checklist on page 14.22**



3 Landing gear lever UP

4 Choose one:

◆ GEAR DISAGREE message **blanks**:

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



◆ GEAR DISAGREE message **stays shown**:

Observe the gear extend or extended limit speed of 270 knots and .82 Mach.

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.



▼ Continued on next page ▼

▼ **GEAR DISAGREE** continued ▼

5 Landing gear lever OFF

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

6  **ALTN GEAR EXTEND** switch DN

7 Choose one:

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

Landing gear lever DN



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

►► **Go to step 8**

8 Plan to land on available gear.

9 Landing gear lever DN

VP-BOQ through VP-BRL, VQ-BRA

10 GND PROX/CONFIG GEAR OVRD switch . . . OVRD

VP-BDI, VP-BMC, VP-BWW through VQ-BPT

11 GND PROX GEAR OVRD switch OVRD

12 Use flaps 30 for landing.

This ensures slowest landing speed.

13 Do **not** arm speedbrake lever.

▼ **Continued on next page** ▼



▼GEAR DISAGREE continued▼

14 Choose one:

- ◆ Stopping distance is **not critical**:
Do **not** use thrust reversers.
▶▶ **Go to step 17**
- ◆ Stopping distance is **critical**:
▶▶ **Go to step 15**

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

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

17 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 ___

▼ Continued on next page ▼

▼ GEAR DISAGREE continued ▼

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 ChecklistSpeedbrake **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.



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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.

VP-BOQ through VP-BRL, VQ-BRA

- 7 GND PROX/CONFIG GEAR OVRD switch OVRD

VP-BDI, VP-BMC, VP-BWW through VQ-BPT

- 8 GND PROX GEAR OVRD switch OVRD

▼ Continued on next page ▼

▼SIDE BRACE continued▼

9 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

Landing Checklist

Speedbrake **DOWN**
Landing gear Down
Flaps **30**





TAILSKID

TAILSKID

Messages: TAILSKID

Condition: The tailskid is not in the commanded position.



TIRE PRESSURE

VP-BWW through VQ-BMQ, VQ-BPT

Messages: TIRE PRESSURE

Condition: One or more tire pressures are not normal.





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****VP-BMC, VP-BOY through VQ-BPT**

Message: ALT CALLOUTS

Condition: Altitude voice annunciations during approach are not supplied.

**Altitude Callouts****VP-BOQ**

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:

- Below 800 feet radio altitude and a thrust lever is near idle
- 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**VP-BDI, VP-BMC, VP-BWW through VQ-BPT**

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.

**PILOT RESPONSE****VP-BDI through VP-BOQ, VP-BWW through VQ-BMQ,
VQ-BOG through VQ-BRA**

Message: PILOT RESPONSE

Condition: Pilot action is not detected during a specified time.





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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 the
outflow valve indication
shows fully open to
depressurize the airplane
- 3 Level off at the lowest safe altitude.
- 4 Plan to land at the nearest suitable airport.

VP-BOQ

- 5 Choose one:

◆ Climb above 11,000 feet is **not needed**:

▶▶ **Go to step 6**

◆ Climb above 11,000 feet is **needed**:

PACK control selectors (both) OFF

This ensures cabin will remain
depressurized when outflow valve
closes automatically at 11,000 feet.

Do **not** accomplish the following checklist:

PACK OFF

▶▶ **Go to step 6**

▼ Continued on next page ▼

▼ Tail Strike continued ▼

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

CABIN AUTOMATIC INOPERATIVE



TCAS

VP-BDI through VQ-BMQ, VQ-BOG, VQ-BPT

Message: TCAS

Condition: TCAS system is failed.



TCAS OFF

VP-BDI through VQ-BMQ, VQ-BOG, VQ-BPT

Message: TCAS OFF

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



TERRAIN OVERRIDE

VP-BDI, VP-BMC, VP-BWW through VQ-BPT

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

VP-BDI, VP-BMC, VP-BWW through VQ-BPT

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.





767 Flight Crew Operations Manual

Operations Information

Chapter OI

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767 Flight Crew Operations Manual

Operational Information

Ops Info

Chapter OI

Section 1

Introduction

Note: This Section Reserved For Operator-Developed Information.



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Performance Inflight - QRH

Chapter PI-QRH

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Performance Inflight - QRH

Chapter PI-QRH

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 KG)				
		100	120	140	160	180
40000	PITCH ATT	4.0	4.0			
	V/S (FT/MIN)	1600	1000			
30000	PITCH ATT	4.5	4.0	4.0	4.0	4.0
	V/S (FT/MIN)	2700	2100	1700	1300	1000
20000	PITCH ATT	7.0	6.5	6.0	6.0	5.5
	V/S (FT/MIN)	4200	3400	2700	2300	1900
10000	PITCH ATT	10.5	9.0	8.5	8.0	7.5
	V/S (FT/MIN)	5600	4500	3700	3200	2700
SEA LEVEL	PITCH ATT	13.5	11.5	10.5	9.5	9.0
	V/S (FT/MIN)	6300	5100	4300	3600	3100

Cruise (.78/290)**Flaps Up, Set Thrust for Level Flight**

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG)				
		100	120	140	160	180
40000	PITCH ATT	2.0	2.5	3.5		
	%N1	88.1	92.1	97.5		
35000	PITCH ATT	1.5	2.0	2.5	3.0	3.5
	%N1	85.1	87.3	90.0	93.6	98.2
30000	PITCH ATT	1.0	1.5	2.0	2.0	2.5
	%N1	84.2	85.7	87.4	89.4	91.9
25000	PITCH ATT	1.0	1.5	2.0	2.5	3.0
	%N1	80.7	82.2	83.8	85.8	87.9
20000	PITCH ATT	1.0	1.5	2.0	2.5	3.0
	%N1	76.7	78.2	79.8	81.9	83.9
15000	PITCH ATT	1.0	1.5	2.0	2.5	3.0
	%N1	72.7	74.3	76.1	77.9	79.9

Descent (.78/290)**Flaps Up, Set Idle Thrust**

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG)				
		100	120	140	160	180
40000	PITCH ATT	-1.5	-0.5	0.0	0.5	1.0
	V/S (FT/MIN)	-2600	-2600	-2700	-2800	-3100
30000	PITCH ATT	-2.5	-1.5	-1.0	-0.5	0.0
	V/S (FT/MIN)	-2700	-2400	-2200	-2100	-2000
20000	PITCH ATT	-2.5	-1.5	-1.0	0.0	0.5
	V/S (FT/MIN)	-2400	-2100	-2000	-1900	-1800
10000	PITCH ATT	-2.5	-1.5	-1.0	-0.5	0.5
	V/S (FT/MIN)	-2100	-1900	-1700	-1700	-1600
SEA LEVEL	PITCH ATT	-3.0	-2.0	-1.0	-0.5	0.0
	V/S (FT/MIN)	-2000	-1700	-1600	-1500	-1500

Flight With Unreliable Airspeed / Turbulent Air Penetration

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

Holding (VREF30+80)

Flaps Up, Set Thrust for Level Flight

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG)				
		100	120	140	160	180
10000	PITCH ATT	4.0	4.5	5.0	5.0	5.0
	%N1	58.7	63.4	67.3	70.9	74.4
	KIAS	199	211	222	236	251
5000	PITCH ATT	4.0	4.5	5.0	5.0	5.0
	%N1	54.8	59.0	63.1	66.8	69.9
	KIAS	199	211	222	236	251

Terminal Area (5000 FT)

Set Thrust for Level Flight

FLAP POSITION (GEAR POSITION) (VREF + INCREMENT)		WEIGHT (1000 KG)				
		100	120	140	160	180
FLAPS UP (GEAR UP) (VREF30+80)	PITCH ATT	4.0	4.5	5.0	5.0	5.0
	%N1	55.6	60.1	64.6	68.0	71.1
	KIAS	199	211	222	236	251
FLAPS 1 (GEAR UP) (VREF30+60)	PITCH ATT	6.0	6.5	6.5	6.5	6.5
	%N1	56.6	61.6	65.8	69.4	72.9
	KIAS	179	191	202	216	231
FLAPS 5 (GEAR UP) (VREF30+40)	PITCH ATT	4.5	4.5	5.0	4.5	4.5
	%N1	59.0	64.1	68.3	72.4	75.7
	KIAS	159	171	182	196	211
FLAPS 15 (GEAR UP) (VREF30+20)	PITCH ATT	5.5	5.5	6.0	6.0	5.5
	%N1	61.1	65.9	70.6	74.3	77.6
	KIAS	139	151	162	176	191
FLAPS 20 (GEAR DOWN) (VREF30+20)	PITCH ATT	4.0	4.5	4.5	4.0	3.5
	%N1	67.6	72.9	77.5	81.6	85.4
	KIAS	139	151	162	176	191

Final Approach (1500 FT)

Gear Down, Set Thrust for 3° Glideslope

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG)				
		100	120	140	160	180
FLAPS 20 (VREF20 +10)	PITCH ATT	1.5	1.5	1.5	1.5	1.5
	%N1	48.0	51.8	55.6	59.2	62.6
	KIAS	138	150	162	172	184

Go-Around (VREF 30 + 20)

Flaps 20, Gear Up, Set Go-Around Thrust

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG)				
		100	120	140	160	180
10000	PITCH ATT	18.0	15.0	12.5	10.5	9.0
	V/S (FT/MIN)	4000	3300	2700	2300	2000
	KIAS	139	151	162	176	191
5000	PITCH ATT	21.5	17.5	15.0	12.5	10.5
	V/S (FT/MIN)	4500	3800	3200	2800	2400
	KIAS	139	151	162	176	191
SEA LEVEL	PITCH ATT	25.0	20.5	17.0	14.5	12.0
	V/S (FT/MIN)	5000	4200	3600	3200	2800
	KIAS	139	151	162	176	191

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

767 Flight Crew Operations Manual

Category C & D Brake

VREF (KIAS)

WEIGHT (1000 KG)	FLAPS		
	30	25	20
190	179	170	179
180	171	166	173
170	164	161	168
160	156	156	162
150	148	151	157
140	142	146	151
130	137	141	146
120	131	135	141
110	125	129	135
100	119	123	128



Performance Inflight - QRH

Advisory Information

Chapter PI-QRH

Section 11

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	150000 KG LANDING WEIGHT	PER 5000 KG ABV/ BLW 150000 KG	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	3200	110/-60	80	-130	440	50	-40	80	-70	250	80	170
MAX AUTO	5370	130/-130	150	-250	840	0	0	160	-160	600	0	0
AUTOBRAKE 4	5540	140/-140	160	-260	880	0	0	160	-160	630	0	0
AUTOBRAKE 3	6370	160/-160	190	-300	1040	0	-20	190	-190	710	0	0
AUTOBRAKE 2	7090	190/-190	220	-350	1190	50	-120	220	-210	630	110	110
AUTOBRAKE 1	7740	220/-220	250	-390	1360	170	-220	250	-230	580	480	620

Good Reported Braking Action

MAX MANUAL	4400	110/-100	120	-210	720	120	-110	120	-110	340	260	580
MAX AUTO	5380	130/-130	150	-250	860	20	0	160	-160	600	20	80
AUTOBRAKE 4	5540	140/-140	160	-260	880	10	0	160	-160	630	10	50
AUTOBRAKE 3	6370	160/-160	190	-300	1040	0	-20	190	-190	710	0	0

Medium Reported Braking Action

MAX MANUAL	6030	170/-160	190	-330	1190	300	-230	180	-170	440	690	1660
MAX AUTO	6060	170/-160	190	-330	1190	260	-160	190	-170	570	600	1580
AUTOBRAKE 4	6130	170/-160	190	-330	1200	240	-140	190	-180	610	530	1510
AUTOBRAKE 3	6670	180/-170	200	-350	1260	160	-100	200	-200	710	350	1100

Poor Reported Braking Action

MAX MANUAL	7790	240/-230	260	-480	1830	660	-440	250	-220	520	1450	3870
MAX AUTO	7790	240/-230	260	-480	1820	660	-440	250	-220	510	1460	3890
AUTOBRAKE 4	7790	240/-230	260	-480	1820	670	-430	250	-220	520	1460	3890
AUTOBRAKE 3	7870	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

	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	150000 KG LANDING WEIGHT	PER 5000 KG ABV/ BLW 150000 KG	PER 1000 FT ABV SEA LEVEL	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 10 KTS ABV VREF 30	ONE REV	NO REV
MAX MANUAL	3150	140/-70	80	-130	440	50	-40	80	-70	250	80	160
MAX AUTO	5220	210/-140	150	-240	830	0	0	150	-150	600	0	0
AUTOBRAKE 4	5380	220/-140	150	-250	870	0	0	160	-160	620	0	0
AUTOBRAKE 3	6180	260/-170	180	-300	1020	0	-10	190	-190	720	0	0
AUTOBRAKE 2	6930	280/-200	210	-340	1180	40	-110	210	-210	640	80	80
AUTOBRAKE 1	7590	300/-220	240	-390	1350	160	-210	240	-230	580	410	540

Good Reported Braking Action

MAX MANUAL	4340	160/-110	120	-210	720	120	-110	120	-110	350	240	540
MAX AUTO	5230	210/-140	150	-250	850	20	0	150	-150	600	20	80
AUTOBRAKE 4	5390	220/-140	150	-250	870	10	0	160	-160	620	10	50
AUTOBRAKE 3	6180	260/-170	180	-300	1020	0	-10	190	-190	720	0	0

Medium Reported Braking Action

MAX MANUAL	5960	230/-170	190	-330	1190	300	-240	180	-170	450	650	1540
MAX AUTO	5960	250/-170	190	-330	1190	280	-170	180	-170	560	600	1500
AUTOBRAKE 4	6020	250/-170	190	-330	1200	260	-150	190	-180	600	540	1430
AUTOBRAKE 3	6510	280/-180	200	-350	1250	170	-100	200	-190	720	360	1060

Poor Reported Braking Action

MAX MANUAL	7720	310/-230	260	-480	1830	680	-440	250	-220	520	1370	3600
MAX AUTO	7720	310/-230	260	-480	1830	680	-440	250	-220	520	1380	3610
AUTOBRAKE 4	7720	310/-230	260	-480	1830	680	-440	250	-220	520	1380	3610
AUTOBRAKE 3	7750	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	150000 KG LDG WT	PER 5000 KG ABV/BLW 150000KG	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	4210	90/-90	100	-170/570	90/-80	110/-110	420	0	0
AIR/GRD SYS (FLAPS 30)	VREF30	4130	160/-100	100	-170/570	90/-80	110/-110	440	0	0
ALL FLAPS AND SLATS UP LANDING	VREF30+50	4530	260/-110	130	-170/570	80/-70	130/-120	320	200	440
ANTI-SKID OFF (FLAPS 25)	VREF25	5920	160/-150	160	-290/1010	190/-160	160/-150	440	410	960
ANTI-SKID OFF (FLAPS 30)	VREF30	5770	230/-160	160	-290/1010	190/-160	160/-150	450	380	880
ENGINE FAILURE (FLAPS 20)	VREF20	3460	150/-80	90	-140/470	60/-50	90/-90	280	0	110
HYD SYS PRESS (C ONLY) (FLAPS 20)	VREF20	4140	110/-100	100	-160/530	70/-60	100/-100	380	140	300
HYD SYS PRESS (L ONLY) (FLAPS 25)	VREF25	3350	90/-80	80	-130/460	50/-50	80/-80	290	100	200
HYD SYS PRESS (L ONLY) (FLAPS 30)	VREF30	3300	130/-80	80	-130/460	60/-50	80/-80	300	90	190
HYD SYS PRESS (R ONLY) (FLAPS 25)	VREF25	3680	90/-90	90	-150/530	70/-60	90/-90	310	140	300
HYD SYS PRESS (R ONLY) (FLAPS 30)	VREF30	3620	140/-90	90	-150/530	70/-70	90/-90	330	130	280
HYD SYS PRESS (L AND C) (FLAPS 20)	VREF30+20	4890	190/-110	130	-180/600	100/-90	130/-130	510	230	510
HYD SYS PRESS (L AND R) (FLAPS 20)	VREF30+20	4570	180/-110	130	-180/610	110/-90	130/-120	420	260	570
HYD SYS PRESS (R AND C) (FLAPS 20)	VREF30+20	5800	240/-150	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	150000 KG LDG WT	PER 5000 KG ABV/BLW 150000KG	PER 1000FT ABV S.L.	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER10°C ABV/ BLW ISA	PER 10 KTS ABV VREF	ONE REV	NO REV
LE SLAT ASYM (FLAPS > 20)	VREF30+20	3670	180/-80	90	-140/480	60/-50	90/-90	270	120	260
LE SLAT ASYM (FLAPS = 20)	VREF30+30	4140	170/-90	110	-150/520	70/-60	110/-110	310	160	340
LE SLAT ASYM (5 < FLAPS < 20)	VREF30+40	4440	170/-100	120	-160/540	80/-70	120/-120	320	180	390
LE SLAT DISAGREE (FLAPS > 20)	VREF20	3390	140/-80	80	-130/450	50/-50	80/-80	260	100	220
LE SLAT DISAGREE - ALTN FLAP EXT ACCOMPLISHED (FLAPS = 20)	VREF20	3390	140/-80	80	-130/450	50/-50	80/-80	260	100	220
LE SLAT DISAGREE - ALTN FLAP EXT FAILED (FLAPS = 20)	VREF30+30	3940	180/-90	100	-150/500	60/-60	100/-100	280	140	290
REVERSER UNLOCKED (FLAPS 20)	VREF30+30	4260	180/-100	110	-160/540	80/-70	120/-110	330	0	180
TE FLAP ASYM (FLAPS ≥ 20)	VREF20	3390	140/-80	80	-130/450	50/-50	80/-80	260	100	220
TE FLAP ASYM (5 < FLAPS < 20)	VREF30+20	3670	180/-80	90	-140/480	60/-50	90/-90	270	120	260
TE FLAP ASYM (FLAPS ≤ 5)	VREF30+30	3890	210/-90	100	-150/490	60/-50	100/-100	270	130	290
TE FLAP DISAGREE (FLAPS ≥ 20)	VREF20	3390	140/-80	80	-130/450	50/-50	80/-80	260	100	220
TE FLAP DISAGREE (5 < FLAPS < 20)	VREF30+20	3670	180/-80	90	-140/480	60/-50	90/-90	270	120	260
TE FLAP DISAGREE (FLAPS ≤ 5)	VREF30+30	3890	210/-90	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	150000 KG LDG WT	PER 5000 KG ABV/BLW 150000KG	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	6240	150/-150	180	-300/1010	270/-220	180/-180	620	0	0
AIR/GRD SYS (FLAPS 30)	VREF30	6090	250/-150	180	-300/1010	280/-230	180/-180	640	0	0
ALL FLAPS AND SLATS UP LANDING	VREF30+50	6220	220/-160	190	-250/860	160/-150	190/-180	380	530	1220
ANTI-SKID OFF (FLAPS 25)	VREF25	6660	190/-180	190	-350/1240	290/-230	190/-180	490	630	1530
ANTI-SKID OFF (FLAPS 30)	VREF30	6500	260/-180	190	-350/1240	290/-230	190/-180	490	590	1410
ENGINE FAILURE (FLAPS 20)	VREF20	4980	150/-130	140	-230/800	160/-140	140/-140	410	0	410
HYD SYS PRESS (C ONLY) (FLAPS 20)	VREF20	5600	170/-150	160	-250/840	170/-150	160/-150	510	430	1010
HYD SYS PRESS (L ONLY) (FLAPS 25)	VREF25	4620	130/-120	130	-220/750	140/-120	130/-120	390	300	680
HYD SYS PRESS (L ONLY) (FLAPS 30)	VREF30	4550	190/-120	130	-220/750	140/-120	130/-120	400	280	640
HYD SYS PRESS (R ONLY) (FLAPS 25)	VREF25	4620	130/-120	130	-220/750	140/-120	130/-120	390	300	680
HYD SYS PRESS (R ONLY) (FLAPS 30)	VREF30	4550	190/-120	130	-220/750	140/-120	130/-120	400	280	640
HYD SYS PRESS (L AND C) (FLAPS 20)	VREF30+20	6580	280/-180	200	-280/940	230/-190	200/-190	640	650	1560
HYD SYS PRESS (L AND R) (FLAPS 20)	VREF30+20	5760	240/-160	180	-250/860	190/-170	180/-170	510	530	1250
HYD SYS PRESS (R AND C) (FLAPS 20)	VREF30+20	6580	280/-180	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 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	
		150000 KG LDG WT	PER 5000 KG ABV/BLW 150000KG	PER 1000FT 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	5130	200/-130	150	-230/790	150/-130	150/-140	380	380	860
LE SLAT ASYM (FLAPS = 20)	VREF30+30	5770	220/-150	170	-250/840	170/-150	170/-170	420	470	1080
LE SLAT ASYM (5 < FLAPS < 20)	VREF30+40	6180	230/-160	190	-260/870	180/-160	190/-180	430	520	1190
LE SLAT DISAGREE (FLAPS > 20)	VREF20	4730	140/-130	130	-220/750	130/-120	130/-130	370	330	750
LE SLAT DISAGREE - ALTN FLAP EXT ACCOMPLISHED (FLAPS = 20)	VREF20	4730	140/-130	130	-220/750	130/-120	130/-130	370	330	750
LE SLAT DISAGREE - ALTN FLAP EXT FAILED (FLAPS = 20)	VREF30+30	5500	200/-140	160	-240/810	150/-140	160/-160	380	420	950
REVERSER UNLOCKED (FLAPS 20)	VREF30+30	6160	230/-160	180	-270/900	210/-180	190/-180	470	0	590
TE FLAP ASYM (FLAPS ≥ 20)	VREF20	4730	140/-130	130	-220/750	130/-120	130/-130	370	330	750
TE FLAP ASYM (5 < FLAPS < 20)	VREF30+20	5140	200/-140	150	-230/790	140/-130	150/-140	380	380	880
TE FLAP ASYM (FLAPS ≤ 5)	VREF30+30	5470	200/-140	160	-230/810	150/-130	160/-150	370	430	980
TE FLAP DISAGREE (FLAPS ≥ 20)	VREF20	4730	140/-130	130	-220/750	130/-120	130/-130	370	330	750
TE FLAP DISAGREE (5 < FLAPS < 20)	VREF30+20	5140	200/-140	150	-230/790	140/-130	150/-140	380	380	880
TE FLAP DISAGREE (FLAPS ≤ 5)	VREF30+30	5470	200/-140	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	150000 KG LDG WT	PER 5000 KG ABV/BLW 150000KG	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	9940	240/-230	310	-560/1950	1000/-670	320/-320	870	0	0
AIR/GRD SYS (FLAPS 30)	VREF30	9650	370/-230	310	-550/1940	1000/-670	320/-320	870	0	0
ALL FLAPS AND SLATS UP LANDING	VREF30+50	8820	340/-250	300	-400/1400	410/-330	300/-270	520	1430	3670
ANTI-SKID OFF (FLAPS 25)	VREF25	8370	260/-250	260	-500/1870	640/-440	250/-230	560	1370	3680
ANTI-SKID OFF (FLAPS 30)	VREF30	8180	350/-250	260	-500/1870	650/-440	250/-230	560	1290	3390
ENGINE FAILURE (FLAPS 20)	VREF20	7250	240/-220	230	-390/1360	440/-340	230/-220	560	0	1250
HYD SYS PRESS (C ONLY) (FLAPS 20)	VREF20	7520	260/-230	240	-380/1340	400/-310	240/-220	630	1120	2890
HYD SYS PRESS (L ONLY) (FLAPS 25)	VREF25	6320	190/-190	200	-340/1220	330/-260	200/-180	490	780	1900
HYD SYS PRESS (L ONLY) (FLAPS 30)	VREF30	6220	280/-190	200	-340/1220	340/-260	200/-180	500	740	1780
HYD SYS PRESS (R ONLY) (FLAPS 25)	VREF25	6320	190/-190	200	-340/1220	330/-260	200/-180	490	780	1900
HYD SYS PRESS (R ONLY) (FLAPS 30)	VREF30	6220	280/-190	200	-340/1220	340/-260	200/-180	500	740	1780
HYD SYS PRESS (L AND C) (FLAPS 20)	VREF30+20	8720	390/-260	290	-420/1460	500/-390	290/-260	740	1530	4090
HYD SYS PRESS (L AND R) (FLAPS 20)	VREF30+20	7850	350/-240	270	-390/1370	430/-340	260/-240	620	1300	3370
HYD SYS PRESS (R AND C) (FLAPS 20)	VREF30+20	8720	390/-260	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 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	
		150000 KG LDG WT	PER 5000 KG ABV/BLW 150000 KG	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	7070	290/-210	230	-360/1280	350/-280	230/-210	490	980	2430
LE SLAT ASYM (FLAPS = 20)	VREF30+30	7900	320/-230	260	-380/1350	390/-320	260/-240	530	1170	2930
LE SLAT ASYM (5 < FLAPS < 20)	VREF30+40	8430	340/-250	290	-400/1380	410/-330	280/-260	540	1340	3430
LE SLAT DISAGREE (FLAPS > 20)	VREF20	6540	220/-200	210	-340/1230	330/-260	200/-190	490	880	2200
LE SLAT DISAGREE - ALTN FLAP EXT ACCOMPLISHED (FLAPS = 20)	VREF20	6540	220/-200	210	-340/1230	330/-260	200/-190	490	880	2200
LE SLAT DISAGREE - ALTN FLAP EXT FAILED (FLAPS = 20)	VREF30+30	7550	300/-220	250	-370/1310	360/-290	250/-230	490	1050	2620
REVERSER UNLOCKED (FLAPS 20)	VREF30+30	8860	360/-260	290	-430/1510	530/-420	290/-280	610	0	1680
TE FLAP ASYM (FLAPS ≥ 20)	VREF20	6540	220/-200	210	-340/1230	330/-260	200/-190	490	880	2200
TE FLAP ASYM (5 < FLAPS < 20)	VREF30+20	7120	300/-210	230	-360/1280	350/-280	230/-210	490	1010	2540
TE FLAP ASYM (FLAPS ≤ 5)	VREF30+30	7590	310/-220	250	-370/1310	360/-290	250/-230	490	1110	2810
TE FLAP DISAGREE (FLAPS ≥ 20)	VREF20	6540	220/-200	210	-340/1230	330/-260	200/-190	490	880	2200
TE FLAP DISAGREE (5 < FLAPS < 20)	VREF30+20	7120	300/-210	230	-360/1280	350/-280	230/-210	490	1010	2540
TE FLAP DISAGREE (FLAPS ≤ 5)	VREF30+30	7590	310/-220	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	
		150000 KG LDG WT	PER 5000 KG ABV/BLW 150000 KG	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	16490	320/-200	570	-1120/4230	6080/-2020	600/-590	1090	0	0
AIR/GRD SYS (FLAPS 30)	VREF30	15920	480/-200	550	-1100/4180	5960/-1970	580/-570	1080	0	0
ALL FLAPS AND SLATS UP LANDING	VREF30+50	11600	480/-370	430	-590/2140	900/-630	410/-370	640	3020	8970
ANTI-SKID OFF (FLAPS 25)	VREF25	10950	380/-360	370	-800/3310	3040/-940	350/-310	630	3540	14250
ANTI-SKID OFF (FLAPS 30)	VREF30	10760	480/-360	360	-800/3310	3040/-950	350/-310	630	3380	13380
ENGINE FAILURE (FLAPS 20)	VREF20	9970	360/-320	340	-600/2200	1100/-700	330/-310	690	0	3070
HYD SYS PRESS (C ONLY) (FLAPS 20)	VREF20	9560	360/-310	330	-550/2030	840/-570	320/-290	710	2280	6740
HYD SYS PRESS (L ONLY) (FLAPS 25)	VREF25	8130	280/-260	280	-500/1870	710/-480	270/-240	560	1610	4380
HYD SYS PRESS (L ONLY) (FLAPS 30)	VREF30	8030	370/-270	280	-500/1870	730/-490	270/-240	570	1530	4080
HYD SYS PRESS (R ONLY) (FLAPS 25)	VREF25	8130	280/-260	280	-500/1870	710/-480	270/-240	560	1610	4380
HYD SYS PRESS (R ONLY) (FLAPS 30)	VREF30	8030	370/-270	280	-500/1870	730/-490	270/-240	570	1530	4080
HYD SYS PRESS (L AND C) (FLAPS 20)	VREF30+20	10910	510/-360	400	-600/2160	990/-670	380/-340	800	2910	8920
HYD SYS PRESS (L AND R) (FLAPS 20)	VREF30+20	10000	460/-330	360	-560/2060	890/-610	350/-310	690	2540	7490
HYD SYS PRESS (R AND C) (FLAPS 20)	VREF30+20	10910	510/-360	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 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
		150000 KG LDG WT	PER 5000 KG ABV/BLW 150000 KG	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	9120	400/-290	320	-530/1950	760/-520	310/-280	570	2010 5610
LE SLAT ASYM (FLAPS = 20)	VREF30+30	10100	430/-320	360	-560/2040	820/-570	350/-320	600	2310 6530
LE SLAT ASYM (5 < FLAPS < 20)	VREF30+40	10880	460/-350	400	-570/2100	870/-610	380/-340	630	2700 7890
LE SLAT DISAGREE (FLAPS > 20)	VREF20	8500	320/-280	290	-510/1900	730/-500	280/-260	580	1860 5230
LE SLAT DISAGREE - ALTN FLAP EXT ACCOMPLISHED (FLAPS = 20)	VREF20	8500	320/-280	290	-510/1900	730/-500	280/-260	580	1860 5230
LE SLAT DISAGREE - ALTN FLAP EXT FAILED (FLAPS = 20)	VREF30+30	9680	410/-310	340	-540/1990	780/-540	330/-300	560	2120 5910
REVERSER UNLOCKED (FLAPS 20)	VREF30+30	11960	500/-380	420	-660/2380	1260/-830	410/-390	730	0 3880
TE FLAP ASYM (FLAPS ≥ 20)	VREF20	8500	320/-280	290	-510/1900	730/-500	280/-260	580	1860 5230
TE FLAP ASYM (5 < FLAPS < 20)	VREF30+20	9250	410/-300	330	-530/1960	760/-520	320/-280	590	2160 6210
TE FLAP ASYM (FLAPS ≤ 5)	VREF30+30	9820	420/-310	350	-540/2000	780/-540	340/-300	580	2290 6540
TE FLAP DISAGREE (FLAPS ≥ 20)	VREF20	8500	320/-280	290	-510/1900	730/-500	280/-260	580	1860 5230
TE FLAP DISAGREE (5 < FLAPS < 20)	VREF30+20	9250	410/-300	330	-530/1960	760/-520	320/-280	590	2160 6210
TE FLAP DISAGREE (FLAPS ≤ 5)	VREF30+30	9820	420/-310	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 KG)	OAT (°C)	PRESSURE ALTITUDE (1000 FT)																	
		0	2	4	0	2	4	0	2	4	0	2	4	0	2	4	0	2	4
180	0	15.1	16.1	17.0	22.8	24.3	25.8	31.8	33.9	35.9	41.8	44.6	47.4	52.7	56.3	59.9			
	10	15.7	16.6	17.6	23.6	25.1	26.6	32.9	35.0	37.2	43.2	46.1	49.1	54.5	58.3	62.0			
	20	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	60.3	64.2			
	30	16.7	17.7	18.7	25.2	26.8	28.4	35.0	37.4	39.7	46.1	49.2	52.3	58.2	62.2	66.2			
	40	16.9	18.0	19.0	25.6	27.3	29.0	35.8	38.2	40.5	47.2	50.4	53.6	59.6	63.7	67.9			
160	0	13.7	14.5	15.3	20.6	21.9	23.2	28.5	30.4	32.3	37.5	40.0	42.5	47.2	50.4	53.6	57.6	61.6	65.6
	10	14.1	15.0	15.9	21.3	22.6	24.0	29.5	31.5	33.4	38.8	41.4	44.0	48.9	52.2	55.5	59.6	63.8	67.9
	20	14.6	15.5	16.4	22.0	23.4	24.8	30.5	32.5	34.5	40.1	42.8	45.4	50.5	54.0	57.4	61.7	65.9	70.2
	30	15.0	16.0	16.9	22.7	24.1	25.5	31.5	33.5	35.6	41.3	44.1	46.9	52.1	55.7	59.3	63.7	68.1	72.5
	40	15.3	16.2	17.2	23.1	24.5	26.0	32.1	34.2	36.3	42.3	45.1	48.0	53.4	57.0	60.7	65.2	69.8	74.3
140	0	12.2	13.0	13.7	18.3	19.4	20.6	25.3	26.9	28.6	33.1	35.3	37.4	41.5	44.3	47.1	50.6	54.0	57.5
	10	12.7	13.4	14.2	18.9	20.1	21.3	26.2	27.9	29.5	34.2	36.5	38.8	43.0	45.9	48.8	52.4	56.0	59.6
	20	13.1	13.9	14.6	19.6	20.8	22.0	27.0	28.8	30.5	35.4	37.7	40.1	44.4	47.4	50.5	54.1	57.8	61.6
	30	13.5	14.3	15.1	20.2	21.4	22.7	27.9	29.7	31.5	36.5	38.9	41.3	45.9	49.0	52.1	55.9	59.7	63.6
	40	13.7	14.5	15.3	20.5	21.8	23.1	28.4	30.3	32.1	37.3	39.8	42.2	46.9	50.1	53.3	57.2	61.2	65.1
120	0	10.8	11.5	12.1	16.0	17.0	18.0	22.0	23.4	24.8	28.6	30.5	32.3	35.7	38.1	40.5	43.3	46.2	49.1
	10	11.2	11.9	12.5	16.6	17.6	18.6	22.8	24.2	25.7	29.6	31.5	33.4	37.0	39.4	41.9	44.8	47.8	50.9
	20	11.6	12.2	12.9	17.1	18.2	19.3	23.5	25.0	26.5	30.6	32.6	34.6	38.2	40.7	43.3	46.3	49.4	52.6
	30	11.9	12.6	13.3	17.7	18.8	19.9	24.2	25.8	27.3	31.5	33.6	35.7	39.4	42.0	44.7	47.8	51.0	54.3
	40	12.1	12.8	13.5	18.0	19.1	20.2	24.7	26.3	27.9	32.2	34.3	36.4	40.3	43.0	45.7	48.9	52.2	55.6
100	0	9.4	10.0	10.5	13.8	14.6	15.5	18.7	19.8	21.0	24.0	25.5	27.1	29.7	31.6	33.6	35.7	38.0	40.4
	10	9.8	10.3	10.9	14.3	15.1	16.0	19.3	20.5	21.7	24.8	26.4	28.0	30.7	32.7	34.7	36.9	39.4	41.8
	20	10.1	10.7	11.2	14.7	15.6	16.5	20.0	21.2	22.5	25.7	27.3	29.0	31.7	33.8	35.9	38.2	40.7	43.2
	30	10.4	11.0	11.6	15.2	16.1	17.0	20.6	21.9	23.2	26.5	28.2	29.9	32.7	34.9	37.0	39.4	42.0	44.6
	40	10.5	11.1	11.7	15.4	16.4	17.3	20.9	22.3	23.6	27.0	28.7	30.5	33.4	35.6	37.8	40.2	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
LANDING	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
	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	NO SPECIAL	PROCEDURE REQUIRED	1	1	2	2	3	4	6	CAUTION	FUSE PLUG MELT ZONE		
GEAR DOWN			11	15	19	24	34	44	59				
GROUND													

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 THRUST

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)	
KLAS	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)	
KLAS	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)	
KLAS	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)	
KLAS	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)	
KLAS	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)	
KLAS	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 THRUST

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)														
CIAS	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)														
CIAS	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)														
CIAS	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)														
CIAS	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)														
CIAS	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)														
CIAS	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 THRUST

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)							
KLAS	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	103.8	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)							
KLAS	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)							
KLAS	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)							
KLAS	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 KG)		OPTIMUM DRIFTDOWN SPEED (KIAS)	LEVEL OFF ALTITUDE (FT)		
START DRIFT DOWN	LEVEL OFF		ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
190	183	276	18400	17400	15600
180	174	269	20000	19100	17700
170	165	262	21200	20600	19700
160	155	254	22600	21900	21000
150	145	247	24000	23200	22300
140	135	238	25500	24700	23700
130	126	230	27200	26700	25500
120	116	221	29100	28900	28100
110	106	212	30900	30900	30500
100	97	202	32900	32800	32600

Includes APU fuel burn.

ENGINE INOP

MAX CONTINUOUS THRUST

Driftdown/LRC Cruise Range Capability

Ground to Air Miles Conversion

AIR DISTANCE (NM)					GROUND DISTANCE (NM)	AIR DISTANCE (NM)				
HEADWIND COMPONENT (KTS)						TAILWIND COMPONENT (KTS)				
100	80	60	40	20		20	40	60	80	100
274	255	239	224	211	200	190	180	172	164	157
547	510	477	448	423	400	380	361	344	329	315
819	763	715	672	634	600	570	542	517	494	473
1090	1016	952	895	845	800	760	723	690	660	632
1361	1269	1189	1119	1056	1000	950	904	863	825	790
1632	1522	1426	1342	1267	1200	1140	1085	1036	990	949
1902	1775	1664	1565	1478	1400	1330	1266	1208	1156	1107
2174	2029	1901	1789	1689	1600	1520	1447	1381	1321	1266
2447	2283	2139	2013	1900	1800	1710	1628	1554	1486	1424

Driftdown/Cruise Fuel and Time

AIR DIST (NM)	FUEL REQUIRED (1000 KG)										TIME (HR:MIN)
	WEIGHT AT START OF DRIFTDOWN (1000 KG)										
	100	110	120	130	140	150	160	170	180	190	
200	1.5	1.7	1.8	1.9	2.1	2.1	2.3	2.4	2.5	2.6	0:33
400	3.4	3.7	4.0	4.3	4.6	4.9	5.2	5.4	5.8	6.0	1:05
600	5.2	5.7	6.1	6.6	7.0	7.5	7.9	8.3	8.8	9.3	1:36
800	6.9	7.5	8.1	8.8	9.4	10.0	10.6	11.2	11.8	12.4	2:08
1000	8.6	9.4	10.1	10.9	11.7	12.4	13.2	13.9	14.7	15.5	2:39
1200	10.2	11.2	12.1	13.1	14.0	14.9	15.8	16.7	17.6	18.5	3:10
1400	11.9	13.0	14.0	15.2	16.3	17.3	18.4	19.4	20.5	21.5	3:42
1600	13.5	14.8	16.0	17.2	18.5	19.6	20.9	22.0	23.3	24.5	4:14
1800	15.1	16.5	17.8	19.2	20.6	22.0	23.3	24.6	26.0	27.4	4:45

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 KG)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
190	15400	13000	10200
185	16300	14200	11400
180	17200	15300	12700
175	18200	16500	13900
170	19100	17600	15200
165	20000	18700	16400
160	20700	19700	17800
155	21400	20500	19100
150	22100	21200	20200
145	22800	21900	20900
140	23600	22600	21600
135	24300	23400	22300
130	25100	24100	23000
125	26100	24900	23700
120	27200	26200	24500
115	28300	27600	25700
110	29400	29000	27400
105	30500	30300	29100
100	31400	31300	30500

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 KG)		PRESSURE ALTITUDE (1000 FT)								
		10	14	18	21	23	25	27	29	31
190	%N1	98.8	102.4							
	MACH	.583	.616							
	KIAS	324	318							
	FF/ENG	6358	6418							
180	%N1	97.2	100.7	105.0						
	MACH	.572	.605	.641						
	KIAS	317	312	307						
	FF/ENG	6000	6034	6176						
170	%N1	95.6	99.0	102.9						
	MACH	.559	.593	.628						
	KIAS	310	306	300						
	FF/ENG	5646	5675	5766						
160	%N1	93.9	97.2	100.8	104.3					
	MACH	.545	.580	.614	.643					
	KIAS	303	299	294	290					
	FF/ENG	5286	5313	5367	5482					
150	%N1	92.1	95.3	98.8	101.9	104.6				
	MACH	.532	.567	.601	.628	.647				
	KIAS	295	292	287	283	281				
	FF/ENG	4945	4965	4991	5067	5157				
140	%N1	90.3	93.4	96.8	99.6	101.8				
	MACH	.518	.551	.587	.612	.632				
	KIAS	287	283	280	276	273				
	FF/ENG	4609	4607	4633	4669	4732				
130	%N1	88.4	91.4	94.7	97.3	99.3	101.6			
	MACH	.503	.535	.571	.597	.615	.635			
	KIAS	278	275	272	268	266	263			
	FF/ENG	4279	4262	4280	4301	4328	4393			
120	%N1	86.3	89.3	92.4	95.0	96.8	98.8	101.3		
	MACH	.487	.518	.553	.580	.598	.616	.636		
	KIAS	269	266	263	261	258	255	253		
	FF/ENG	3955	3927	3928	3944	3959	3986	4051		
110	%N1	84.0	87.1	90.1	92.6	94.3	96.2	98.2	100.7	
	MACH	.470	.501	.534	.562	.580	.598	.617	.637	
	KIAS	260	257	254	252	250	248	245	243	
	FF/ENG	3634	3599	3585	3597	3606	3617	3642	3703	
100	%N1	81.5	84.6	87.6	90.0	91.7	93.4	95.3	97.3	99.9
	MACH	.450	.482	.514	.540	.559	.578	.597	.615	.636
	KIAS	249	247	244	242	241	239	237	234	232
	FF/ENG	3300	3279	3253	3247	3260	3267	3277	3297	3350



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
287	264	244	227	213	200	190	181	173	166	159
575	529	489	455	426	400	381	363	347	332	319
864	796	735	684	640	600	571	544	520	498	478
1155	1063	982	913	853	800	761	726	693	664	637
1446	1331	1228	1142	1067	1000	952	907	866	829	796
1738	1598	1475	1370	1281	1200	1142	1088	1039	995	955
2032	1868	1723	1600	1495	1400	1332	1269	1212	1160	1113
2327	2138	1971	1830	1709	1600	1522	1451	1385	1325	1271
2623	2409	2219	2060	1923	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		26	
	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)
200	2.6	0:41	2.3	0:40	2.0	0:38	1.9	0:37	1.7	0:36
400	5.4	1:17	4.9	1:15	4.6	1:12	4.3	1:09	4.2	1:07
600	8.1	1:54	7.6	1:50	7.1	1:45	6.8	1:41	6.6	1:37
800	10.8	2:32	10.2	2:25	9.6	2:19	9.2	2:14	8.9	2:08
1000	13.5	3:09	12.7	3:01	12.1	2:53	11.5	2:46	11.3	2:39
1200	16.2	3:47	15.3	3:37	14.5	3:27	13.9	3:19	13.6	3:11
1400	18.8	4:26	17.8	4:14	16.9	4:02	16.2	3:52	15.8	3:42
1600	21.4	5:04	20.2	4:50	19.3	4:36	18.5	4:25	18.1	4:14
1800	24.0	5:43	22.7	5:27	21.6	5:12	20.7	4:58	20.3	4:45

Fuel Required Adjustment (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG)				
	100	120	140	160	180
2	-0.3	-0.1	0.0	0.2	0.4
4	-0.6	-0.3	0.0	0.5	0.9
6	-1.0	-0.5	0.0	0.7	1.4
8	-1.3	-0.6	0.0	1.0	2.0
10	-1.6	-0.8	0.0	1.3	2.5
12	-2.0	-1.0	0.0	1.6	3.0
14	-2.3	-1.2	0.0	1.8	3.6
16	-2.7	-1.3	0.0	2.1	4.1
18	-3.0	-1.5	0.0	2.4	4.7
20	-3.4	-1.7	0.0	2.6	5.2
22	-3.7	-1.8	0.0	2.9	5.7
24	-4.1	-2.0	0.0	3.1	6.3
26	-4.4	-2.2	0.0	3.4	6.8
28	-4.8	-2.3	0.0	3.6	7.4
30	-5.1	-2.5	0.0	3.8	7.9

Includes APU fuel burn.

ENGINE INOP

MAX CONTINUOUS THRUST

Holding Flaps Up

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)						
		1500	5000	10000	15000	20000	25000	30000
190	%N1	87.3	90.3	94.9	100.2			
	KIAS	259	259	259	259			
	FF/ENG	5450	5490	5600	5810			
180	%N1	85.5	88.7	93.1	98.2	105.4		
	KIAS	251	251	251	251	251		
	FF/ENG	5140	5170	5250	5410	5770		
170	%N1	83.8	86.9	91.3	96.2	102.4		
	KIAS	244	244	244	244	244		
	FF/ENG	4840	4850	4910	5040	5310		
160	%N1	82.0	85.0	89.4	94.2	99.9		
	KIAS	236	236	236	236	236		
	FF/ENG	4530	4540	4580	4680	4890		
150	%N1	79.8	83.0	87.5	92.1	97.5		
	KIAS	228	228	228	228	228		
	FF/ENG	4230	4240	4260	4330	4490		
140	%N1	77.6	81.0	85.4	90.0	95.0	101.7	
	KIAS	222	222	222	222	222	222	
	FF/ENG	3940	3940	3950	4000	4120	4370	
130	%N1	75.5	78.6	83.2	87.7	92.5	98.4	
	KIAS	217	217	217	217	217	217	
	FF/ENG	3660	3650	3660	3690	3770	3950	
120	%N1	73.2	76.2	81.0	85.5	90.1	95.4	
	KIAS	211	211	211	211	211	211	
	FF/ENG	3380	3370	3370	3390	3440	3560	
110	%N1	70.6	73.9	78.4	83.0	87.6	92.6	99.0
	KIAS	205	205	205	205	205	205	205
	FF/ENG	3120	3100	3090	3100	3140	3220	3410
100	%N1	67.9	71.2	75.7	80.5	85.0	89.7	95.3
	KIAS	199	199	199	199	199	199	199
	FF/ENG	2850	2840	2830	2820	2840	2890	3020

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



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

GEAR DOWN

Long Range Cruise Altitude Capability

WEIGHT (1000 KG)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
190	19800	18200	14800
185	20700	19300	17400
180	21700	20300	18600
175	22700	21200	19800
170	23700	22200	20800
165	24800	23200	21700
160	25800	24100	22700
155	26800	25200	23700
150	27600	26400	24800
145	28500	27700	26100
140	29300	29000	27500
135	30000	30000	29000
130	30700	30700	30100
125	31400	31400	30900
120	32200	32100	31700
115	32900	32900	32500
110	33700	33600	33300
105	34500	34400	34200
100	35300	35200	35000
95	36100	36100	35800
90	36900	36900	36600



GEAR DOWN

Long Range Cruise Control

WEIGHT (1000 KG)		PRESSURE ALTITUDE (1000 FT)										
		10	14	18	21	23	25	27	29	31	33	35
190	%N1	91.6	95.1	99.1								
	MACH	.472	.508	.546								
	KIAS	261	261	260								
	FF/ENG	4765	4811	4928								
180	%N1	90.0	93.4	97.3	100.6							
	MACH	.461	.495	.534	.563							
	KIAS	255	254	254	253							
	FF/ENG	4490	4522	4612	4715							
170	%N1	88.4	91.7	95.4	98.5	101.0						
	MACH	.449	.483	.520	.550	.571						
	KIAS	248	248	247	246	246						
	FF/ENG	4225	4241	4295	4386	4471						
160	%N1	86.8	89.9	93.5	96.5	98.6	101.4					
	MACH	.437	.469	.506	.536	.555	.577					
	KIAS	241	240	240	240	239	238					
	FF/ENG	3963	3961	4000	4072	4126	4222					
150	%N1	84.8	88.1	91.5	94.3	96.4	98.7	101.6				
	MACH	.424	.456	.491	.520	.540	.561	.583				
	KIAS	234	233	233	232	232	231	231				
	FF/ENG	3703	3693	3717	3758	3812	3868	3966				
140	%N1	82.8	86.2	89.5	92.2	94.2	96.3	98.7	101.9			
	MACH	.411	.442	.476	.504	.524	.544	.565	.587			
	KIAS	227	226	225	225	225	224	224	223			
	FF/ENG	3443	3434	3440	3465	3502	3549	3611	3704			
130	%N1	81.0	84.1	87.3	90.0	91.8	93.9	96.0	98.6	102.0		
	MACH	.398	.427	.460	.487	.506	.527	.548	.570	.591		
	KIAS	220	219	218	217	217	217	216	216	214		
	FF/ENG	3205	3176	3170	3187	3205	3244	3286	3353	3436		
120	%N1	78.7	81.8	85.2	87.7	89.5	91.3	93.4	95.6	98.3	101.8	
	MACH	.385	.411	.443	.469	.488	.508	.529	.550	.572	.593	
	KIAS	212	210	210	209	209	209	209	208	207	206	
	FF/ENG	2974	2918	2912	2913	2927	2944	2981	3022	3090	3165	
110	%N1	76.1	79.6	82.8	85.3	87.0	88.8	90.7	92.7	95.0	97.7	101.5
	MACH	.369	.396	.426	.451	.469	.488	.508	.529	.551	.574	.595
	KIAS	203	203	201	201	200	200	200	200	199	199	197
	FF/ENG	2726	2685	2658	2653	2654	2668	2682	2717	2759	2822	2895
100	%N1	73.5	76.9	80.1	82.7	84.4	86.0	87.9	89.8	91.9	94.1	96.9
	MACH	.353	.380	.408	.432	.449	.467	.487	.507	.528	.550	.574
	KIAS	195	194	192	192	192	191	191	191	191	190	190
	FF/ENG	2489	2454	2407	2400	2397	2397	2408	2421	2454	2495	2553

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
650	581	521	474	434	400	378	357	339	323	308
981	875	784	711	652	600	567	536	509	484	462
1317	1173	1049	951	870	800	755	714	677	644	615
1656	1472	1315	1190	1089	1000	944	893	846	805	768
2000	1775	1583	1431	1308	1200	1132	1070	1014	964	920
2349	2082	1854	1674	1527	1400	1320	1248	1182	1124	1072
2703	2391	2125	1916	1747	1600	1508	1425	1349	1282	1223
3062	2705	2400	2161	1968	1800	1696	1602	1517	1441	1374
3427	3021	2675	2406	2188	2000	1884	1779	1684	1599	1524

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT)									
	10		14		18		22		28	
	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)
200	4.8	0:49	4.4	0:47	4.0	0:45	3.7	0:44	3.3	0:41
400	9.9	1:36	9.2	1:32	8.6	1:27	8.0	1:23	7.5	1:17
600	14.9	2:24	13.9	2:17	13.0	2:09	12.2	2:03	11.5	1:53
800	19.8	3:12	18.5	3:02	17.4	2:52	16.4	2:43	15.4	2:30
1000	24.6	4:02	23.0	3:49	21.6	3:36	20.4	3:24	19.2	3:07
1200	29.3	4:52	27.4	4:36	25.8	4:20	24.4	4:05	23.0	3:45
1400	33.9	5:43	31.8	5:24	29.9	5:06	28.3	4:48	26.6	4:23
1600	38.5	6:36	36.0	6:13	33.9	5:51	32.1	5:31	30.1	5:02
1800	42.9	7:29	40.2	7:03	37.8	6:38	35.8	6:14	33.6	5:41
2000	47.2	8:24	44.2	7:54	41.6	7:26	39.4	6:58	37.0	6:21

Fuel Required Adjustment (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG)				
	100	120	140	160	180
5	-0.7	-0.4	0.0	0.6	1.3
10	-1.5	-0.8	0.0	1.3	2.7
15	-2.4	-1.2	0.0	1.9	4.0
20	-3.2	-1.6	0.0	2.5	5.3
25	-4.0	-2.0	0.0	3.1	6.6
30	-4.8	-2.4	0.0	3.7	7.8
35	-5.6	-2.8	0.0	4.3	8.9
40	-6.4	-3.2	0.0	4.8	10.1
45	-7.2	-3.6	0.0	5.3	11.1
50	-8.0	-4.0	0.0	5.8	12.1
55	-8.9	-4.5	0.0	6.3	13.1
60	-9.7	-4.9	0.0	6.7	14.0

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	68	71	74
TIME (MINUTES)	7	10	12	13	14	15	16	16	17	18	19	19	20

GEAR DOWN

Holding

Flaps Up

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)						
		1500	5000	10000	15000	20000	25000	30000
190	%N1	83.1	85.9	90.1	94.6	100.0		
	KIAS	249	249	249	249	249		
	FF/ENG	4710	4690	4710	4790	4980		
180	%N1	81.2	84.2	88.4	92.8	97.9		
	KIAS	241	241	241	241	241		
	FF/ENG	4440	4410	4420	4470	4610		
170	%N1	79.4	82.5	86.7	91.0	95.9	102.5	
	KIAS	234	234	234	234	234	234	
	FF/ENG	4180	4160	4150	4180	4280	4550	
160	%N1	77.4	80.5	84.7	89.0	93.7	99.6	
	KIAS	226	226	226	226	226	226	
	FF/ENG	3910	3890	3860	3880	3950	4140	
150	%N1	75.4	78.3	82.7	87.0	91.5	96.9	
	KIAS	218	218	218	218	218	218	
	FF/ENG	3650	3620	3590	3590	3640	3770	
140	%N1	73.6	76.4	80.9	85.2	89.5	94.6	102.0
	KIAS	212	212	212	212	212	212	212
	FF/ENG	3420	3390	3360	3350	3380	3470	3710
130	%N1	71.5	74.6	79.0	83.2	87.6	92.4	98.6
	KIAS	207	207	207	207	207	207	207
	FF/ENG	3210	3180	3150	3120	3140	3210	3380
120	%N1	69.4	72.6	76.8	81.2	85.6	90.2	95.7
	KIAS	201	201	201	201	201	201	201
	FF/ENG	3000	2970	2930	2900	2910	2950	3060
110	%N1	67.3	70.3	74.7	79.2	83.6	88.0	93.1
	KIAS	195	195	195	195	195	195	195
	FF/ENG	2800	2760	2730	2690	2680	2710	2790
100	%N1	65.1	68.0	72.5	76.8	81.2	85.7	90.5
	KIAS	189	189	189	189	189	189	189
	FF/ENG	2590	2560	2520	2490	2470	2480	2520

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

Intentionally
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Performance Inflight - QRH

Chapter PI-QRH

Gear Down, Engine Inop

Section 14

GEAR DOWN

ENGINE INOP

MAX CONTINUOUS THRUST

Initial Max Continuous %N1

29000 FT to 10000 FT Pressure Altitudes

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

29000 FT PRESS ALT								TAT (°C)					
MACH	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	
0.6	102.6	103.6	104.7	105.8	106.8	107.9	108.6	107.7	106.8	106.1	105.5	104.9	
0.5	102.6	103.6	104.7	105.8	106.8	107.9	108.4	107.4	106.8	106.1	105.5	102.8	
0.4	102.6	103.6	104.7	105.8	106.8	107.9	108.2	107.5	106.8	106.2	103.6	100.5	
27000 FT PRESS ALT								TAT (°C)					
MACH	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	
0.6	102.6	103.6	104.7	105.8	106.8	107.9	108.6	107.6	106.7	105.7	105.0	104.3	
0.5	102.6	103.6	104.7	105.8	106.8	107.9	108.2	107.2	106.3	105.6	104.8	104.0	
0.4	102.6	103.6	104.7	105.8	106.8	107.9	108.0	107.0	106.3	105.6	104.7	101.8	
25000 FT PRESS ALT								TAT (°C)					
MACH	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	20	
0.6	102.3	103.2	104.2	105.2	106.1	106.9	107.3	106.4	105.4	104.4	103.6	102.9	
0.5	103.6	104.7	105.8	106.8	107.6	107.8	106.9	105.9	104.9	104.1	103.4	102.1	
0.4	103.6	104.7	105.8	106.8	107.9	107.7	106.7	105.7	104.9	104.1	102.8	100.0	
23000 FT PRESS ALT								TAT (°C)					
MACH	-30	-25	-20	-15	-10	-5	0	5	10	15	20	25	
0.6	103.2	104.2	105.2	106.1	107.0	107.9	108.0	107.2	106.2	105.3	104.5	103.7	
0.5	104.7	105.8	106.8	107.8	108.7	108.6	107.7	106.7	105.8	105.0	104.2	102.7	
0.4	104.7	105.8	106.8	107.9	108.9	108.6	107.6	106.6	105.8	105.0	103.4	100.8	
21000 FT PRESS ALT								TAT (°C)					
MACH	-30	-25	-20	-15	-10	-5	0	5	10	15	20	25	
0.6	103.9	104.8	105.8	106.8	107.7	108.6	109.5	109.4	108.5	107.5	106.6	105.7	
0.5	104.7	105.8	106.8	107.9	108.9	109.9	109.9	109.0	108.0	107.0	106.1	105.3	
0.4	104.7	105.8	106.8	107.9	108.9	109.9	109.8	108.8	107.8	106.9	106.1	104.2	
19000 FT PRESS ALT								TAT (°C)					
MACH	-25	-20	-15	-10	-5	0	5	10	15	20	25	30	
0.6	104.3	105.3	106.2	107.2	108.1	109.0	110.0	109.6	108.7	107.7	106.8	105.9	
0.5	105.8	106.8	107.9	108.9	109.8	110.7	110.1	109.2	108.2	107.3	106.4	105.5	
0.4	105.8	106.8	107.9	108.9	109.9	110.9	110.1	109.1	108.2	107.2	106.4	104.3	
15000 FT PRESS ALT								TAT (°C)					
MACH	-20	-15	-10	-5	0	5	10	15	20	25	30	35	
0.6	102.8	103.8	104.7	105.6	106.6	107.5	108.4	109.2	108.2	107.3	106.4	105.7	
0.5	104.3	105.2	106.2	107.1	108.1	109.0	109.4	108.4	107.5	106.7	105.9	105.1	
0.4	105.2	106.2	107.2	108.2	109.2	110.2	109.5	108.6	107.7	106.9	106.1	105.1	
10000 FT PRESS ALT								TAT (°C)					
MACH	-15	-10	-5	0	5	10	15	20	25	30	35	40	
0.6	100.3	101.2	102.1	103.0	103.9	104.8	105.6	106.5	107.4	106.7	106.0	105.2	
0.5	101.4	102.4	103.3	104.2	105.1	106.0	106.9	107.5	106.8	106.0	105.2	104.5	
0.4	102.6	103.5	104.4	105.4	106.3	107.2	107.8	107.0	106.2	105.4	104.7	104.1	

GEAR DOWN

ENGINE INOP

MAX CONTINUOUS THRUST

Driftdown Speed/Level Off Altitude

100 ft/min residual rate of climb

WEIGHT (1000 KG)		OPTIMUM DRIFTDOWN SPEED (KIAS)	LEVEL OFF ALTITUDE (FT)		
START DRIFT DOWN	LEVEL OFF		ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
180	171	238	2900		
170	162	231	5500	3700	1600
160	153	223	8200	6600	4700
150	143	215	10600	9200	7600
140	134	210	12800	11800	10100
130	125	205	14900	14400	12900
120	115	199	16700	16500	15600
110	106	193	18900	18800	18100
100	96	188	21000	20800	20400

Includes APU fuel burn.

GEAR DOWN**ENGINE INOP****MAX CONTINUOUS THRUST****Long Range Cruise Altitude Capability****100 ft/min residual rate of climb**

WEIGHT (1000 KG)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
160	4300	1700	
155	5800	3400	
150	7400	5000	2500
145	8900	6700	4200
140	10300	8400	6000
135	11700	9900	7800
130	13100	11700	9500
125	14600	13600	11400
120	15700	15300	13400
115	16700	16600	15300
110	17900	17800	17000
105	19100	19000	18400
100	20300	20200	19700
95	21300	21200	20700
90	22300	22200	21600

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 KG)		PRESSURE ALTITUDE (1000 FT)							
		6	8	10	12	14	16	18	20
160	%N1	103.3							
	MACH	.398							
	KIAS	237							
	FF/ENG	7736							
150	%N1	101.0	103.1						
	MACH	.389	.400						
	KIAS	231	229						
	FF/ENG	7195	7225						
140	%N1	98.6	100.6	102.7	105.3				
	MACH	.379	.390	.401	.412				
	KIAS	225	223	221	219				
	FF/ENG	6672	6685	6714	6765				
130	%N1	96.2	98.0	100.0	102.2	104.8			
	MACH	.367	.379	.391	.402	.412			
	KIAS	218	217	215	213	211			
	FF/ENG	6167	6164	6175	6200	6251			
120	%N1	93.8	95.5	97.3	99.2	101.5	104.2		
	MACH	.355	.367	.379	.390	.402	.412		
	KIAS	211	210	209	207	205	203		
	FF/ENG	5671	5660	5658	5666	5686	5740		
110	%N1	91.2	92.8	94.5	96.3	98.3	100.5	103.4	
	MACH	.342	.353	.365	.377	.389	.401	.413	
	KIAS	203	202	201	200	199	197	195	
	FF/ENG	5188	5169	5157	5156	5159	5177	5259	
100	%N1	88.4	90.1	91.6	93.3	95.2	97.1	99.5	102.8
	MACH	.328	.339	.351	.363	.375	.387	.400	.417
	KIAS	195	194	193	192	191	190	189	189
	FF/ENG	4697	4689	4671	4659	4657	4658	4700	4837



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
164	146	131	118	109	100	94	89	84	79	75
334	296	264	239	218	200	187	175	165	156	148
505	447	398	359	327	300	281	263	247	234	222
677	598	531	479	437	400	374	350	329	311	295
850	751	666	600	546	500	467	438	411	388	368
1025	904	801	720	656	600	560	524	493	465	441
1200	1057	936	841	766	700	653	611	574	541	513
1377	1212	1072	963	876	800	746	698	655	618	586
1554	1367	1208	1085	986	900	839	785	737	694	658
1733	1523	1345	1207	1096	1000	932	872	818	771	731

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT)							
	6		10		14		18	
	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)
100	2.5	0:27	2.2	0:27	2.0	0:26	1.8	0:26
200	5.2	0:52	4.8	0:50	4.6	0:49	4.4	0:47
300	7.8	1:17	7.4	1:14	7.1	1:12	7.0	1:09
400	10.5	1:42	9.9	1:38	9.5	1:35	9.5	1:31
500	13.1	2:08	12.4	2:02	12.0	1:58	11.9	1:54
600	15.7	2:33	14.9	2:27	14.4	2:22	14.3	2:16
700	18.2	2:59	17.3	2:51	16.7	2:45	16.7	2:39
800	20.7	3:25	19.7	3:16	19.0	3:09	19.0	3:01
900	23.2	3:51	22.1	3:41	21.3	3:32	21.2	3:24
1000	25.7	4:18	24.4	4:06	23.6	3:56	23.5	3:47

Fuel Required Adjustment (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG)				
	100	120	140	160	180
2	-0.3	-0.2	0.0	0.2	0.5
4	-0.7	-0.3	0.0	0.5	1.1
6	-1.0	-0.5	0.0	0.8	1.7
8	-1.4	-0.7	0.0	1.1	2.3
10	-1.8	-0.9	0.0	1.4	2.9
12	-2.1	-1.1	0.0	1.7	3.4
14	-2.5	-1.2	0.0	2.0	4.0
16	-2.9	-1.4	0.0	2.3	4.6
18	-3.2	-1.6	0.0	2.6	5.2
20	-3.6	-1.8	0.0	2.9	5.8
22	-4.0	-2.0	0.0	3.1	6.4
24	-4.4	-2.1	0.0	3.4	6.9
26	-4.7	-2.3	0.0	3.7	7.5
28	-5.1	-2.5	0.0	4.0	8.1
30	-5.5	-2.7	0.0	4.3	8.7

Includes APU fuel burn.

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GEAR DOWN
ENGINE INOP

MAX CONTINUOUS THRUST

**Holding
Flaps Up**

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)				
		1500	5000	10000	15000	20000
180	%N1	101.3				
	KIAS	241				
	FF/ENG	8700				
170	%N1	99.2	103.1			
	KIAS	234	234			
	FF/ENG	8130	8300			
160	%N1	96.9	100.4			
	KIAS	226	226			
	FF/ENG	7540	7640			
150	%N1	94.5	97.9	103.9		
	KIAS	218	218	218		
	FF/ENG	6970	7030	7280		
140	%N1	92.5	95.6	101.0		
	KIAS	212	212	212		
	FF/ENG	6480	6520	6690		
130	%N1	90.4	93.5	98.5	105.9	
	KIAS	207	207	207	207	
	FF/ENG	6040	6070	6170	6500	
120	%N1	88.2	91.2	95.9	102.0	
	KIAS	201	201	201	201	
	FF/ENG	5600	5610	5670	5870	
110	%N1	86.0	88.9	93.4	98.8	
	KIAS	195	195	195	195	
	FF/ENG	5170	5170	5210	5330	
100	%N1	83.5	86.5	90.8	95.8	102.8
	KIAS	189	189	189	189	189
	FF/ENG	4750	4750	4760	4830	5080

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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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 KG)				
		100	120	140	160	180
40000	PITCH ATT	4.0	4.0			
	V/S (FT/MIN)	1600	1000			
30000	PITCH ATT	4.5	4.0	4.0	4.0	4.0
	V/S (FT/MIN)	2700	2100	1700	1300	1000
20000	PITCH ATT	7.0	6.5	6.0	6.0	5.5
	V/S (FT/MIN)	4200	3400	2700	2300	1900
10000	PITCH ATT	10.5	9.0	8.5	8.0	7.5
	V/S (FT/MIN)	5600	4500	3700	3200	2700
SEA LEVEL	PITCH ATT	13.5	11.5	10.5	9.5	9.0
	V/S (FT/MIN)	6300	5100	4300	3600	3100

Cruise (.78/290)**Flaps Up, Set Thrust for Level Flight**

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG)				
		100	120	140	160	180
40000	PITCH ATT	2.0	2.5	3.5		
	%N1	88.1	92.1	97.5		
35000	PITCH ATT	1.5	2.0	2.5	3.0	3.5
	%N1	85.1	87.3	90.0	93.6	98.2
30000	PITCH ATT	1.0	1.5	2.0	2.0	2.5
	%N1	84.2	85.7	87.4	89.4	91.9
25000	PITCH ATT	1.0	1.5	2.0	2.5	3.0
	%N1	80.7	82.2	83.8	85.8	87.9
20000	PITCH ATT	1.0	1.5	2.0	2.5	3.0
	%N1	76.7	78.2	79.8	81.9	83.9
15000	PITCH ATT	1.0	1.5	2.0	2.5	3.0
	%N1	72.7	74.3	76.1	77.9	79.9

Descent (.78/290)**Flaps Up, Set Idle Thrust**

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG)				
		100	120	140	160	180
40000	PITCH ATT	-1.5	-0.5	0.0	0.5	1.0
	V/S (FT/MIN)	-2600	-2600	-2700	-2800	-3100
30000	PITCH ATT	-2.5	-1.5	-1.0	-0.5	0.0
	V/S (FT/MIN)	-2700	-2400	-2200	-2100	-2000
20000	PITCH ATT	-2.5	-1.5	-1.0	0.0	0.5
	V/S (FT/MIN)	-2400	-2100	-2000	-1900	-1800
10000	PITCH ATT	-2.5	-1.5	-1.0	-0.5	0.5
	V/S (FT/MIN)	-2100	-1900	-1700	-1700	-1600
SEA LEVEL	PITCH ATT	-3.0	-2.0	-1.0	-0.5	0.0
	V/S (FT/MIN)	-2000	-1700	-1600	-1500	-1500

Flight With Unreliable Airspeed / Turbulent Air Penetration

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

Holding (VREF30+80)

Flaps Up, Set Thrust for Level Flight

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG)				
		100	120	140	160	180
10000	PITCH ATT	4.0	4.5	5.0	5.0	5.0
	%N1	58.7	63.4	67.3	70.9	74.4
	KIAS	199	211	222	236	251
5000	PITCH ATT	4.0	4.5	5.0	5.0	5.0
	%N1	54.8	59.0	63.1	66.8	69.9
	KIAS	199	211	222	236	251

Terminal Area (5000 FT)

Set Thrust for Level Flight

FLAP POSITION (GEAR POSITION) (VREF + INCREMENT)		WEIGHT (1000 KG)				
		100	120	140	160	180
FLAPS UP (GEAR UP) (VREF30+80)	PITCH ATT	4.0	4.5	5.0	5.0	5.0
	%N1	55.6	60.1	64.6	68.0	71.1
	KIAS	199	211	222	236	251
FLAPS 1 (GEAR UP) (VREF30+60)	PITCH ATT	6.0	6.5	6.5	6.5	6.5
	%N1	56.6	61.6	65.8	69.4	72.9
	KIAS	179	191	202	216	231
FLAPS 5 (GEAR UP) (VREF30+40)	PITCH ATT	4.5	4.5	5.0	4.5	4.5
	%N1	59.0	64.1	68.3	72.4	75.7
	KIAS	159	171	182	196	211
FLAPS 15 (GEAR UP) (VREF30+20)	PITCH ATT	5.5	5.5	6.0	6.0	5.5
	%N1	61.1	65.9	70.6	74.3	77.6
	KIAS	139	151	162	176	191
FLAPS 20 (GEAR DOWN) (VREF30+20)	PITCH ATT	4.0	4.5	4.5	4.0	3.5
	%N1	67.6	72.9	77.5	81.6	85.4
	KIAS	139	151	162	176	191

Final Approach (1500 FT)

Gear Down, Set Thrust for 3° Glideslope

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG)				
		100	120	140	160	180
FLAPS 20 (VREF20 +10)	PITCH ATT	1.5	1.5	1.5	1.5	1.5
	%N1	48.0	51.8	55.6	59.2	62.6
	KIAS	138	150	162	172	184

Go-Around (VREF 30 + 20)

Flaps 20, Gear Up, Set Go-Around Thrust

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG)				
		100	120	140	160	180
10000	PITCH ATT	18.0	15.0	12.5	10.5	9.0
	V/S (FT/MIN)	4000	3300	2700	2300	2000
	KIAS	139	151	162	176	191
5000	PITCH ATT	21.5	17.5	15.0	12.5	10.5
	V/S (FT/MIN)	4500	3800	3200	2800	2400
	KIAS	139	151	162	176	191
SEA LEVEL	PITCH ATT	25.0	20.5	17.0	14.5	12.0
	V/S (FT/MIN)	5000	4200	3600	3200	2800
	KIAS	139	151	162	176	191

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

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VREF (KIAS)

WEIGHT (1000 KG)	FLAPS		
	30	25	20
190	179	170	179
180	171	166	173
170	164	161	168
160	156	156	162
150	148	151	157
140	142	146	151
130	137	141	146
120	131	135	141
110	125	129	135
100	119	123	128

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Advisory Information

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Section 21

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	150000 KG LANDING WEIGHT	PER 5000 KG ABV/ BLW 150000 KG	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	3200	110/-60	80	-130	440	50	-40	80	-70	250	80	170
MAX AUTO	5370	130/-130	150	-250	840	0	0	160	-160	600	0	0
AUTOBRAKE 4	5540	140/-140	160	-260	880	0	0	160	-160	630	0	0
AUTOBRAKE 3	6370	160/-160	190	-300	1040	0	-20	190	-190	710	0	0
AUTOBRAKE 2	7090	190/-190	220	-350	1190	50	-120	220	-210	630	110	110
AUTOBRAKE 1	7740	220/-220	250	-390	1360	170	-220	250	-230	580	480	620

Good Reported Braking Action

MAX MANUAL	5060	120/-120	140	-240	830	140	-120	140	-130	400	300	660
MAX AUTO	6180	150/-150	180	-290	980	20	0	180	-180	700	20	90
AUTOBRAKE 4	6370	160/-160	180	-300	1010	10	0	190	-190	720	10	60
AUTOBRAKE 3	7320	190/-190	220	-350	1190	0	-20	220	-220	820	0	0

Medium Reported Braking Action

MAX MANUAL	6940	190/-190	220	-370	1360	340	-270	210	-190	510	790	1910
MAX AUTO	6970	190/-180	220	-380	1370	300	-180	210	-200	660	700	1820
AUTOBRAKE 4	7050	190/-190	220	-380	1380	280	-160	220	-200	710	610	1730
AUTOBRAKE 3	7670	210/-200	230	-400	1450	180	-120	230	-230	820	410	1270

Poor Reported Braking Action

MAX MANUAL	8960	270/-260	300	-550	2100	760	-500	290	-260	590	1670	4460
MAX AUTO	8960	270/-260	300	-550	2100	760	-500	290	-260	590	1670	4470
AUTOBRAKE 4	8960	270/-260	300	-550	2100	770	-500	290	-260	600	1670	4470
AUTOBRAKE 3	9050	270/-260	300	-550	2110	700	-410	290	-270	760	1530	4320

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 460 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).

Distances for GOOD, MEDIUM, and POOR are increased by 15%.

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	150000 KG LANDING WEIGHT	PER 5000 KG ABV/ BLW 150000 KG	PER 1000 FT ABV SEA LEVEL	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 10 KTS ABV VREF 30	ONE REV	NO REV
MAX MANUAL	3150	140/-70	80	-130	440	50	-40	80	-70	250	80	160
MAX AUTO	5220	210/-140	150	-240	830	0	0	150	-150	600	0	0
AUTOBRAKE 4	5380	220/-140	150	-250	870	0	0	160	-160	620	0	0
AUTOBRAKE 3	6180	260/-170	180	-300	1020	0	-10	190	-190	720	0	0
AUTOBRAKE 2	6930	280/-200	210	-340	1180	40	-110	210	-210	640	80	80
AUTOBRAKE 1	7590	300/-220	240	-390	1350	160	-210	240	-230	580	410	540

Good Reported Braking Action

MAX MANUAL	5000	180/-130	140	-240	830	140	-120	140	-130	400	280	620
MAX AUTO	6010	250/-160	170	-280	970	20	0	170	-170	690	20	90
AUTOBRAKE 4	6190	260/-170	180	-290	1000	10	0	180	-180	710	10	60
AUTOBRAKE 3	7110	300/-200	210	-340	1180	0	-10	210	-210	830	0	0

Medium Reported Braking Action

MAX MANUAL	6860	260/-190	210	-370	1370	350	-270	210	-190	510	740	1770
MAX AUTO	6860	280/-190	210	-380	1370	320	-190	210	-200	650	690	1720
AUTOBRAKE 4	6920	290/-200	220	-380	1380	300	-170	210	-200	690	620	1650
AUTOBRAKE 3	7480	320/-210	230	-400	1440	190	-110	230	-220	830	410	1220

Poor Reported Braking Action

MAX MANUAL	8870	360/-270	300	-550	2110	780	-510	290	-260	600	1580	4140
MAX AUTO	8870	360/-270	300	-550	2100	780	-510	290	-260	590	1580	4150
AUTOBRAKE 4	8870	360/-270	300	-550	2100	780	-510	290	-260	590	1580	4150
AUTOBRAKE 3	8920	380/-270	300	-550	2110	730	-420	290	-270	770	1480	4050

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 460 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).

Distances for GOOD, MEDIUM, and POOR are increased by 15%.

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	150000 KG LDG WT	PER 5000 KG ABV/BLW 150000KG	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	4210	90/-90	100	-170/570	90/-80	110/-110	420	0	0
AIR/GRD SYS (FLAPS 30)	VREF30	4130	160/-100	100	-170/570	90/-80	110/-110	440	0	0
ALL FLAPS AND SLATS UP LANDING	VREF30+50	4530	260/-110	130	-170/570	80/-70	130/-120	320	200	440
ANTI-SKID OFF (FLAPS 25)	VREF25	5920	160/-150	160	-290/1010	190/-160	160/-150	440	410	960
ANTI-SKID OFF (FLAPS 30)	VREF30	5770	230/-160	160	-290/1010	190/-160	160/-150	450	380	880
ENGINE FAILURE (FLAPS 20)	VREF20	3460	150/-80	90	-140/470	60/-50	90/-90	280	0	110
HYD SYS PRESS (C ONLY) (FLAPS 20)	VREF20	4140	110/-100	100	-160/530	70/-60	100/-100	380	140	300
HYD SYS PRESS (L ONLY) (FLAPS 25)	VREF25	3350	90/-80	80	-130/460	50/-50	80/-80	290	100	200
HYD SYS PRESS (L ONLY) (FLAPS 30)	VREF30	3300	130/-80	80	-130/460	60/-50	80/-80	300	90	190
HYD SYS PRESS (R ONLY) (FLAPS 25)	VREF25	3680	90/-90	90	-150/530	70/-60	90/-90	310	140	300
HYD SYS PRESS (R ONLY) (FLAPS 30)	VREF30	3620	140/-90	90	-150/530	70/-70	90/-90	330	130	280
HYD SYS PRESS (L AND C) (FLAPS 20)	VREF30+20	4890	190/-110	130	-180/600	100/-90	130/-130	510	230	510
HYD SYS PRESS (L AND R) (FLAPS 20)	VREF30+20	4570	180/-110	130	-180/610	110/-90	130/-120	420	260	570
HYD SYS PRESS (R AND C) (FLAPS 20)	VREF30+20	5800	240/-150	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	150000 KG LDG WT	PER 5000 KG ABV/BLW 150000KG	PER 1000FT ABV S.L.	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER10°C ABV/ BLW ISA	PER 10 KTS ABV VREF	ONE REV	NO REV
LE SLAT ASYM (FLAPS > 20)	VREF30+20	3670	180/-80	90	-140/480	60/-50	90/-90	270	120	260
LE SLAT ASYM (FLAPS = 20)	VREF30+30	4140	170/-90	110	-150/520	70/-60	110/-110	310	160	340
LE SLAT ASYM (5 < FLAPS < 20)	VREF30+40	4440	170/-100	120	-160/540	80/-70	120/-120	320	180	390
LE SLAT DISAGREE (FLAPS > 20)	VREF20	3390	140/-80	80	-130/450	50/-50	80/-80	260	100	220
LE SLAT DISAGREE - ALTN FLAP EXT ACCOMPLISHED (FLAPS = 20)	VREF20	3390	140/-80	80	-130/450	50/-50	80/-80	260	100	220
LE SLAT DISAGREE - ALTN FLAP EXT FAILED (FLAPS = 20)	VREF30+30	3940	180/-90	100	-150/500	60/-60	100/-100	280	140	290
REVERSER UNLOCKED (FLAPS 20)	VREF30+30	4260	180/-100	110	-160/540	80/-70	120/-110	330	0	180
TE FLAP ASYM (FLAPS ≥ 20)	VREF20	3390	140/-80	80	-130/450	50/-50	80/-80	260	100	220
TE FLAP ASYM (5 < FLAPS < 20)	VREF30+20	3670	180/-80	90	-140/480	60/-50	90/-90	270	120	260
TE FLAP ASYM (FLAPS ≤ 5)	VREF30+30	3890	210/-90	100	-150/490	60/-50	100/-100	270	130	290
TE FLAP DISAGREE (FLAPS ≥ 20)	VREF20	3390	140/-80	80	-130/450	50/-50	80/-80	260	100	220
TE FLAP DISAGREE (5 < FLAPS < 20)	VREF30+20	3670	180/-80	90	-140/480	60/-50	90/-90	270	120	260
TE FLAP DISAGREE (FLAPS ≤ 5)	VREF30+30	3890	210/-90	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	150000 KG LDG WT	PER 5000 KG ABV/BLW 150000KG	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	6240	150/-150	180	-300/1010	270/-220	180/-180	620	0	0
AIR/GRD SYS (FLAPS 30)	VREF30	6090	250/-150	180	-300/1010	280/-230	180/-180	640	0	0
ALL FLAPS AND SLATS UP LANDING	VREF30+50	6220	220/-160	190	-250/860	160/-150	190/-180	380	530	1220
ANTI-SKID OFF (FLAPS 25)	VREF25	6660	190/-180	190	-350/1240	290/-230	190/-180	490	630	1530
ANTI-SKID OFF (FLAPS 30)	VREF30	6500	260/-180	190	-350/1240	290/-230	190/-180	490	590	1410
ENGINE FAILURE (FLAPS 20)	VREF20	4980	150/-130	140	-230/800	160/-140	140/-140	410	0	410
HYD SYS PRESS (C ONLY) (FLAPS 20)	VREF20	5600	170/-150	160	-250/840	170/-150	160/-150	510	430	1010
HYD SYS PRESS (L ONLY) (FLAPS 25)	VREF25	4620	130/-120	130	-220/750	140/-120	130/-120	390	300	680
HYD SYS PRESS (L ONLY) (FLAPS 30)	VREF30	4550	190/-120	130	-220/750	140/-120	130/-120	400	280	640
HYD SYS PRESS (R ONLY) (FLAPS 25)	VREF25	4620	130/-120	130	-220/750	140/-120	130/-120	390	300	680
HYD SYS PRESS (R ONLY) (FLAPS 30)	VREF30	4550	190/-120	130	-220/750	140/-120	130/-120	400	280	640
HYD SYS PRESS (L AND C) (FLAPS 20)	VREF30+20	6580	280/-180	200	-280/940	230/-190	200/-190	640	650	1560
HYD SYS PRESS (L AND R) (FLAPS 20)	VREF30+20	5760	240/-160	180	-250/860	190/-170	180/-170	510	530	1250
HYD SYS PRESS (R AND C) (FLAPS 20)	VREF30+20	6580	280/-180	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 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	
		150000 KG LDG WT	PER 5000 KG ABV/BLW 150000KG	PER 1000FT 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	5130	200/-130	150	-230/790	150/-130	150/-140	380	380	860
LE SLAT ASYM (FLAPS = 20)	VREF30+30	5770	220/-150	170	-250/840	170/-150	170/-170	420	470	1080
LE SLAT ASYM (5 < FLAPS < 20)	VREF30+40	6180	230/-160	190	-260/870	180/-160	190/-180	430	520	1190
LE SLAT DISAGREE (FLAPS > 20)	VREF20	4730	140/-130	130	-220/750	130/-120	130/-130	370	330	750
LE SLAT DISAGREE - ALTN FLAP EXT ACCOMPLISHED (FLAPS = 20)	VREF20	4730	140/-130	130	-220/750	130/-120	130/-130	370	330	750
LE SLAT DISAGREE - ALTN FLAP EXT FAILED (FLAPS = 20)	VREF30+30	5500	200/-140	160	-240/810	150/-140	160/-160	380	420	950
REVERSER UNLOCKED (FLAPS 20)	VREF30+30	6160	230/-160	180	-270/900	210/-180	190/-180	470	0	590
TE FLAP ASYM (FLAPS ≥ 20)	VREF20	4730	140/-130	130	-220/750	130/-120	130/-130	370	330	750
TE FLAP ASYM (5 < FLAPS < 20)	VREF30+20	5140	200/-140	150	-230/790	140/-130	150/-140	380	380	880
TE FLAP ASYM (FLAPS ≤ 5)	VREF30+30	5470	200/-140	160	-230/810	150/-130	160/-150	370	430	980
TE FLAP DISAGREE (FLAPS ≥ 20)	VREF20	4730	140/-130	130	-220/750	130/-120	130/-130	370	330	750
TE FLAP DISAGREE (5 < FLAPS < 20)	VREF30+20	5140	200/-140	150	-230/790	140/-130	150/-140	380	380	880
TE FLAP DISAGREE (FLAPS ≤ 5)	VREF30+30	5470	200/-140	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 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	
		150000 KG LDG WT	PER 5000 KG ABV/BLW 150000KG	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	9940	240/-230	310	-560/1950	1000/-670	320/-320	870	0	0
AIR/GRD SYS (FLAPS 30)	VREF30	9650	370/-230	310	-550/1940	1000/-670	320/-320	870	0	0
ALL FLAPS AND SLATS UP LANDING	VREF30+50	8820	340/-250	300	-400/1400	410/-330	300/-270	520	1430	3670
ANTI-SKID OFF (FLAPS 25)	VREF25	8370	260/-250	260	-500/1870	640/-440	250/-230	560	1370	3680
ANTI-SKID OFF (FLAPS 30)	VREF30	8180	350/-250	260	-500/1870	650/-440	250/-230	560	1290	3390
ENGINE FAILURE (FLAPS 20)	VREF20	7250	240/-220	230	-390/1360	440/-340	230/-220	560	0	1250
HYD SYS PRESS (C ONLY) (FLAPS 20)	VREF20	7520	260/-230	240	-380/1340	400/-310	240/-220	630	1120	2890
HYD SYS PRESS (L ONLY) (FLAPS 25)	VREF25	6320	190/-190	200	-340/1220	330/-260	200/-180	490	780	1900
HYD SYS PRESS (L ONLY) (FLAPS 30)	VREF30	6220	280/-190	200	-340/1220	340/-260	200/-180	500	740	1780
HYD SYS PRESS (R ONLY) (FLAPS 25)	VREF25	6320	190/-190	200	-340/1220	330/-260	200/-180	490	780	1900
HYD SYS PRESS (R ONLY) (FLAPS 30)	VREF30	6220	280/-190	200	-340/1220	340/-260	200/-180	500	740	1780
HYD SYS PRESS (L AND C) (FLAPS 20)	VREF30+20	8720	390/-260	290	-420/1460	500/-390	290/-260	740	1530	4090
HYD SYS PRESS (L AND R) (FLAPS 20)	VREF30+20	7850	350/-240	270	-390/1370	430/-340	260/-240	620	1300	3370
HYD SYS PRESS (R AND C) (FLAPS 20)	VREF30+20	8720	390/-260	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 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	
		150000 KG LDG WT	PER 5000 KG ABV/BLW 150000 KG	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	7070	290/-210	230	-360/1280	350/-280	230/-210	490	980	2430
LE SLAT ASYM (FLAPS = 20)	VREF30+30	7900	320/-230	260	-380/1350	390/-320	260/-240	530	1170	2930
LE SLAT ASYM (5 < FLAPS < 20)	VREF30+40	8430	340/-250	290	-400/1380	410/-330	280/-260	540	1340	3430
LE SLAT DISAGREE (FLAPS > 20)	VREF20	6540	220/-200	210	-340/1230	330/-260	200/-190	490	880	2200
LE SLAT DISAGREE - ALTN FLAP EXT ACCOMPLISHED (FLAPS = 20)	VREF20	6540	220/-200	210	-340/1230	330/-260	200/-190	490	880	2200
LE SLAT DISAGREE - ALTN FLAP EXT FAILED (FLAPS = 20)	VREF30+30	7550	300/-220	250	-370/1310	360/-290	250/-230	490	1050	2620
REVERSER UNLOCKED (FLAPS 20)	VREF30+30	8860	360/-260	290	-430/1510	530/-420	290/-280	610	0	1680
TE FLAP ASYM (FLAPS ≥ 20)	VREF20	6540	220/-200	210	-340/1230	330/-260	200/-190	490	880	2200
TE FLAP ASYM (5 < FLAPS < 20)	VREF30+20	7120	300/-210	230	-360/1280	350/-280	230/-210	490	1010	2540
TE FLAP ASYM (FLAPS ≤ 5)	VREF30+30	7590	310/-220	250	-370/1310	360/-290	250/-230	490	1110	2810
TE FLAP DISAGREE (FLAPS ≥ 20)	VREF20	6540	220/-200	210	-340/1230	330/-260	200/-190	490	880	2200
TE FLAP DISAGREE (5 < FLAPS < 20)	VREF30+20	7120	300/-210	230	-360/1280	350/-280	230/-210	490	1010	2540
TE FLAP DISAGREE (FLAPS ≤ 5)	VREF30+30	7590	310/-220	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	
		150000 KG LDG WT	PER 5000 KG ABV/BLW 150000 KG	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	16490	320/-200	570	-1120/4230	6080/-2020	600/-590	1090	0	0
AIR/GRD SYS (FLAPS 30)	VREF30	15920	480/-200	550	-1100/4180	5960/-1970	580/-570	1080	0	0
ALL FLAPS AND SLATS UP LANDING	VREF30+50	11600	480/-370	430	-590/2140	900/-630	410/-370	640	3020	8970
ANTI-SKID OFF (FLAPS 25)	VREF25	10950	380/-360	370	-800/3310	3040/-940	350/-310	630	3540	14250
ANTI-SKID OFF (FLAPS 30)	VREF30	10760	480/-360	360	-800/3310	3040/-950	350/-310	630	3380	13380
ENGINE FAILURE (FLAPS 20)	VREF20	9970	360/-320	340	-600/2200	1100/-700	330/-310	690	0	3070
HYD SYS PRESS (C ONLY) (FLAPS 20)	VREF20	9560	360/-310	330	-550/2030	840/-570	320/-290	710	2280	6740
HYD SYS PRESS (L ONLY) (FLAPS 25)	VREF25	8130	280/-260	280	-500/1870	710/-480	270/-240	560	1610	4380
HYD SYS PRESS (L ONLY) (FLAPS 30)	VREF30	8030	370/-270	280	-500/1870	730/-490	270/-240	570	1530	4080
HYD SYS PRESS (R ONLY) (FLAPS 25)	VREF25	8130	280/-260	280	-500/1870	710/-480	270/-240	560	1610	4380
HYD SYS PRESS (R ONLY) (FLAPS 30)	VREF30	8030	370/-270	280	-500/1870	730/-490	270/-240	570	1530	4080
HYD SYS PRESS (L AND C) (FLAPS 20)	VREF30+20	10910	510/-360	400	-600/2160	990/-670	380/-340	800	2910	8920
HYD SYS PRESS (L AND R) (FLAPS 20)	VREF30+20	10000	460/-330	360	-560/2060	890/-610	350/-310	690	2540	7490
HYD SYS PRESS (R AND C) (FLAPS 20)	VREF30+20	10910	510/-360	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 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	
		150000 KG LDG WT	PER 5000 KG ABV/BLW 150000 KG	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	9120	400/-290	320	-530/1950	760/-520	310/-280	570	2010	5610
LE SLAT ASYM (FLAPS = 20)	VREF30+30	10100	430/-320	360	-560/2040	820/-570	350/-320	600	2310	6530
LE SLAT ASYM (5 < FLAPS < 20)	VREF30+40	10880	460/-350	400	-570/2100	870/-610	380/-340	630	2700	7890
LE SLAT DISAGREE (FLAPS > 20)	VREF20	8500	320/-280	290	-510/1900	730/-500	280/-260	580	1860	5230
LE SLAT DISAGREE - ALTN FLAP EXT ACCOMPLISHED (FLAPS = 20)	VREF20	8500	320/-280	290	-510/1900	730/-500	280/-260	580	1860	5230
LE SLAT DISAGREE - ALTN FLAP EXT FAILED (FLAPS = 20)	VREF30+30	9680	410/-310	340	-540/1990	780/-540	330/-300	560	2120	5910
REVERSER UNLOCKED (FLAPS 20)	VREF30+30	11960	500/-380	420	-660/2380	1260/-830	410/-390	730	0	3880
TE FLAP ASYM (FLAPS ≥ 20)	VREF20	8500	320/-280	290	-510/1900	730/-500	280/-260	580	1860	5230
TE FLAP ASYM (5 < FLAPS < 20)	VREF30+20	9250	410/-300	330	-530/1960	760/-520	320/-280	590	2160	6210
TE FLAP ASYM (FLAPS ≤ 5)	VREF30+30	9820	420/-310	350	-540/2000	780/-540	340/-300	580	2290	6540
TE FLAP DISAGREE (FLAPS ≥ 20)	VREF20	8500	320/-280	290	-510/1900	730/-500	280/-260	580	1860	5230
TE FLAP DISAGREE (5 < FLAPS < 20)	VREF30+20	9250	410/-300	330	-530/1960	760/-520	320/-280	590	2160	6210
TE FLAP DISAGREE (FLAPS ≤ 5)	VREF30+30	9820	420/-310	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 KG)	OAT (°C)	PRESSURE ALTITUDE (1000 FT)																							
		0	2	4	0	2	4	0	2	4	0	2	4	0	2	4	0	2	4	0	2	4			
180	0	15.1	16.1	17.0	22.8	24.3	25.8	31.8	33.9	35.9	41.8	44.6	47.4	52.7	56.3	59.9									
	10	15.7	16.6	17.6	23.6	25.1	26.6	32.9	35.0	37.2	43.2	46.1	49.1	54.5	58.3	62.0									
	20	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	60.3	64.2									
	30	16.7	17.7	18.7	25.2	26.8	28.4	35.0	37.4	39.7	46.1	49.2	52.3	58.2	62.2	66.2									
	40	16.9	18.0	19.0	25.6	27.3	29.0	35.8	38.2	40.5	47.2	50.4	53.6	59.6	63.7	67.9									
160	0	13.7	14.5	15.3	20.6	21.9	23.2	28.5	30.4	32.3	37.5	40.0	42.5	47.2	50.4	53.6	57.6	61.6	65.6						
	10	14.1	15.0	15.9	21.3	22.6	24.0	29.5	31.5	33.4	38.8	41.4	44.0	48.9	52.2	55.5	59.6	63.8	67.9						
	20	14.6	15.5	16.4	22.0	23.4	24.8	30.5	32.5	34.5	40.1	42.8	45.4	50.5	54.0	57.4	61.7	65.9	70.2						
	30	15.0	16.0	16.9	22.7	24.1	25.5	31.5	33.5	35.6	41.3	44.1	46.9	52.1	55.7	59.3	63.7	68.1	72.5						
	40	15.3	16.2	17.2	23.1	24.5	26.0	32.1	34.2	36.3	42.3	45.1	48.0	53.4	57.0	60.7	65.2	69.8	74.3						
140	0	12.2	13.0	13.7	18.3	19.4	20.6	25.3	26.9	28.6	33.1	35.3	37.4	41.5	44.3	47.1	50.6	54.0	57.5						
	10	12.7	13.4	14.2	18.9	20.1	21.3	26.2	27.9	29.5	34.2	36.5	38.8	43.0	45.9	48.8	52.4	56.0	59.6						
	20	13.1	13.9	14.6	19.6	20.8	22.0	27.0	28.8	30.5	35.4	37.7	40.1	44.4	47.4	50.5	54.1	57.8	61.6						
	30	13.5	14.3	15.1	20.2	21.4	22.7	27.9	29.7	31.5	36.5	38.9	41.3	45.9	49.0	52.1	55.9	59.7	63.6						
	40	13.7	14.5	15.3	20.5	21.8	23.1	28.4	30.3	32.1	37.3	39.8	42.2	46.9	50.1	53.3	57.2	61.2	65.1						
120	0	10.8	11.5	12.1	16.0	17.0	18.0	22.0	23.4	24.8	28.6	30.5	32.3	35.7	38.1	40.5	43.3	46.2	49.1						
	10	11.2	11.9	12.5	16.6	17.6	18.6	22.8	24.2	25.7	29.6	31.5	33.4	37.0	39.4	41.9	44.8	47.8	50.9						
	20	11.6	12.2	12.9	17.1	18.2	19.3	23.5	25.0	26.5	30.6	32.6	34.6	38.2	40.7	43.3	46.3	49.4	52.6						
	30	11.9	12.6	13.3	17.7	18.8	19.9	24.2	25.8	27.3	31.5	33.6	35.7	39.4	42.0	44.7	47.8	51.0	54.3						
	40	12.1	12.8	13.5	18.0	19.1	20.2	24.7	26.3	27.9	32.2	34.3	36.4	40.3	43.0	45.7	48.9	52.2	55.6						
100	0	9.4	10.0	10.5	13.8	14.6	15.5	18.7	19.8	21.0	24.0	25.5	27.1	29.7	31.6	33.6	35.7	38.0	40.4						
	10	9.8	10.3	10.9	14.3	15.1	16.0	19.3	20.5	21.7	24.8	26.4	28.0	30.7	32.7	34.7	36.9	39.4	41.8						
	20	10.1	10.7	11.2	14.7	15.6	16.5	20.0	21.2	22.5	25.7	27.3	29.0	31.7	33.8	35.9	38.2	40.7	43.2						
	30	10.4	11.0	11.6	15.2	16.1	17.0	20.6	21.9	23.2	26.5	28.2	29.9	32.7	34.9	37.0	39.4	42.0	44.6						
	40	10.5	11.1	11.7	15.4	16.4	17.3	20.9	22.3	23.6	27.0	28.7	30.5	33.4	35.6	37.8	40.2	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
LANDING	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
	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 22

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 THRUST

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)	
KLAS	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)	
KLAS	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)	
KLAS	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)	
KLAS	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)	
KLAS	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)	
KLAS	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 THRUST

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)														
CIAS	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)														
CIAS	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)														
CIAS	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)														
CIAS	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)														
CIAS	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)														
CIAS	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 THRUST

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)															
CIAS	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)															
CIAS	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)															
CIAS	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)															
CIAS	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 KG)		OPTIMUM DRIFTDOWN SPEED (KIAS)	LEVEL OFF ALTITUDE (FT)		
START DRIFT DOWN	LEVEL OFF		ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
190	183	276	18400	17400	15600
180	174	269	20000	19100	17700
170	165	262	21200	20600	19700
160	155	254	22600	21900	21000
150	145	247	24000	23200	22300
140	135	238	25500	24700	23700
130	126	230	27200	26700	25500
120	116	221	29100	28900	28100
110	106	212	30900	30900	30500
100	97	202	32900	32800	32600

Includes APU fuel burn.

ENGINE INOP

MAX CONTINUOUS THRUST

Driftdown/LRC Cruise Range Capability Ground to Air Miles Conversion

AIR DISTANCE (NM)					GROUND DISTANCE (NM)	AIR DISTANCE (NM)				
HEADWIND COMPONENT (KTS)						TAILWIND COMPONENT (KTS)				
100	80	60	40	20		20	40	60	80	100
274	255	239	224	211	200	190	180	172	164	157
547	510	477	448	423	400	380	361	344	329	315
819	763	715	672	634	600	570	542	517	494	473
1090	1016	952	895	845	800	760	723	690	660	632
1361	1269	1189	1119	1056	1000	950	904	863	825	790
1632	1522	1426	1342	1267	1200	1140	1085	1036	990	949
1902	1775	1664	1565	1478	1400	1330	1266	1208	1156	1107
2174	2029	1901	1789	1689	1600	1520	1447	1381	1321	1266
2447	2283	2139	2013	1900	1800	1710	1628	1554	1486	1424

Driftdown/Cruise Fuel and Time

AIR DIST (NM)	FUEL REQUIRED (1000 KG)										TIME (HR:MIN)
	WEIGHT AT START OF DRIFTDOWN (1000 KG)										
	100	110	120	130	140	150	160	170	180	190	
200	1.5	1.7	1.8	1.9	2.1	2.1	2.3	2.4	2.5	2.6	0:33
400	3.4	3.7	4.0	4.3	4.6	4.9	5.2	5.4	5.8	6.0	1:05
600	5.2	5.7	6.1	6.6	7.0	7.5	7.9	8.3	8.8	9.3	1:36
800	6.9	7.5	8.1	8.8	9.4	10.0	10.6	11.2	11.8	12.4	2:08
1000	8.6	9.4	10.1	10.9	11.7	12.4	13.2	13.9	14.7	15.5	2:39
1200	10.2	11.2	12.1	13.1	14.0	14.9	15.8	16.7	17.6	18.5	3:10
1400	11.9	13.0	14.0	15.2	16.3	17.3	18.4	19.4	20.5	21.5	3:42
1600	13.5	14.8	16.0	17.2	18.5	19.6	20.9	22.0	23.3	24.5	4:14
1800	15.1	16.5	17.8	19.2	20.6	22.0	23.3	24.6	26.0	27.4	4:45

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 KG)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
190	15400	13000	10200
185	16300	14200	11400
180	17200	15300	12700
175	18200	16500	13900
170	19100	17600	15200
165	20000	18700	16400
160	20700	19700	17800
155	21400	20500	19100
150	22100	21200	20200
145	22800	21900	20900
140	23600	22600	21600
135	24300	23400	22300
130	25100	24100	23000
125	26100	24900	23700
120	27200	26200	24500
115	28300	27600	25700
110	29400	29000	27400
105	30500	30300	29100
100	31400	31300	30500

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 KG)		PRESSURE ALTITUDE (1000 FT)								
		10	14	18	21	23	25	27	29	31
190	%N1	98.8	102.4							
	MACH	.583	.616							
	KIAS	324	318							
	FF/ENG	6358	6418							
180	%N1	97.2	100.7	105.0						
	MACH	.572	.605	.641						
	KIAS	317	312	307						
	FF/ENG	6000	6034	6176						
170	%N1	95.6	99.0	102.9						
	MACH	.559	.593	.628						
	KIAS	310	306	300						
	FF/ENG	5646	5675	5766						
160	%N1	93.9	97.2	100.8	104.3					
	MACH	.545	.580	.614	.643					
	KIAS	303	299	294	290					
	FF/ENG	5286	5313	5367	5482					
150	%N1	92.1	95.3	98.8	101.9	104.6				
	MACH	.532	.567	.601	.628	.647				
	KIAS	295	292	287	283	281				
	FF/ENG	4945	4965	4991	5067	5157				
140	%N1	90.3	93.4	96.8	99.6	101.8				
	MACH	.518	.551	.587	.612	.632				
	KIAS	287	283	280	276	273				
	FF/ENG	4609	4607	4633	4669	4732				
130	%N1	88.4	91.4	94.7	97.3	99.3	101.6			
	MACH	.503	.535	.571	.597	.615	.635			
	KIAS	278	275	272	268	266	263			
	FF/ENG	4279	4262	4280	4301	4328	4393			
120	%N1	86.3	89.3	92.4	95.0	96.8	98.8	101.3		
	MACH	.487	.518	.553	.580	.598	.616	.636		
	KIAS	269	266	263	261	258	255	253		
	FF/ENG	3955	3927	3928	3944	3959	3986	4051		
110	%N1	84.0	87.1	90.1	92.6	94.3	96.2	98.2	100.7	
	MACH	.470	.501	.534	.562	.580	.598	.617	.637	
	KIAS	260	257	254	252	250	248	245	243	
	FF/ENG	3634	3599	3585	3597	3606	3617	3642	3703	
100	%N1	81.5	84.6	87.6	90.0	91.7	93.4	95.3	97.3	99.9
	MACH	.450	.482	.514	.540	.559	.578	.597	.615	.636
	KIAS	249	247	244	242	241	239	237	234	232
	FF/ENG	3300	3279	3253	3247	3260	3267	3277	3297	3350

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
287	264	244	227	213	200	190	181	173	166	159
575	529	489	455	426	400	381	363	347	332	319
864	796	735	684	640	600	571	544	520	498	478
1155	1063	982	913	853	800	761	726	693	664	637
1446	1331	1228	1142	1067	1000	952	907	866	829	796
1738	1598	1475	1370	1281	1200	1142	1088	1039	995	955
2032	1868	1723	1600	1495	1400	1332	1269	1212	1160	1113
2327	2138	1971	1830	1709	1600	1522	1451	1385	1325	1271
2623	2409	2219	2060	1923	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		26	
	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)
200	2.6	0:41	2.3	0:40	2.0	0:38	1.9	0:37	1.7	0:36
400	5.4	1:17	4.9	1:15	4.6	1:12	4.3	1:09	4.2	1:07
600	8.1	1:54	7.6	1:50	7.1	1:45	6.8	1:41	6.6	1:37
800	10.8	2:32	10.2	2:25	9.6	2:19	9.2	2:14	8.9	2:08
1000	13.5	3:09	12.7	3:01	12.1	2:53	11.5	2:46	11.3	2:39
1200	16.2	3:47	15.3	3:37	14.5	3:27	13.9	3:19	13.6	3:11
1400	18.8	4:26	17.8	4:14	16.9	4:02	16.2	3:52	15.8	3:42
1600	21.4	5:04	20.2	4:50	19.3	4:36	18.5	4:25	18.1	4:14
1800	24.0	5:43	22.7	5:27	21.6	5:12	20.7	4:58	20.3	4:45

Fuel Required Adjustment (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG)				
	100	120	140	160	180
2	-0.3	-0.1	0.0	0.2	0.4
4	-0.6	-0.3	0.0	0.5	0.9
6	-1.0	-0.5	0.0	0.7	1.4
8	-1.3	-0.6	0.0	1.0	2.0
10	-1.6	-0.8	0.0	1.3	2.5
12	-2.0	-1.0	0.0	1.6	3.0
14	-2.3	-1.2	0.0	1.8	3.6
16	-2.7	-1.3	0.0	2.1	4.1
18	-3.0	-1.5	0.0	2.4	4.7
20	-3.4	-1.7	0.0	2.6	5.2
22	-3.7	-1.8	0.0	2.9	5.7
24	-4.1	-2.0	0.0	3.1	6.3
26	-4.4	-2.2	0.0	3.4	6.8
28	-4.8	-2.3	0.0	3.6	7.4
30	-5.1	-2.5	0.0	3.8	7.9

Includes APU fuel burn.

ENGINE INOP

MAX CONTINUOUS THRUST

**Holding
Flaps Up**

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)						
		1500	5000	10000	15000	20000	25000	30000
190	%N1	87.3	90.3	94.9	100.2			
	KIAS	259	259	259	259			
	FF/ENG	5450	5490	5600	5810			
180	%N1	85.5	88.7	93.1	98.2	105.4		
	KIAS	251	251	251	251	251		
	FF/ENG	5140	5170	5250	5410	5770		
170	%N1	83.8	86.9	91.3	96.2	102.4		
	KIAS	244	244	244	244	244		
	FF/ENG	4840	4850	4910	5040	5310		
160	%N1	82.0	85.0	89.4	94.2	99.9		
	KIAS	236	236	236	236	236		
	FF/ENG	4530	4540	4580	4680	4890		
150	%N1	79.8	83.0	87.5	92.1	97.5		
	KIAS	228	228	228	228	228		
	FF/ENG	4230	4240	4260	4330	4490		
140	%N1	77.6	81.0	85.4	90.0	95.0	101.7	
	KIAS	222	222	222	222	222	222	
	FF/ENG	3940	3940	3950	4000	4120	4370	
130	%N1	75.5	78.6	83.2	87.7	92.5	98.4	
	KIAS	217	217	217	217	217	217	
	FF/ENG	3660	3650	3660	3690	3770	3950	
120	%N1	73.2	76.2	81.0	85.5	90.1	95.4	
	KIAS	211	211	211	211	211	211	
	FF/ENG	3380	3370	3370	3390	3440	3560	
110	%N1	70.6	73.9	78.4	83.0	87.6	92.6	99.0
	KIAS	205	205	205	205	205	205	205
	FF/ENG	3120	3100	3090	3100	3140	3220	3410
100	%N1	67.9	71.2	75.7	80.5	85.0	89.7	95.3
	KIAS	199	199	199	199	199	199	199
	FF/ENG	2850	2840	2830	2820	2840	2890	3020

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



Performance Inflight - QRH

Chapter PI-QRH

Gear Down

Section 23

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



GEAR DOWN

Long Range Cruise Altitude Capability

WEIGHT (1000 KG)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
190	19800	18200	14800
185	20700	19300	17400
180	21700	20300	18600
175	22700	21200	19800
170	23700	22200	20800
165	24800	23200	21700
160	25800	24100	22700
155	26800	25200	23700
150	27600	26400	24800
145	28500	27700	26100
140	29300	29000	27500
135	30000	30000	29000
130	30700	30700	30100
125	31400	31400	30900
120	32200	32100	31700
115	32900	32900	32500
110	33700	33600	33300
105	34500	34400	34200
100	35300	35200	35000
95	36100	36100	35800
90	36900	36900	36600

GEAR DOWN

Long Range Cruise Control

WEIGHT (1000 KG)		PRESSURE ALTITUDE (1000 FT)										
		10	14	18	21	23	25	27	29	31	33	35
190	%N1	91.6	95.1	99.1								
	MACH	.472	.508	.546								
	KIAS	261	261	260								
	FF/ENG	4765	4811	4928								
180	%N1	90.0	93.4	97.3	100.6							
	MACH	.461	.495	.534	.563							
	KIAS	255	254	254	253							
	FF/ENG	4490	4522	4612	4715							
170	%N1	88.4	91.7	95.4	98.5	101.0						
	MACH	.449	.483	.520	.550	.571						
	KIAS	248	248	247	246	246						
	FF/ENG	4225	4241	4295	4386	4471						
160	%N1	86.8	89.9	93.5	96.5	98.6	101.4					
	MACH	.437	.469	.506	.536	.555	.577					
	KIAS	241	240	240	240	239	238					
	FF/ENG	3963	3961	4000	4072	4126	4222					
150	%N1	84.8	88.1	91.5	94.3	96.4	98.7	101.6				
	MACH	.424	.456	.491	.520	.540	.561	.583				
	KIAS	234	233	233	232	232	231	231				
	FF/ENG	3703	3693	3717	3758	3812	3868	3966				
140	%N1	82.8	86.2	89.5	92.2	94.2	96.3	98.7	101.9			
	MACH	.411	.442	.476	.504	.524	.544	.565	.587			
	KIAS	227	226	225	225	225	224	224	223			
	FF/ENG	3443	3434	3440	3465	3502	3549	3611	3704			
130	%N1	81.0	84.1	87.3	90.0	91.8	93.9	96.0	98.6	102.0		
	MACH	.398	.427	.460	.487	.506	.527	.548	.570	.591		
	KIAS	220	219	218	217	217	217	216	216	214		
	FF/ENG	3205	3176	3170	3187	3205	3244	3286	3353	3436		
120	%N1	78.7	81.8	85.2	87.7	89.5	91.3	93.4	95.6	98.3	101.8	
	MACH	.385	.411	.443	.469	.488	.508	.529	.550	.572	.593	
	KIAS	212	210	210	209	209	209	209	208	207	206	
	FF/ENG	2974	2918	2912	2913	2927	2944	2981	3022	3090	3165	
110	%N1	76.1	79.6	82.8	85.3	87.0	88.8	90.7	92.7	95.0	97.7	101.5
	MACH	.369	.396	.426	.451	.469	.488	.508	.529	.551	.574	.595
	KIAS	203	203	201	201	200	200	200	200	199	199	197
	FF/ENG	2726	2685	2658	2653	2654	2668	2682	2717	2759	2822	2895
100	%N1	73.5	76.9	80.1	82.7	84.4	86.0	87.9	89.8	91.9	94.1	96.9
	MACH	.353	.380	.408	.432	.449	.467	.487	.507	.528	.550	.574
	KIAS	195	194	192	192	192	191	191	191	191	190	190
	FF/ENG	2489	2454	2407	2400	2397	2397	2408	2421	2454	2495	2553

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
650	581	521	474	434	400	378	357	339	323	308
981	875	784	711	652	600	567	536	509	484	462
1317	1173	1049	951	870	800	755	714	677	644	615
1656	1472	1315	1190	1089	1000	944	893	846	805	768
2000	1775	1583	1431	1308	1200	1132	1070	1014	964	920
2349	2082	1854	1674	1527	1400	1320	1248	1182	1124	1072
2703	2391	2125	1916	1747	1600	1508	1425	1349	1282	1223
3062	2705	2400	2161	1968	1800	1696	1602	1517	1441	1374
3427	3021	2675	2406	2188	2000	1884	1779	1684	1599	1524

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT)									
	10		14		18		22		28	
	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)
200	4.8	0:49	4.4	0:47	4.0	0:45	3.7	0:44	3.3	0:41
400	9.9	1:36	9.2	1:32	8.6	1:27	8.0	1:23	7.5	1:17
600	14.9	2:24	13.9	2:17	13.0	2:09	12.2	2:03	11.5	1:53
800	19.8	3:12	18.5	3:02	17.4	2:52	16.4	2:43	15.4	2:30
1000	24.6	4:02	23.0	3:49	21.6	3:36	20.4	3:24	19.2	3:07
1200	29.3	4:52	27.4	4:36	25.8	4:20	24.4	4:05	23.0	3:45
1400	33.9	5:43	31.8	5:24	29.9	5:06	28.3	4:48	26.6	4:23
1600	38.5	6:36	36.0	6:13	33.9	5:51	32.1	5:31	30.1	5:02
1800	42.9	7:29	40.2	7:03	37.8	6:38	35.8	6:14	33.6	5:41
2000	47.2	8:24	44.2	7:54	41.6	7:26	39.4	6:58	37.0	6:21

Fuel Required Adjustment (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG)				
	100	120	140	160	180
5	-0.7	-0.4	0.0	0.6	1.3
10	-1.5	-0.8	0.0	1.3	2.7
15	-2.4	-1.2	0.0	1.9	4.0
20	-3.2	-1.6	0.0	2.5	5.3
25	-4.0	-2.0	0.0	3.1	6.6
30	-4.8	-2.4	0.0	3.7	7.8
35	-5.6	-2.8	0.0	4.3	8.9
40	-6.4	-3.2	0.0	4.8	10.1
45	-7.2	-3.6	0.0	5.3	11.1
50	-8.0	-4.0	0.0	5.8	12.1
55	-8.9	-4.5	0.0	6.3	13.1
60	-9.7	-4.9	0.0	6.7	14.0

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	68	71	74
TIME (MINUTES)	7	10	12	13	14	15	16	16	17	18	19	19	20

GEAR DOWN

Holding Flaps Up

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)						
		1500	5000	10000	15000	20000	25000	30000
190	%N1	83.1	85.9	90.1	94.6	100.0		
	KIAS	249	249	249	249	249		
	FF/ENG	4710	4690	4710	4790	4980		
180	%N1	81.2	84.2	88.4	92.8	97.9		
	KIAS	241	241	241	241	241		
	FF/ENG	4440	4410	4420	4470	4610		
170	%N1	79.4	82.5	86.7	91.0	95.9	102.5	
	KIAS	234	234	234	234	234	234	
	FF/ENG	4180	4160	4150	4180	4280	4550	
160	%N1	77.4	80.5	84.7	89.0	93.7	99.6	
	KIAS	226	226	226	226	226	226	
	FF/ENG	3910	3890	3860	3880	3950	4140	
150	%N1	75.4	78.3	82.7	87.0	91.5	96.9	
	KIAS	218	218	218	218	218	218	
	FF/ENG	3650	3620	3590	3590	3640	3770	
140	%N1	73.6	76.4	80.9	85.2	89.5	94.6	102.0
	KIAS	212	212	212	212	212	212	212
	FF/ENG	3420	3390	3360	3350	3380	3470	3710
130	%N1	71.5	74.6	79.0	83.2	87.6	92.4	98.6
	KIAS	207	207	207	207	207	207	207
	FF/ENG	3210	3180	3150	3120	3140	3210	3380
120	%N1	69.4	72.6	76.8	81.2	85.6	90.2	95.7
	KIAS	201	201	201	201	201	201	201
	FF/ENG	3000	2970	2930	2900	2910	2950	3060
110	%N1	67.3	70.3	74.7	79.2	83.6	88.0	93.1
	KIAS	195	195	195	195	195	195	195
	FF/ENG	2800	2760	2730	2690	2680	2710	2790
100	%N1	65.1	68.0	72.5	76.8	81.2	85.7	90.5
	KIAS	189	189	189	189	189	189	189
	FF/ENG	2590	2560	2520	2490	2470	2480	2520

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

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Performance Inflight - QRH

Gear Down, Engine Inop

Chapter PI-QRH

Section 24

GEAR DOWN

ENGINE INOP

MAX CONTINUOUS THRUST

Initial Max Continuous %N1

29000 FT to 10000 FT Pressure Altitudes

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

29000 FT PRESS ALT								TAT (°C)					
MACH	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	
0.6	102.6	103.6	104.7	105.8	106.8	107.9	108.6	107.7	106.8	106.1	105.5	104.9	
0.5	102.6	103.6	104.7	105.8	106.8	107.9	108.4	107.4	106.8	106.1	105.5	102.8	
0.4	102.6	103.6	104.7	105.8	106.8	107.9	108.2	107.5	106.8	106.2	103.6	100.5	
27000 FT PRESS ALT								TAT (°C)					
MACH	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	
0.6	102.6	103.6	104.7	105.8	106.8	107.9	108.6	107.6	106.7	105.7	105.0	104.3	
0.5	102.6	103.6	104.7	105.8	106.8	107.9	108.2	107.2	106.3	105.6	104.8	104.0	
0.4	102.6	103.6	104.7	105.8	106.8	107.9	108.0	107.0	106.3	105.6	104.7	101.8	
25000 FT PRESS ALT								TAT (°C)					
MACH	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	20	
0.6	102.3	103.2	104.2	105.2	106.1	106.9	107.3	106.4	105.4	104.4	103.6	102.9	
0.5	103.6	104.7	105.8	106.8	107.6	107.8	106.9	105.9	104.9	104.1	103.4	102.1	
0.4	103.6	104.7	105.8	106.8	107.9	107.7	106.7	105.7	104.9	104.1	102.8	100.0	
23000 FT PRESS ALT								TAT (°C)					
MACH	-30	-25	-20	-15	-10	-5	0	5	10	15	20	25	
0.6	103.2	104.2	105.2	106.1	107.0	107.9	108.0	107.2	106.2	105.3	104.5	103.7	
0.5	104.7	105.8	106.8	107.8	108.7	108.6	107.7	106.7	105.8	105.0	104.2	102.7	
0.4	104.7	105.8	106.8	107.9	108.9	108.6	107.6	106.6	105.8	105.0	103.4	100.8	
21000 FT PRESS ALT								TAT (°C)					
MACH	-30	-25	-20	-15	-10	-5	0	5	10	15	20	25	
0.6	103.9	104.8	105.8	106.8	107.7	108.6	109.5	109.4	108.5	107.5	106.6	105.7	
0.5	104.7	105.8	106.8	107.9	108.9	109.9	109.9	109.0	108.0	107.0	106.1	105.3	
0.4	104.7	105.8	106.8	107.9	108.9	109.9	109.8	108.8	107.8	106.9	106.1	104.2	
19000 FT PRESS ALT								TAT (°C)					
MACH	-25	-20	-15	-10	-5	0	5	10	15	20	25	30	
0.6	104.3	105.3	106.2	107.2	108.1	109.0	110.0	109.6	108.7	107.7	106.8	105.9	
0.5	105.8	106.8	107.9	108.9	109.8	110.7	110.1	109.2	108.2	107.3	106.4	105.5	
0.4	105.8	106.8	107.9	108.9	109.9	110.9	110.1	109.1	108.2	107.2	106.4	104.3	
15000 FT PRESS ALT								TAT (°C)					
MACH	-20	-15	-10	-5	0	5	10	15	20	25	30	35	
0.6	102.8	103.8	104.7	105.6	106.6	107.5	108.4	109.2	108.2	107.3	106.4	105.7	
0.5	104.3	105.2	106.2	107.1	108.1	109.0	109.4	108.4	107.5	106.7	105.9	105.1	
0.4	105.2	106.2	107.2	108.2	109.2	110.2	109.5	108.6	107.7	106.9	106.1	105.1	
10000 FT PRESS ALT								TAT (°C)					
MACH	-15	-10	-5	0	5	10	15	20	25	30	35	40	
0.6	100.3	101.2	102.1	103.0	103.9	104.8	105.6	106.5	107.4	106.7	106.0	105.2	
0.5	101.4	102.4	103.3	104.2	105.1	106.0	106.9	107.5	106.8	106.0	105.2	104.5	
0.4	102.6	103.5	104.4	105.4	106.3	107.2	107.8	107.0	106.2	105.4	104.7	104.1	

GEAR DOWN

ENGINE INOP

MAX CONTINUOUS THRUST

Driftdown Speed/Level Off Altitude

100 ft/min residual rate of climb

WEIGHT (1000 KG)		OPTIMUM DRIFTDOWN SPEED (KIAS)	LEVEL OFF ALTITUDE (FT)		
START DRIFT DOWN	LEVEL OFF		ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
180	171	238	2900		
170	162	231	5500	3700	1600
160	153	223	8200	6600	4700
150	143	215	10600	9200	7600
140	134	210	12800	11800	10100
130	125	205	14900	14400	12900
120	115	199	16700	16500	15600
110	106	193	18900	18800	18100
100	96	188	21000	20800	20400

Includes APU fuel burn.

GEAR DOWN

ENGINE INOP

MAX CONTINUOUS THRUST

Long Range Cruise Altitude Capability

100 ft/min residual rate of climb

WEIGHT (1000 KG)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
160	4300	1700	
155	5800	3400	
150	7400	5000	2500
145	8900	6700	4200
140	10300	8400	6000
135	11700	9900	7800
130	13100	11700	9500
125	14600	13600	11400
120	15700	15300	13400
115	16700	16600	15300
110	17900	17800	17000
105	19100	19000	18400
100	20300	20200	19700
95	21300	21200	20700
90	22300	22200	21600

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 KG)		PRESSURE ALTITUDE (1000 FT)							
		6	8	10	12	14	16	18	20
160	%N1	103.3							
	MACH	.398							
	KIAS	237							
	FF/ENG	7736							
150	%N1	101.0	103.1						
	MACH	.389	.400						
	KIAS	231	229						
	FF/ENG	7195	7225						
140	%N1	98.6	100.6	102.7	105.3				
	MACH	.379	.390	.401	.412				
	KIAS	225	223	221	219				
	FF/ENG	6672	6685	6714	6765				
130	%N1	96.2	98.0	100.0	102.2	104.8			
	MACH	.367	.379	.391	.402	.412			
	KIAS	218	217	215	213	211			
	FF/ENG	6167	6164	6175	6200	6251			
120	%N1	93.8	95.5	97.3	99.2	101.5	104.2		
	MACH	.355	.367	.379	.390	.402	.412		
	KIAS	211	210	209	207	205	203		
	FF/ENG	5671	5660	5658	5666	5686	5740		
110	%N1	91.2	92.8	94.5	96.3	98.3	100.5	103.4	
	MACH	.342	.353	.365	.377	.389	.401	.413	
	KIAS	203	202	201	200	199	197	195	
	FF/ENG	5188	5169	5157	5156	5159	5177	5259	
100	%N1	88.4	90.1	91.6	93.3	95.2	97.1	99.5	102.8
	MACH	.328	.339	.351	.363	.375	.387	.400	.417
	KIAS	195	194	193	192	191	190	189	189
	FF/ENG	4697	4689	4671	4659	4657	4658	4700	4837

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
164	146	131	118	109	100	94	89	84	79	75
334	296	264	239	218	200	187	175	165	156	148
505	447	398	359	327	300	281	263	247	234	222
677	598	531	479	437	400	374	350	329	311	295
850	751	666	600	546	500	467	438	411	388	368
1025	904	801	720	656	600	560	524	493	465	441
1200	1057	936	841	766	700	653	611	574	541	513
1377	1212	1072	963	876	800	746	698	655	618	586
1554	1367	1208	1085	986	900	839	785	737	694	658
1733	1523	1345	1207	1096	1000	932	872	818	771	731

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT)							
	6		10		14		18	
	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)
100	2.5	0:27	2.2	0:27	2.0	0:26	1.8	0:26
200	5.2	0:52	4.8	0:50	4.6	0:49	4.4	0:47
300	7.8	1:17	7.4	1:14	7.1	1:12	7.0	1:09
400	10.5	1:42	9.9	1:38	9.5	1:35	9.5	1:31
500	13.1	2:08	12.4	2:02	12.0	1:58	11.9	1:54
600	15.7	2:33	14.9	2:27	14.4	2:22	14.3	2:16
700	18.2	2:59	17.3	2:51	16.7	2:45	16.7	2:39
800	20.7	3:25	19.7	3:16	19.0	3:09	19.0	3:01
900	23.2	3:51	22.1	3:41	21.3	3:32	21.2	3:24
1000	25.7	4:18	24.4	4:06	23.6	3:56	23.5	3:47

Fuel Required Adjustment (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG)				
	100	120	140	160	180
2	-0.3	-0.2	0.0	0.2	0.5
4	-0.7	-0.3	0.0	0.5	1.1
6	-1.0	-0.5	0.0	0.8	1.7
8	-1.4	-0.7	0.0	1.1	2.3
10	-1.8	-0.9	0.0	1.4	2.9
12	-2.1	-1.1	0.0	1.7	3.4
14	-2.5	-1.2	0.0	2.0	4.0
16	-2.9	-1.4	0.0	2.3	4.6
18	-3.2	-1.6	0.0	2.6	5.2
20	-3.6	-1.8	0.0	2.9	5.8
22	-4.0	-2.0	0.0	3.1	6.4
24	-4.4	-2.1	0.0	3.4	6.9
26	-4.7	-2.3	0.0	3.7	7.5
28	-5.1	-2.5	0.0	4.0	8.1
30	-5.5	-2.7	0.0	4.3	8.7

Includes APU fuel burn.

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GEAR DOWN

ENGINE INOP

MAX CONTINUOUS THRUST

**Holding
Flaps Up**

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)				
		1500	5000	10000	15000	20000
180	%N1	101.3				
	KIAS	241				
	FF/ENG	8700				
170	%N1	99.2	103.1			
	KIAS	234	234			
	FF/ENG	8130	8300			
160	%N1	96.9	100.4			
	KIAS	226	226			
	FF/ENG	7540	7640			
150	%N1	94.5	97.9	103.9		
	KIAS	218	218	218		
	FF/ENG	6970	7030	7280		
140	%N1	92.5	95.6	101.0		
	KIAS	212	212	212		
	FF/ENG	6480	6520	6690		
130	%N1	90.4	93.5	98.5	105.9	
	KIAS	207	207	207	207	
	FF/ENG	6040	6070	6170	6500	
120	%N1	88.2	91.2	95.9	102.0	
	KIAS	201	201	201	201	
	FF/ENG	5600	5610	5670	5870	
110	%N1	86.0	88.9	93.4	98.8	
	KIAS	195	195	195	195	
	FF/ENG	5170	5170	5210	5330	
100	%N1	83.5	86.5	90.8	95.8	102.8
	KIAS	189	189	189	189	189
	FF/ENG	4750	4750	4760	4830	5080

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

Performance Inflight - QRH

Chapter PI-QRH

Text

Section 25

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. Landing distances for slippery runways are 115% of the actual landing distances.

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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Performance Inflight - QRH

Chapter PI-QRH

General

Section 30

Flight With Unreliable Airspeed / Turbulent Air Penetration

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

Climb (290/.78)**Flaps Up, Set Max Climb Thrust**

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG)				
		100	120	140	160	180
40000	PITCH ATT	4.0	4.0			
	V/S (FT/MIN)	1600	1000			
30000	PITCH ATT	4.5	4.0	4.0	4.0	4.0
	V/S (FT/MIN)	2700	2100	1700	1300	1000
20000	PITCH ATT	7.0	6.5	6.0	6.0	5.5
	V/S (FT/MIN)	4200	3400	2700	2300	1900
10000	PITCH ATT	10.5	9.0	8.5	8.0	7.5
	V/S (FT/MIN)	5600	4500	3700	3200	2700
SEA LEVEL	PITCH ATT	13.5	11.5	10.5	9.5	9.0
	V/S (FT/MIN)	6300	5100	4300	3600	3100

Cruise (.78/290)**Flaps Up, Set Thrust for Level Flight**

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG)				
		100	120	140	160	180
40000	PITCH ATT	2.0	2.5	3.5		
	%N1	88.1	92.1	97.5		
35000	PITCH ATT	1.5	2.0	2.5	3.0	3.5
	%N1	85.1	87.3	90.0	93.6	98.2
30000	PITCH ATT	1.0	1.5	2.0	2.0	2.5
	%N1	84.2	85.7	87.4	89.4	91.9
25000	PITCH ATT	1.0	1.5	2.0	2.5	3.0
	%N1	80.7	82.2	83.8	85.8	87.9
20000	PITCH ATT	1.0	1.5	2.0	2.5	3.0
	%N1	76.7	78.2	79.8	81.9	83.9
15000	PITCH ATT	1.0	1.5	2.0	2.5	3.0
	%N1	72.7	74.3	76.1	77.9	79.9

Descent (.78/290)**Flaps Up, Set Idle Thrust**

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG)				
		100	120	140	160	180
40000	PITCH ATT	-1.5	-0.5	0.0	0.5	1.0
	V/S (FT/MIN)	-2600	-2600	-2700	-2800	-3100
30000	PITCH ATT	-2.5	-1.5	-1.0	-0.5	0.0
	V/S (FT/MIN)	-2700	-2400	-2200	-2100	-2000
20000	PITCH ATT	-2.5	-1.5	-1.0	0.0	0.5
	V/S (FT/MIN)	-2400	-2100	-2000	-1900	-1800
10000	PITCH ATT	-2.5	-1.5	-1.0	-0.5	0.5
	V/S (FT/MIN)	-2100	-1900	-1700	-1700	-1600
SEA LEVEL	PITCH ATT	-3.0	-2.0	-1.0	-0.5	0.0
	V/S (FT/MIN)	-2000	-1700	-1600	-1500	-1500

Flight With Unreliable Airspeed / Turbulent Air Penetration

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

Holding (VREF30+80)

Flaps Up, Set Thrust for Level Flight

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG)				
		100	120	140	160	180
10000	PITCH ATT	4.0	4.5	5.0	5.0	5.0
	%N1	58.7	63.4	67.3	70.9	74.4
	KIAS	199	211	222	236	251
5000	PITCH ATT	4.0	4.5	5.0	5.0	5.0
	%N1	54.8	59.0	63.1	66.8	69.9
	KIAS	199	211	222	236	251

Terminal Area (5000 FT)

Set Thrust for Level Flight

FLAP POSITION (GEAR POSITION) (VREF + INCREMENT)		WEIGHT (1000 KG)				
		100	120	140	160	180
FLAPS UP (GEAR UP) (VREF30+80)	PITCH ATT	4.0	4.5	5.0	5.0	5.0
	%N1	55.6	60.1	64.6	68.0	71.1
	KIAS	199	211	222	236	251
FLAPS 1 (GEAR UP) (VREF30+60)	PITCH ATT	6.0	6.5	6.5	6.5	6.5
	%N1	56.6	61.6	65.8	69.4	72.9
	KIAS	179	191	202	216	231
FLAPS 5 (GEAR UP) (VREF30+40)	PITCH ATT	4.5	4.5	5.0	4.5	4.5
	%N1	59.0	64.1	68.3	72.4	75.7
	KIAS	159	171	182	196	211
FLAPS 15 (GEAR UP) (VREF30+20)	PITCH ATT	5.5	5.5	6.0	6.0	5.5
	%N1	61.1	65.9	70.6	74.3	77.6
	KIAS	139	151	162	176	191
FLAPS 20 (GEAR DOWN) (VREF30+20)	PITCH ATT	4.0	4.5	4.5	4.0	3.5
	%N1	67.6	72.9	77.5	81.6	85.4
	KIAS	139	151	162	176	191

Final Approach (1500 FT)

Gear Down, Set Thrust for 3° Glideslope

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG)				
		100	120	140	160	180
FLAPS 20 (VREF20 +10)	PITCH ATT	1.5	1.5	1.5	1.5	1.5
	%N1	48.0	51.8	55.6	59.2	62.6
	KIAS	138	150	162	172	184

Go-Around (VREF 30 + 20)

Flaps 20, Gear Up, Set Go-Around Thrust

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG)				
		100	120	140	160	180
10000	PITCH ATT	18.0	15.0	12.5	10.5	9.0
	V/S (FT/MIN)	4000	3300	2700	2300	2000
	KIAS	139	151	162	176	191
5000	PITCH ATT	21.5	17.5	15.0	12.5	10.5
	V/S (FT/MIN)	4500	3800	3200	2800	2400
	KIAS	139	151	162	176	191
SEA LEVEL	PITCH ATT	25.0	20.5	17.0	14.5	12.0
	V/S (FT/MIN)	5000	4200	3600	3200	2800
	KIAS	139	151	162	176	191

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

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VREF (KIAS)

WEIGHT (1000 KG)	FLAPS		
	30	25	20
190	179	170	179
180	171	166	173
170	164	161	168
160	156	156	162
150	148	151	157
140	142	146	151
130	137	141	146
120	131	135	141
110	125	129	135
100	119	123	128



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Advisory Information

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Section 31

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	150000 KG LANDING WEIGHT	PER 5000 KG ABV/ BLW 150000 KG	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	3200	110/-60	80	-130	440	50	-40	80	-70	250	80	170
MAX AUTO	5370	130/-130	150	-250	840	0	0	160	-160	600	0	0
AUTOBRAKE 4	5540	140/-140	160	-260	880	0	0	160	-160	630	0	0
AUTOBRAKE 3	6370	160/-160	190	-300	1040	0	-20	190	-190	710	0	0
AUTOBRAKE 2	7090	190/-190	220	-350	1190	50	-120	220	-210	630	110	110
AUTOBRAKE 1	7740	220/-220	250	-390	1360	170	-220	250	-230	580	480	620

Good Reported Braking Action

MAX MANUAL	5060	120/-120	140	-240	830	140	-120	140	-130	400	300	660
MAX AUTO	6180	150/-150	180	-290	980	20	0	180	-180	700	20	90
AUTOBRAKE 4	6370	160/-160	180	-300	1010	10	0	190	-190	720	10	60
AUTOBRAKE 3	7320	190/-190	220	-350	1190	0	-20	220	-220	820	0	0

Medium Reported Braking Action

MAX MANUAL	6940	190/-190	220	-370	1360	340	-270	210	-190	510	790	1910
MAX AUTO	6970	190/-180	220	-380	1370	300	-180	210	-200	660	700	1820
AUTOBRAKE 4	7050	190/-190	220	-380	1380	280	-160	220	-200	710	610	1730
AUTOBRAKE 3	7670	210/-200	230	-400	1450	180	-120	230	-230	820	410	1270

Poor Reported Braking Action

MAX MANUAL	8960	270/-260	300	-550	2100	760	-500	290	-260	590	1670	4460
MAX AUTO	8960	270/-260	300	-550	2100	760	-500	290	-260	590	1670	4470
AUTOBRAKE 4	8960	270/-260	300	-550	2100	770	-500	290	-260	600	1670	4470
AUTOBRAKE 3	9050	270/-260	300	-550	2110	700	-410	290	-270	760	1530	4320

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 460 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).

Distances for GOOD, MEDIUM, and POOR are increased by 15%.

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	150000 KG LANDING WEIGHT	PER 5000 KG ABV/ BLW 150000 KG	PER 1000 FT ABV SEA LEVEL	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 10 KTS ABV VREF 30	ONE REV	NO REV
MAX MANUAL	3150	140/-70	80	-130	440	50	-40	80	-70	250	80	160
MAX AUTO	5220	210/-140	150	-240	830	0	0	150	-150	600	0	0
AUTOBRAKE 4	5380	220/-140	150	-250	870	0	0	160	-160	620	0	0
AUTOBRAKE 3	6180	260/-170	180	-300	1020	0	-10	190	-190	720	0	0
AUTOBRAKE 2	6930	280/-200	210	-340	1180	40	-110	210	-210	640	80	80
AUTOBRAKE 1	7590	300/-220	240	-390	1350	160	-210	240	-230	580	410	540

Good Reported Braking Action

MAX MANUAL	5000	180/-130	140	-240	830	140	-120	140	-130	400	280	620
MAX AUTO	6010	250/-160	170	-280	970	20	0	170	-170	690	20	90
AUTOBRAKE 4	6190	260/-170	180	-290	1000	10	0	180	-180	710	10	60
AUTOBRAKE 3	7110	300/-200	210	-340	1180	0	-10	210	-210	830	0	0

Medium Reported Braking Action

MAX MANUAL	6860	260/-190	210	-370	1370	350	-270	210	-190	510	740	1770
MAX AUTO	6860	280/-190	210	-380	1370	320	-190	210	-200	650	690	1720
AUTOBRAKE 4	6920	290/-200	220	-380	1380	300	-170	210	-200	690	620	1650
AUTOBRAKE 3	7480	320/-210	230	-400	1440	190	-110	230	-220	830	410	1220

Poor Reported Braking Action

MAX MANUAL	8870	360/-270	300	-550	2110	780	-510	290	-260	600	1580	4140
MAX AUTO	8870	360/-270	300	-550	2100	780	-510	290	-260	590	1580	4150
AUTOBRAKE 4	8870	360/-270	300	-550	2100	780	-510	290	-260	590	1580	4150
AUTOBRAKE 3	8920	380/-270	300	-550	2110	730	-420	290	-270	770	1480	4050

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 460 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).

Distances for GOOD, MEDIUM, and POOR are increased by 15%.

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	150000 KG LDG WT	PER 5000 KG ABV/BLW 150000KG	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	4210	90/-90	100	-170/570	90/-80	110/-110	420	0	0
AIR/GRD SYS (FLAPS 30)	VREF30	4130	160/-100	100	-170/570	90/-80	110/-110	440	0	0
ALL FLAPS AND SLATS UP LANDING	VREF30+50	4530	260/-110	130	-170/570	80/-70	130/-120	320	200	440
ANTI-SKID OFF (FLAPS 25)	VREF25	5920	160/-150	160	-290/1010	190/-160	160/-150	440	410	960
ANTI-SKID OFF (FLAPS 30)	VREF30	5770	230/-160	160	-290/1010	190/-160	160/-150	450	380	880
ENGINE FAILURE (FLAPS 20)	VREF20	3460	150/-80	90	-140/470	60/-50	90/-90	280	0	110
HYD SYS PRESS (C ONLY) (FLAPS 20)	VREF20	4140	110/-100	100	-160/530	70/-60	100/-100	380	140	300
HYD SYS PRESS (L ONLY) (FLAPS 25)	VREF25	3350	90/-80	80	-130/460	50/-50	80/-80	290	100	200
HYD SYS PRESS (L ONLY) (FLAPS 30)	VREF30	3300	130/-80	80	-130/460	60/-50	80/-80	300	90	190
HYD SYS PRESS (R ONLY) (FLAPS 25)	VREF25	3680	90/-90	90	-150/530	70/-60	90/-90	310	140	300
HYD SYS PRESS (R ONLY) (FLAPS 30)	VREF30	3620	140/-90	90	-150/530	70/-70	90/-90	330	130	280
HYD SYS PRESS (L AND C) (FLAPS 20)	VREF30+20	4890	190/-110	130	-180/600	100/-90	130/-130	510	230	510
HYD SYS PRESS (L AND R) (FLAPS 20)	VREF30+20	4570	180/-110	130	-180/610	110/-90	130/-120	420	260	570
HYD SYS PRESS (R AND C) (FLAPS 20)	VREF30+20	5800	240/-150	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	150000 KG LDG WT	PER 5000 KG ABV/BLW 150000KG	PER 1000FT ABV S.L.	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER10°C ABV/ BLW ISA	PER 10 KTS ABV VREF	ONE REV	NO REV
LE SLAT ASYM (FLAPS > 20)	VREF30+20	3670	180/-80	90	-140/480	60/-50	90/-90	270	120	260
LE SLAT ASYM (FLAPS = 20)	VREF30+30	4140	170/-90	110	-150/520	70/-60	110/-110	310	160	340
LE SLAT ASYM (5 < FLAPS < 20)	VREF30+40	4440	170/-100	120	-160/540	80/-70	120/-120	320	180	390
LE SLAT DISAGREE (FLAPS > 20)	VREF20	3390	140/-80	80	-130/450	50/-50	80/-80	260	100	220
LE SLAT DISAGREE - ALTN FLAP EXT ACCOMPLISHED (FLAPS = 20)	VREF20	3390	140/-80	80	-130/450	50/-50	80/-80	260	100	220
LE SLAT DISAGREE - ALTN FLAP EXT FAILED (FLAPS = 20)	VREF30+30	3940	180/-90	100	-150/500	60/-60	100/-100	280	140	290
REVERSER UNLOCKED (FLAPS 20)	VREF30+30	4260	180/-100	110	-160/540	80/-70	120/-110	330	0	180
TE FLAP ASYM (FLAPS ≥ 20)	VREF20	3390	140/-80	80	-130/450	50/-50	80/-80	260	100	220
TE FLAP ASYM (5 < FLAPS < 20)	VREF30+20	3670	180/-80	90	-140/480	60/-50	90/-90	270	120	260
TE FLAP ASYM (FLAPS ≤ 5)	VREF30+30	3890	210/-90	100	-150/490	60/-50	100/-100	270	130	290
TE FLAP DISAGREE (FLAPS ≥ 20)	VREF20	3390	140/-80	80	-130/450	50/-50	80/-80	260	100	220
TE FLAP DISAGREE (5 < FLAPS < 20)	VREF30+20	3670	180/-80	90	-140/480	60/-50	90/-90	270	120	260
TE FLAP DISAGREE (FLAPS ≤ 5)	VREF30+30	3890	210/-90	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	150000 KG LDG WT	PER 5000 KG ABV/BLW 150000KG	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	6240	150/-150	180	-300/1010	270/-220	180/-180	620	0	0
AIR/GRD SYS (FLAPS 30)	VREF30	6090	250/-150	180	-300/1010	280/-230	180/-180	640	0	0
ALL FLAPS AND SLATS UP LANDING	VREF30+50	6220	220/-160	190	-250/860	160/-150	190/-180	380	530	1220
ANTI-SKID OFF (FLAPS 25)	VREF25	6660	190/-180	190	-350/1240	290/-230	190/-180	490	630	1530
ANTI-SKID OFF (FLAPS 30)	VREF30	6500	260/-180	190	-350/1240	290/-230	190/-180	490	590	1410
ENGINE FAILURE (FLAPS 20)	VREF20	4980	150/-130	140	-230/800	160/-140	140/-140	410	0	410
HYD SYS PRESS (C ONLY) (FLAPS 20)	VREF20	5600	170/-150	160	-250/840	170/-150	160/-150	510	430	1010
HYD SYS PRESS (L ONLY) (FLAPS 25)	VREF25	4620	130/-120	130	-220/750	140/-120	130/-120	390	300	680
HYD SYS PRESS (L ONLY) (FLAPS 30)	VREF30	4550	190/-120	130	-220/750	140/-120	130/-120	400	280	640
HYD SYS PRESS (R ONLY) (FLAPS 25)	VREF25	4620	130/-120	130	-220/750	140/-120	130/-120	390	300	680
HYD SYS PRESS (R ONLY) (FLAPS 30)	VREF30	4550	190/-120	130	-220/750	140/-120	130/-120	400	280	640
HYD SYS PRESS (L AND C) (FLAPS 20)	VREF30+20	6580	280/-180	200	-280/940	230/-190	200/-190	640	650	1560
HYD SYS PRESS (L AND R) (FLAPS 20)	VREF30+20	5760	240/-160	180	-250/860	190/-170	180/-170	510	530	1250
HYD SYS PRESS (R AND C) (FLAPS 20)	VREF30+20	6580	280/-180	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 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	
		150000 KG LDG WT	PER 5000 KG ABV/BLW 150000KG	PER 1000FT 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	5130	200/-130	150	-230/790	150/-130	150/-140	380	380	860
LE SLAT ASYM (FLAPS = 20)	VREF30+30	5770	220/-150	170	-250/840	170/-150	170/-170	420	470	1080
LE SLAT ASYM (5 < FLAPS < 20)	VREF30+40	6180	230/-160	190	-260/870	180/-160	190/-180	430	520	1190
LE SLAT DISAGREE (FLAPS > 20)	VREF20	4730	140/-130	130	-220/750	130/-120	130/-130	370	330	750
LE SLAT DISAGREE - ALTN FLAP EXT ACCOMPLISHED (FLAPS = 20)	VREF20	4730	140/-130	130	-220/750	130/-120	130/-130	370	330	750
LE SLAT DISAGREE - ALTN FLAP EXT FAILED (FLAPS = 20)	VREF30+30	5500	200/-140	160	-240/810	150/-140	160/-160	380	420	950
REVERSER UNLOCKED (FLAPS 20)	VREF30+30	6160	230/-160	180	-270/900	210/-180	190/-180	470	0	590
TE FLAP ASYM (FLAPS ≥ 20)	VREF20	4730	140/-130	130	-220/750	130/-120	130/-130	370	330	750
TE FLAP ASYM (5 < FLAPS < 20)	VREF30+20	5140	200/-140	150	-230/790	140/-130	150/-140	380	380	880
TE FLAP ASYM (FLAPS ≤ 5)	VREF30+30	5470	200/-140	160	-230/810	150/-130	160/-150	370	430	980
TE FLAP DISAGREE (FLAPS ≥ 20)	VREF20	4730	140/-130	130	-220/750	130/-120	130/-130	370	330	750
TE FLAP DISAGREE (5 < FLAPS < 20)	VREF30+20	5140	200/-140	150	-230/790	140/-130	150/-140	380	380	880
TE FLAP DISAGREE (FLAPS ≤ 5)	VREF30+30	5470	200/-140	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 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	
		150000 KG LDG WT	PER 5000 KG ABV/BLW 150000KG	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	9940	240/-230	310	-560/1950	1000/-670	320/-320	870	0	0
AIR/GRD SYS (FLAPS 30)	VREF30	9650	370/-230	310	-550/1940	1000/-670	320/-320	870	0	0
ALL FLAPS AND SLATS UP LANDING	VREF30+50	8820	340/-250	300	-400/1400	410/-330	300/-270	520	1430	3670
ANTI-SKID OFF (FLAPS 25)	VREF25	8370	260/-250	260	-500/1870	640/-440	250/-230	560	1370	3680
ANTI-SKID OFF (FLAPS 30)	VREF30	8180	350/-250	260	-500/1870	650/-440	250/-230	560	1290	3390
ENGINE FAILURE (FLAPS 20)	VREF20	7250	240/-220	230	-390/1360	440/-340	230/-220	560	0	1250
HYD SYS PRESS (C ONLY) (FLAPS 20)	VREF20	7520	260/-230	240	-380/1340	400/-310	240/-220	630	1120	2890
HYD SYS PRESS (L ONLY) (FLAPS 25)	VREF25	6320	190/-190	200	-340/1220	330/-260	200/-180	490	780	1900
HYD SYS PRESS (L ONLY) (FLAPS 30)	VREF30	6220	280/-190	200	-340/1220	340/-260	200/-180	500	740	1780
HYD SYS PRESS (R ONLY) (FLAPS 25)	VREF25	6320	190/-190	200	-340/1220	330/-260	200/-180	490	780	1900
HYD SYS PRESS (R ONLY) (FLAPS 30)	VREF30	6220	280/-190	200	-340/1220	340/-260	200/-180	500	740	1780
HYD SYS PRESS (L AND C) (FLAPS 20)	VREF30+20	8720	390/-260	290	-420/1460	500/-390	290/-260	740	1530	4090
HYD SYS PRESS (L AND R) (FLAPS 20)	VREF30+20	7850	350/-240	270	-390/1370	430/-340	260/-240	620	1300	3370
HYD SYS PRESS (R AND C) (FLAPS 20)	VREF30+20	8720	390/-260	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 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	
		150000 KG LDG WT	PER 5000 KG ABV/BLW 150000 KG	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	7070	290/-210	230	-360/1280	350/-280	230/-210	490	980	2430
LE SLAT ASYM (FLAPS = 20)	VREF30+30	7900	320/-230	260	-380/1350	390/-320	260/-240	530	1170	2930
LE SLAT ASYM (5 < FLAPS < 20)	VREF30+40	8430	340/-250	290	-400/1380	410/-330	280/-260	540	1340	3430
LE SLAT DISAGREE (FLAPS > 20)	VREF20	6540	220/-200	210	-340/1230	330/-260	200/-190	490	880	2200
LE SLAT DISAGREE - ALTN FLAP EXT ACCOMPLISHED (FLAPS = 20)	VREF20	6540	220/-200	210	-340/1230	330/-260	200/-190	490	880	2200
LE SLAT DISAGREE - ALTN FLAP EXT FAILED (FLAPS = 20)	VREF30+30	7550	300/-220	250	-370/1310	360/-290	250/-230	490	1050	2620
REVERSER UNLOCKED (FLAPS 20)	VREF30+30	8860	360/-260	290	-430/1510	530/-420	290/-280	610	0	1680
TE FLAP ASYM (FLAPS ≥ 20)	VREF20	6540	220/-200	210	-340/1230	330/-260	200/-190	490	880	2200
TE FLAP ASYM (5 < FLAPS < 20)	VREF30+20	7120	300/-210	230	-360/1280	350/-280	230/-210	490	1010	2540
TE FLAP ASYM (FLAPS ≤ 5)	VREF30+30	7590	310/-220	250	-370/1310	360/-290	250/-230	490	1110	2810
TE FLAP DISAGREE (FLAPS ≥ 20)	VREF20	6540	220/-200	210	-340/1230	330/-260	200/-190	490	880	2200
TE FLAP DISAGREE (5 < FLAPS < 20)	VREF30+20	7120	300/-210	230	-360/1280	350/-280	230/-210	490	1010	2540
TE FLAP DISAGREE (FLAPS ≤ 5)	VREF30+30	7590	310/-220	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	
		150000 KG LDG WT	PER 5000 KG ABV/BLW 150000 KG	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	16490	320/-200	570	-1120/4230	6080/-2020	600/-590	1090	0	0
AIR/GRD SYS (FLAPS 30)	VREF30	15920	480/-200	550	-1100/4180	5960/-1970	580/-570	1080	0	0
ALL FLAPS AND SLATS UP LANDING	VREF30+50	11600	480/-370	430	-590/2140	900/-630	410/-370	640	3020	8970
ANTI-SKID OFF (FLAPS 25)	VREF25	10950	380/-360	370	-800/3310	3040/-940	350/-310	630	3540	14250
ANTI-SKID OFF (FLAPS 30)	VREF30	10760	480/-360	360	-800/3310	3040/-950	350/-310	630	3380	13380
ENGINE FAILURE (FLAPS 20)	VREF20	9970	360/-320	340	-600/2200	1100/-700	330/-310	690	0	3070
HYD SYS PRESS (C ONLY) (FLAPS 20)	VREF20	9560	360/-310	330	-550/2030	840/-570	320/-290	710	2280	6740
HYD SYS PRESS (L ONLY) (FLAPS 25)	VREF25	8130	280/-260	280	-500/1870	710/-480	270/-240	560	1610	4380
HYD SYS PRESS (L ONLY) (FLAPS 30)	VREF30	8030	370/-270	280	-500/1870	730/-490	270/-240	570	1530	4080
HYD SYS PRESS (R ONLY) (FLAPS 25)	VREF25	8130	280/-260	280	-500/1870	710/-480	270/-240	560	1610	4380
HYD SYS PRESS (R ONLY) (FLAPS 30)	VREF30	8030	370/-270	280	-500/1870	730/-490	270/-240	570	1530	4080
HYD SYS PRESS (L AND C) (FLAPS 20)	VREF30+20	10910	510/-360	400	-600/2160	990/-670	380/-340	800	2910	8920
HYD SYS PRESS (L AND R) (FLAPS 20)	VREF30+20	10000	460/-330	360	-560/2060	890/-610	350/-310	690	2540	7490
HYD SYS PRESS (R AND C) (FLAPS 20)	VREF30+20	10910	510/-360	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 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	
		150000 KG LDG WT	PER 5000 KG ABV/BLW 150000 KG	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	9120	400/-290	320	-530/1950	760/-520	310/-280	570	2010	5610
LE SLAT ASYM (FLAPS = 20)	VREF30+30	10100	430/-320	360	-560/2040	820/-570	350/-320	600	2310	6530
LE SLAT ASYM (5 < FLAPS < 20)	VREF30+40	10880	460/-350	400	-570/2100	870/-610	380/-340	630	2700	7890
LE SLAT DISAGREE (FLAPS > 20)	VREF20	8500	320/-280	290	-510/1900	730/-500	280/-260	580	1860	5230
LE SLAT DISAGREE - ALTN FLAP EXT ACCOMPLISHED (FLAPS = 20)	VREF20	8500	320/-280	290	-510/1900	730/-500	280/-260	580	1860	5230
LE SLAT DISAGREE - ALTN FLAP EXT FAILED (FLAPS = 20)	VREF30+30	9680	410/-310	340	-540/1990	780/-540	330/-300	560	2120	5910
REVERSER UNLOCKED (FLAPS 20)	VREF30+30	11960	500/-380	420	-660/2380	1260/-830	410/-390	730	0	3880
TE FLAP ASYM (FLAPS ≥ 20)	VREF20	8500	320/-280	290	-510/1900	730/-500	280/-260	580	1860	5230
TE FLAP ASYM (5 < FLAPS < 20)	VREF30+20	9250	410/-300	330	-530/1960	760/-520	320/-280	590	2160	6210
TE FLAP ASYM (FLAPS ≤ 5)	VREF30+30	9820	420/-310	350	-540/2000	780/-540	340/-300	580	2290	6540
TE FLAP DISAGREE (FLAPS ≥ 20)	VREF20	8500	320/-280	290	-510/1900	730/-500	280/-260	580	1860	5230
TE FLAP DISAGREE (5 < FLAPS < 20)	VREF30+20	9250	410/-300	330	-530/1960	760/-520	320/-280	590	2160	6210
TE FLAP DISAGREE (FLAPS ≤ 5)	VREF30+30	9820	420/-310	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 KG)	OAT (°C)	PRESSURE ALTITUDE (1000 FT)																	
		0	2	4	0	2	4	0	2	4	0	2	4	0	2	4	0	2	4
180	0	15.1	16.1	17.0	22.8	24.3	25.8	31.8	33.9	35.9	41.8	44.6	47.4	52.7	56.3	59.9			
	10	15.7	16.6	17.6	23.6	25.1	26.6	32.9	35.0	37.2	43.2	46.1	49.1	54.5	58.3	62.0			
	20	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	60.3	64.2			
	30	16.7	17.7	18.7	25.2	26.8	28.4	35.0	37.4	39.7	46.1	49.2	52.3	58.2	62.2	66.2			
	40	16.9	18.0	19.0	25.6	27.3	29.0	35.8	38.2	40.5	47.2	50.4	53.6	59.6	63.7	67.9			
160	0	13.7	14.5	15.3	20.6	21.9	23.2	28.5	30.4	32.3	37.5	40.0	42.5	47.2	50.4	53.6	57.6	61.6	65.6
	10	14.1	15.0	15.9	21.3	22.6	24.0	29.5	31.5	33.4	38.8	41.4	44.0	48.9	52.2	55.5	59.6	63.8	67.9
	20	14.6	15.5	16.4	22.0	23.4	24.8	30.5	32.5	34.5	40.1	42.8	45.4	50.5	54.0	57.4	61.7	65.9	70.2
	30	15.0	16.0	16.9	22.7	24.1	25.5	31.5	33.5	35.6	41.3	44.1	46.9	52.1	55.7	59.3	63.7	68.1	72.5
	40	15.3	16.2	17.2	23.1	24.5	26.0	32.1	34.2	36.3	42.3	45.1	48.0	53.4	57.0	60.7	65.2	69.8	74.3
140	0	12.2	13.0	13.7	18.3	19.4	20.6	25.3	26.9	28.6	33.1	35.3	37.4	41.5	44.3	47.1	50.6	54.0	57.5
	10	12.7	13.4	14.2	18.9	20.1	21.3	26.2	27.9	29.5	34.2	36.5	38.8	43.0	45.9	48.8	52.4	56.0	59.6
	20	13.1	13.9	14.6	19.6	20.8	22.0	27.0	28.8	30.5	35.4	37.7	40.1	44.4	47.4	50.5	54.1	57.8	61.6
	30	13.5	14.3	15.1	20.2	21.4	22.7	27.9	29.7	31.5	36.5	38.9	41.3	45.9	49.0	52.1	55.9	59.7	63.6
	40	13.7	14.5	15.3	20.5	21.8	23.1	28.4	30.3	32.1	37.3	39.8	42.2	46.9	50.1	53.3	57.2	61.2	65.1
120	0	10.8	11.5	12.1	16.0	17.0	18.0	22.0	23.4	24.8	28.6	30.5	32.3	35.7	38.1	40.5	43.3	46.2	49.1
	10	11.2	11.9	12.5	16.6	17.6	18.6	22.8	24.2	25.7	29.6	31.5	33.4	37.0	39.4	41.9	44.8	47.8	50.9
	20	11.6	12.2	12.9	17.1	18.2	19.3	23.5	25.0	26.5	30.6	32.6	34.6	38.2	40.7	43.3	46.3	49.4	52.6
	30	11.9	12.6	13.3	17.7	18.8	19.9	24.2	25.8	27.3	31.5	33.6	35.7	39.4	42.0	44.7	47.8	51.0	54.3
	40	12.1	12.8	13.5	18.0	19.1	20.2	24.7	26.3	27.9	32.2	34.3	36.4	40.3	43.0	45.7	48.9	52.2	55.6
100	0	9.4	10.0	10.5	13.8	14.6	15.5	18.7	19.8	21.0	24.0	25.5	27.1	29.7	31.6	33.6	35.7	38.0	40.4
	10	9.8	10.3	10.9	14.3	15.1	16.0	19.3	20.5	21.7	24.8	26.4	28.0	30.7	32.7	34.7	36.9	39.4	41.8
	20	10.1	10.7	11.2	14.7	15.6	16.5	20.0	21.2	22.5	25.7	27.3	29.0	31.7	33.8	35.9	38.2	40.7	43.2
	30	10.4	11.0	11.6	15.2	16.1	17.0	20.6	21.9	23.2	26.5	28.2	29.9	32.7	34.9	37.0	39.4	42.0	44.6
	40	10.5	11.1	11.7	15.4	16.4	17.3	20.9	22.3	23.6	27.0	28.7	30.5	33.4	35.6	37.8	40.2	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
LANDING	RTO MAX MAN	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0	45.0	50.0
	MAX MAN	1.0	6.1	11.2	16.1	21.0	25.8	30.5	35.2	39.8	44.5
	MAX AUTO	1.7	6.1	10.4	14.7	18.9	23.1	27.3	31.5	35.8	40.0
	AUTOBRAKE 4	1.9	6.0	10.1	14.1	18.1	22.0	26.0	29.9	33.8	37.8
	AUTOBRAKE 3	1.8	5.7	9.5	13.2	17.0	20.7	24.3	28.0	31.6	35.3
	AUTOBRAKE 2	1.7	5.4	9.0	12.5	15.9	19.3	22.7	26.1	29.4	32.8
	AUTOBRAKE 1	1.7	5.0	8.2	11.3	14.4	17.4	20.3	23.3	26.2	29.1

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	NO SPECIAL	PROCEDURE REQUIRED	1	1	2	2	3	4	6	CAUTION	FUSE PLUG MELT ZONE		
GEAR DOWN			11	15	19	24	34	44	59				
GROUND													

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 32

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 THRUST

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)	
KLAS	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)	
KLAS	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)	
KLAS	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)	
KLAS	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)	
KLAS	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)	
KLAS	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 THRUST

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)														
CIAS	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)														
CIAS	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)														
CIAS	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)														
CIAS	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)														
CIAS	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)														
CIAS	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 THRUST

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)								
KLAS	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)								
KLAS	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)								
KLAS	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)								
KLAS	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 KG)		OPTIMUM DRIFTDOWN SPEED (KIAS)	LEVEL OFF ALTITUDE (FT)		
START DRIFT DOWN	LEVEL OFF		ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
190	183	276	18400	17400	15600
180	174	269	20000	19100	17700
170	165	262	21200	20600	19700
160	155	254	22600	21900	21000
150	145	247	24000	23200	22300
140	135	238	25500	24700	23700
130	126	230	27200	26700	25500
120	116	221	29100	28900	28100
110	106	212	30900	30900	30500
100	97	202	32900	32800	32600

Includes APU fuel burn.

ENGINE INOP

MAX CONTINUOUS THRUST

Driftdown/LRC Cruise Range Capability Ground to Air Miles Conversion

AIR DISTANCE (NM)					GROUND DISTANCE (NM)	AIR DISTANCE (NM)				
HEADWIND COMPONENT (KTS)						TAILWIND COMPONENT (KTS)				
100	80	60	40	20		20	40	60	80	100
274	255	239	224	211	200	190	180	172	164	157
547	510	477	448	423	400	380	361	344	329	315
819	763	715	672	634	600	570	542	517	494	473
1090	1016	952	895	845	800	760	723	690	660	632
1361	1269	1189	1119	1056	1000	950	904	863	825	790
1632	1522	1426	1342	1267	1200	1140	1085	1036	990	949
1902	1775	1664	1565	1478	1400	1330	1266	1208	1156	1107
2174	2029	1901	1789	1689	1600	1520	1447	1381	1321	1266
2447	2283	2139	2013	1900	1800	1710	1628	1554	1486	1424

Driftdown/Cruise Fuel and Time

AIR DIST (NM)	FUEL REQUIRED (1000 KG)										TIME (HR:MIN)
	WEIGHT AT START OF DRIFTDOWN (1000 KG)										
	100	110	120	130	140	150	160	170	180	190	
200	1.5	1.7	1.8	1.9	2.1	2.1	2.3	2.4	2.5	2.6	0:33
400	3.4	3.7	4.0	4.3	4.6	4.9	5.2	5.4	5.8	6.0	1:05
600	5.2	5.7	6.1	6.6	7.0	7.5	7.9	8.3	8.8	9.3	1:36
800	6.9	7.5	8.1	8.8	9.4	10.0	10.6	11.2	11.8	12.4	2:08
1000	8.6	9.4	10.1	10.9	11.7	12.4	13.2	13.9	14.7	15.5	2:39
1200	10.2	11.2	12.1	13.1	14.0	14.9	15.8	16.7	17.6	18.5	3:10
1400	11.9	13.0	14.0	15.2	16.3	17.3	18.4	19.4	20.5	21.5	3:42
1600	13.5	14.8	16.0	17.2	18.5	19.6	20.9	22.0	23.3	24.5	4:14
1800	15.1	16.5	17.8	19.2	20.6	22.0	23.3	24.6	26.0	27.4	4:45

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 KG)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
190	15400	13000	10200
185	16300	14200	11400
180	17200	15300	12700
175	18200	16500	13900
170	19100	17600	15200
165	20000	18700	16400
160	20700	19700	17800
155	21400	20500	19100
150	22100	21200	20200
145	22800	21900	20900
140	23600	22600	21600
135	24300	23400	22300
130	25100	24100	23000
125	26100	24900	23700
120	27200	26200	24500
115	28300	27600	25700
110	29400	29000	27400
105	30500	30300	29100
100	31400	31300	30500

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 KG)		PRESSURE ALTITUDE (1000 FT)								
		10	14	18	21	23	25	27	29	31
190	%N1	98.8	102.4							
	MACH	.583	.616							
	KIAS	324	318							
	FF/ENG	6358	6418							
180	%N1	97.2	100.7	105.0						
	MACH	.572	.605	.641						
	KIAS	317	312	307						
	FF/ENG	6000	6034	6176						
170	%N1	95.6	99.0	102.9						
	MACH	.559	.593	.628						
	KIAS	310	306	300						
	FF/ENG	5646	5675	5766						
160	%N1	93.9	97.2	100.8	104.3					
	MACH	.545	.580	.614	.643					
	KIAS	303	299	294	290					
	FF/ENG	5286	5313	5367	5482					
150	%N1	92.1	95.3	98.8	101.9	104.6				
	MACH	.532	.567	.601	.628	.647				
	KIAS	295	292	287	283	281				
	FF/ENG	4945	4965	4991	5067	5157				
140	%N1	90.3	93.4	96.8	99.6	101.8				
	MACH	.518	.551	.587	.612	.632				
	KIAS	287	283	280	276	273				
	FF/ENG	4609	4607	4633	4669	4732				
130	%N1	88.4	91.4	94.7	97.3	99.3	101.6			
	MACH	.503	.535	.571	.597	.615	.635			
	KIAS	278	275	272	268	266	263			
	FF/ENG	4279	4262	4280	4301	4328	4393			
120	%N1	86.3	89.3	92.4	95.0	96.8	98.8	101.3		
	MACH	.487	.518	.553	.580	.598	.616	.636		
	KIAS	269	266	263	261	258	255	253		
	FF/ENG	3955	3927	3928	3944	3959	3986	4051		
110	%N1	84.0	87.1	90.1	92.6	94.3	96.2	98.2	100.7	
	MACH	.470	.501	.534	.562	.580	.598	.617	.637	
	KIAS	260	257	254	252	250	248	245	243	
	FF/ENG	3634	3599	3585	3597	3606	3617	3642	3703	
100	%N1	81.5	84.6	87.6	90.0	91.7	93.4	95.3	97.3	99.9
	MACH	.450	.482	.514	.540	.559	.578	.597	.615	.636
	KIAS	249	247	244	242	241	239	237	234	232
	FF/ENG	3300	3279	3253	3247	3260	3267	3277	3297	3350

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
287	264	244	227	213	200	190	181	173	166	159
575	529	489	455	426	400	381	363	347	332	319
864	796	735	684	640	600	571	544	520	498	478
1155	1063	982	913	853	800	761	726	693	664	637
1446	1331	1228	1142	1067	1000	952	907	866	829	796
1738	1598	1475	1370	1281	1200	1142	1088	1039	995	955
2032	1868	1723	1600	1495	1400	1332	1269	1212	1160	1113
2327	2138	1971	1830	1709	1600	1522	1451	1385	1325	1271
2623	2409	2219	2060	1923	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		26	
	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)
200	2.6	0:41	2.3	0:40	2.0	0:38	1.9	0:37	1.7	0:36
400	5.4	1:17	4.9	1:15	4.6	1:12	4.3	1:09	4.2	1:07
600	8.1	1:54	7.6	1:50	7.1	1:45	6.8	1:41	6.6	1:37
800	10.8	2:32	10.2	2:25	9.6	2:19	9.2	2:14	8.9	2:08
1000	13.5	3:09	12.7	3:01	12.1	2:53	11.5	2:46	11.3	2:39
1200	16.2	3:47	15.3	3:37	14.5	3:27	13.9	3:19	13.6	3:11
1400	18.8	4:26	17.8	4:14	16.9	4:02	16.2	3:52	15.8	3:42
1600	21.4	5:04	20.2	4:50	19.3	4:36	18.5	4:25	18.1	4:14
1800	24.0	5:43	22.7	5:27	21.6	5:12	20.7	4:58	20.3	4:45

Fuel Required Adjustment (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG)				
	100	120	140	160	180
2	-0.3	-0.1	0.0	0.2	0.4
4	-0.6	-0.3	0.0	0.5	0.9
6	-1.0	-0.5	0.0	0.7	1.4
8	-1.3	-0.6	0.0	1.0	2.0
10	-1.6	-0.8	0.0	1.3	2.5
12	-2.0	-1.0	0.0	1.6	3.0
14	-2.3	-1.2	0.0	1.8	3.6
16	-2.7	-1.3	0.0	2.1	4.1
18	-3.0	-1.5	0.0	2.4	4.7
20	-3.4	-1.7	0.0	2.6	5.2
22	-3.7	-1.8	0.0	2.9	5.7
24	-4.1	-2.0	0.0	3.1	6.3
26	-4.4	-2.2	0.0	3.4	6.8
28	-4.8	-2.3	0.0	3.6	7.4
30	-5.1	-2.5	0.0	3.8	7.9

Includes APU fuel burn.

ENGINE INOP

MAX CONTINUOUS THRUST

Holding Flaps Up

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)						
		1500	5000	10000	15000	20000	25000	30000
190	%N1	87.3	90.3	94.9	100.2			
	KIAS	259	259	259	259			
	FF/ENG	5450	5490	5600	5810			
180	%N1	85.5	88.7	93.1	98.2	105.4		
	KIAS	251	251	251	251	251		
	FF/ENG	5140	5170	5250	5410	5770		
170	%N1	83.8	86.9	91.3	96.2	102.4		
	KIAS	244	244	244	244	244		
	FF/ENG	4840	4850	4910	5040	5310		
160	%N1	82.0	85.0	89.4	94.2	99.9		
	KIAS	236	236	236	236	236		
	FF/ENG	4530	4540	4580	4680	4890		
150	%N1	79.8	83.0	87.5	92.1	97.5		
	KIAS	228	228	228	228	228		
	FF/ENG	4230	4240	4260	4330	4490		
140	%N1	77.6	81.0	85.4	90.0	95.0	101.7	
	KIAS	222	222	222	222	222	222	
	FF/ENG	3940	3940	3950	4000	4120	4370	
130	%N1	75.5	78.6	83.2	87.7	92.5	98.4	
	KIAS	217	217	217	217	217	217	
	FF/ENG	3660	3650	3660	3690	3770	3950	
120	%N1	73.2	76.2	81.0	85.5	90.1	95.4	
	KIAS	211	211	211	211	211	211	
	FF/ENG	3380	3370	3370	3390	3440	3560	
110	%N1	70.6	73.9	78.4	83.0	87.6	92.6	99.0
	KIAS	205	205	205	205	205	205	205
	FF/ENG	3120	3100	3090	3100	3140	3220	3410
100	%N1	67.9	71.2	75.7	80.5	85.0	89.7	95.3
	KIAS	199	199	199	199	199	199	199
	FF/ENG	2850	2840	2830	2820	2840	2890	3020

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



Performance Inflight - QRH

Chapter PI-QRH

Gear Down

Section 33

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



GEAR DOWN

Long Range Cruise Altitude Capability

WEIGHT (1000 KG)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
190	19800	18200	14800
185	20700	19300	17400
180	21700	20300	18600
175	22700	21200	19800
170	23700	22200	20800
165	24800	23200	21700
160	25800	24100	22700
155	26800	25200	23700
150	27600	26400	24800
145	28500	27700	26100
140	29300	29000	27500
135	30000	30000	29000
130	30700	30700	30100
125	31400	31400	30900
120	32200	32100	31700
115	32900	32900	32500
110	33700	33600	33300
105	34500	34400	34200
100	35300	35200	35000
95	36100	36100	35800
90	36900	36900	36600

GEAR DOWN

Long Range Cruise Control

WEIGHT (1000 KG)		PRESSURE ALTITUDE (1000 FT)										
		10	14	18	21	23	25	27	29	31	33	35
190	%N1	91.6	95.1	99.1								
	MACH	.472	.508	.546								
	KIAS	261	261	260								
	FF/ENG	4765	4811	4928								
180	%N1	90.0	93.4	97.3	100.6							
	MACH	.461	.495	.534	.563							
	KIAS	255	254	254	253							
	FF/ENG	4490	4522	4612	4715							
170	%N1	88.4	91.7	95.4	98.5	101.0						
	MACH	.449	.483	.520	.550	.571						
	KIAS	248	248	247	246	246						
	FF/ENG	4225	4241	4295	4386	4471						
160	%N1	86.8	89.9	93.5	96.5	98.6	101.4					
	MACH	.437	.469	.506	.536	.555	.577					
	KIAS	241	240	240	240	239	238					
	FF/ENG	3963	3961	4000	4072	4126	4222					
150	%N1	84.8	88.1	91.5	94.3	96.4	98.7	101.6				
	MACH	.424	.456	.491	.520	.540	.561	.583				
	KIAS	234	233	233	232	232	231	231				
	FF/ENG	3703	3693	3717	3758	3812	3868	3966				
140	%N1	82.8	86.2	89.5	92.2	94.2	96.3	98.7	101.9			
	MACH	.411	.442	.476	.504	.524	.544	.565	.587			
	KIAS	227	226	225	225	225	224	224	223			
	FF/ENG	3443	3434	3440	3465	3502	3549	3611	3704			
130	%N1	81.0	84.1	87.3	90.0	91.8	93.9	96.0	98.6	102.0		
	MACH	.398	.427	.460	.487	.506	.527	.548	.570	.591		
	KIAS	220	219	218	217	217	217	216	216	214		
	FF/ENG	3205	3176	3170	3187	3205	3244	3286	3353	3436		
120	%N1	78.7	81.8	85.2	87.7	89.5	91.3	93.4	95.6	98.3	101.8	
	MACH	.385	.411	.443	.469	.488	.508	.529	.550	.572	.593	
	KIAS	212	210	210	209	209	209	209	208	207	206	
	FF/ENG	2974	2918	2912	2913	2927	2944	2981	3022	3090	3165	
110	%N1	76.1	79.6	82.8	85.3	87.0	88.8	90.7	92.7	95.0	97.7	101.5
	MACH	.369	.396	.426	.451	.469	.488	.508	.529	.551	.574	.595
	KIAS	203	203	201	201	200	200	200	200	199	199	197
	FF/ENG	2726	2685	2658	2653	2654	2668	2682	2717	2759	2822	2895
100	%N1	73.5	76.9	80.1	82.7	84.4	86.0	87.9	89.8	91.9	94.1	96.9
	MACH	.353	.380	.408	.432	.449	.467	.487	.507	.528	.550	.574
	KIAS	195	194	192	192	192	191	191	191	191	190	190
	FF/ENG	2489	2454	2407	2400	2397	2397	2408	2421	2454	2495	2553

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
650	581	521	474	434	400	378	357	339	323	308
981	875	784	711	652	600	567	536	509	484	462
1317	1173	1049	951	870	800	755	714	677	644	615
1656	1472	1315	1190	1089	1000	944	893	846	805	768
2000	1775	1583	1431	1308	1200	1132	1070	1014	964	920
2349	2082	1854	1674	1527	1400	1320	1248	1182	1124	1072
2703	2391	2125	1916	1747	1600	1508	1425	1349	1282	1223
3062	2705	2400	2161	1968	1800	1696	1602	1517	1441	1374
3427	3021	2675	2406	2188	2000	1884	1779	1684	1599	1524

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT)									
	10		14		18		22		28	
	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)
200	4.8	0:49	4.4	0:47	4.0	0:45	3.7	0:44	3.3	0:41
400	9.9	1:36	9.2	1:32	8.6	1:27	8.0	1:23	7.5	1:17
600	14.9	2:24	13.9	2:17	13.0	2:09	12.2	2:03	11.5	1:53
800	19.8	3:12	18.5	3:02	17.4	2:52	16.4	2:43	15.4	2:30
1000	24.6	4:02	23.0	3:49	21.6	3:36	20.4	3:24	19.2	3:07
1200	29.3	4:52	27.4	4:36	25.8	4:20	24.4	4:05	23.0	3:45
1400	33.9	5:43	31.8	5:24	29.9	5:06	28.3	4:48	26.6	4:23
1600	38.5	6:36	36.0	6:13	33.9	5:51	32.1	5:31	30.1	5:02
1800	42.9	7:29	40.2	7:03	37.8	6:38	35.8	6:14	33.6	5:41
2000	47.2	8:24	44.2	7:54	41.6	7:26	39.4	6:58	37.0	6:21

Fuel Required Adjustment (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG)				
	100	120	140	160	180
5	-0.7	-0.4	0.0	0.6	1.3
10	-1.5	-0.8	0.0	1.3	2.7
15	-2.4	-1.2	0.0	1.9	4.0
20	-3.2	-1.6	0.0	2.5	5.3
25	-4.0	-2.0	0.0	3.1	6.6
30	-4.8	-2.4	0.0	3.7	7.8
35	-5.6	-2.8	0.0	4.3	8.9
40	-6.4	-3.2	0.0	4.8	10.1
45	-7.2	-3.6	0.0	5.3	11.1
50	-8.0	-4.0	0.0	5.8	12.1
55	-8.9	-4.5	0.0	6.3	13.1
60	-9.7	-4.9	0.0	6.7	14.0

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	68	71	74
TIME (MINUTES)	7	10	12	13	14	15	16	16	17	18	19	19	20

GEAR DOWN

Holding Flaps Up

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)						
		1500	5000	10000	15000	20000	25000	30000
190	%N1	83.1	85.9	90.1	94.6	100.0		
	KIAS	249	249	249	249	249		
	FF/ENG	4710	4690	4710	4790	4980		
180	%N1	81.2	84.2	88.4	92.8	97.9		
	KIAS	241	241	241	241	241		
	FF/ENG	4440	4410	4420	4470	4610		
170	%N1	79.4	82.5	86.7	91.0	95.9	102.5	
	KIAS	234	234	234	234	234	234	
	FF/ENG	4180	4160	4150	4180	4280	4550	
160	%N1	77.4	80.5	84.7	89.0	93.7	99.6	
	KIAS	226	226	226	226	226	226	
	FF/ENG	3910	3890	3860	3880	3950	4140	
150	%N1	75.4	78.3	82.7	87.0	91.5	96.9	
	KIAS	218	218	218	218	218	218	
	FF/ENG	3650	3620	3590	3590	3640	3770	
140	%N1	73.6	76.4	80.9	85.2	89.5	94.6	102.0
	KIAS	212	212	212	212	212	212	212
	FF/ENG	3420	3390	3360	3350	3380	3470	3710
130	%N1	71.5	74.6	79.0	83.2	87.6	92.4	98.6
	KIAS	207	207	207	207	207	207	207
	FF/ENG	3210	3180	3150	3120	3140	3210	3380
120	%N1	69.4	72.6	76.8	81.2	85.6	90.2	95.7
	KIAS	201	201	201	201	201	201	201
	FF/ENG	3000	2970	2930	2900	2910	2950	3060
110	%N1	67.3	70.3	74.7	79.2	83.6	88.0	93.1
	KIAS	195	195	195	195	195	195	195
	FF/ENG	2800	2760	2730	2690	2680	2710	2790
100	%N1	65.1	68.0	72.5	76.8	81.2	85.7	90.5
	KIAS	189	189	189	189	189	189	189
	FF/ENG	2590	2560	2520	2490	2470	2480	2520

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

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Performance Inflight - QRH

Gear Down, Engine Inop

Chapter PI-QRH

Section 34

GEAR DOWN

ENGINE INOP

MAX CONTINUOUS THRUST

Initial Max Continuous %N1

29000 FT to 10000 FT Pressure Altitudes

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

29000 FT PRESS ALT								TAT (°C)					
MACH	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	
0.6	102.6	103.6	104.7	105.8	106.8	107.9	108.6	107.7	106.8	106.1	105.5	104.9	
0.5	102.6	103.6	104.7	105.8	106.8	107.9	108.4	107.4	106.8	106.1	105.5	102.8	
0.4	102.6	103.6	104.7	105.8	106.8	107.9	108.2	107.5	106.8	106.2	103.6	100.5	
27000 FT PRESS ALT								TAT (°C)					
MACH	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	
0.6	102.6	103.6	104.7	105.8	106.8	107.9	108.6	107.6	106.7	105.7	105.0	104.3	
0.5	102.6	103.6	104.7	105.8	106.8	107.9	108.2	107.2	106.3	105.6	104.8	104.0	
0.4	102.6	103.6	104.7	105.8	106.8	107.9	108.0	107.0	106.3	105.6	104.7	101.8	
25000 FT PRESS ALT								TAT (°C)					
MACH	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	20	
0.6	102.3	103.2	104.2	105.2	106.1	106.9	107.3	106.4	105.4	104.4	103.6	102.9	
0.5	103.6	104.7	105.8	106.8	107.6	107.8	106.9	105.9	104.9	104.1	103.4	102.1	
0.4	103.6	104.7	105.8	106.8	107.9	107.7	106.7	105.7	104.9	104.1	102.8	100.0	
23000 FT PRESS ALT								TAT (°C)					
MACH	-30	-25	-20	-15	-10	-5	0	5	10	15	20	25	
0.6	103.2	104.2	105.2	106.1	107.0	107.9	108.0	107.2	106.2	105.3	104.5	103.7	
0.5	104.7	105.8	106.8	107.8	108.7	108.6	107.7	106.7	105.8	105.0	104.2	102.7	
0.4	104.7	105.8	106.8	107.9	108.9	108.6	107.6	106.6	105.8	105.0	103.4	100.8	
21000 FT PRESS ALT								TAT (°C)					
MACH	-30	-25	-20	-15	-10	-5	0	5	10	15	20	25	
0.6	103.9	104.8	105.8	106.8	107.7	108.6	109.5	109.4	108.5	107.5	106.6	105.7	
0.5	104.7	105.8	106.8	107.9	108.9	109.9	109.9	109.0	108.0	107.0	106.1	105.3	
0.4	104.7	105.8	106.8	107.9	108.9	109.9	109.8	108.8	107.8	106.9	106.1	104.2	
19000 FT PRESS ALT								TAT (°C)					
MACH	-25	-20	-15	-10	-5	0	5	10	15	20	25	30	
0.6	104.3	105.3	106.2	107.2	108.1	109.0	110.0	109.6	108.7	107.7	106.8	105.9	
0.5	105.8	106.8	107.9	108.9	109.8	110.7	110.1	109.2	108.2	107.3	106.4	105.5	
0.4	105.8	106.8	107.9	108.9	109.9	110.9	110.1	109.1	108.2	107.2	106.4	104.3	
15000 FT PRESS ALT								TAT (°C)					
MACH	-20	-15	-10	-5	0	5	10	15	20	25	30	35	
0.6	102.8	103.8	104.7	105.6	106.6	107.5	108.4	109.2	108.2	107.3	106.4	105.7	
0.5	104.3	105.2	106.2	107.1	108.1	109.0	109.4	108.4	107.5	106.7	105.9	105.1	
0.4	105.2	106.2	107.2	108.2	109.2	110.2	109.5	108.6	107.7	106.9	106.1	105.1	
10000 FT PRESS ALT								TAT (°C)					
MACH	-15	-10	-5	0	5	10	15	20	25	30	35	40	
0.6	100.3	101.2	102.1	103.0	103.9	104.8	105.6	106.5	107.4	106.7	106.0	105.2	
0.5	101.4	102.4	103.3	104.2	105.1	106.0	106.9	107.5	106.8	106.0	105.2	104.5	
0.4	102.6	103.5	104.4	105.4	106.3	107.2	107.8	107.0	106.2	105.4	104.7	104.1	

GEAR DOWN

ENGINE INOP

MAX CONTINUOUS THRUST

Driftdown Speed/Level Off Altitude

100 ft/min residual rate of climb

WEIGHT (1000 KG)		OPTIMUM DRIFTDOWN SPEED (KIAS)	LEVEL OFF ALTITUDE (FT)		
START DRIFT DOWN	LEVEL OFF		ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
180	171	238	2900		
170	162	231	5500	3700	1600
160	153	223	8200	6600	4700
150	143	215	10600	9200	7600
140	134	210	12800	11800	10100
130	125	205	14900	14400	12900
120	115	199	16700	16500	15600
110	106	193	18900	18800	18100
100	96	188	21000	20800	20400

Includes APU fuel burn.

GEAR DOWN

ENGINE INOP

MAX CONTINUOUS THRUST

Long Range Cruise Altitude Capability

100 ft/min residual rate of climb

WEIGHT (1000 KG)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
160	4300	1700	
155	5800	3400	
150	7400	5000	2500
145	8900	6700	4200
140	10300	8400	6000
135	11700	9900	7800
130	13100	11700	9500
125	14600	13600	11400
120	15700	15300	13400
115	16700	16600	15300
110	17900	17800	17000
105	19100	19000	18400
100	20300	20200	19700
95	21300	21200	20700
90	22300	22200	21600

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 KG)		PRESSURE ALTITUDE (1000 FT)							
		6	8	10	12	14	16	18	20
160	%N1	103.3							
	MACH	.398							
	KIAS	237							
	FF/ENG	7736							
150	%N1	101.0	103.1						
	MACH	.389	.400						
	KIAS	231	229						
	FF/ENG	7195	7225						
140	%N1	98.6	100.6	102.7	105.3				
	MACH	.379	.390	.401	.412				
	KIAS	225	223	221	219				
	FF/ENG	6672	6685	6714	6765				
130	%N1	96.2	98.0	100.0	102.2	104.8			
	MACH	.367	.379	.391	.402	.412			
	KIAS	218	217	215	213	211			
	FF/ENG	6167	6164	6175	6200	6251			
120	%N1	93.8	95.5	97.3	99.2	101.5	104.2		
	MACH	.355	.367	.379	.390	.402	.412		
	KIAS	211	210	209	207	205	203		
	FF/ENG	5671	5660	5658	5666	5686	5740		
110	%N1	91.2	92.8	94.5	96.3	98.3	100.5	103.4	
	MACH	.342	.353	.365	.377	.389	.401	.413	
	KIAS	203	202	201	200	199	197	195	
	FF/ENG	5188	5169	5157	5156	5159	5177	5259	
100	%N1	88.4	90.1	91.6	93.3	95.2	97.1	99.5	102.8
	MACH	.328	.339	.351	.363	.375	.387	.400	.417
	KIAS	195	194	193	192	191	190	189	189
	FF/ENG	4697	4689	4671	4659	4657	4658	4700	4837

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
164	146	131	118	109	100	94	89	84	79	75
334	296	264	239	218	200	187	175	165	156	148
505	447	398	359	327	300	281	263	247	234	222
677	598	531	479	437	400	374	350	329	311	295
850	751	666	600	546	500	467	438	411	388	368
1025	904	801	720	656	600	560	524	493	465	441
1200	1057	936	841	766	700	653	611	574	541	513
1377	1212	1072	963	876	800	746	698	655	618	586
1554	1367	1208	1085	986	900	839	785	737	694	658
1733	1523	1345	1207	1096	1000	932	872	818	771	731

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT)							
	6		10		14		18	
	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)
100	2.5	0:27	2.2	0:27	2.0	0:26	1.8	0:26
200	5.2	0:52	4.8	0:50	4.6	0:49	4.4	0:47
300	7.8	1:17	7.4	1:14	7.1	1:12	7.0	1:09
400	10.5	1:42	9.9	1:38	9.5	1:35	9.5	1:31
500	13.1	2:08	12.4	2:02	12.0	1:58	11.9	1:54
600	15.7	2:33	14.9	2:27	14.4	2:22	14.3	2:16
700	18.2	2:59	17.3	2:51	16.7	2:45	16.7	2:39
800	20.7	3:25	19.7	3:16	19.0	3:09	19.0	3:01
900	23.2	3:51	22.1	3:41	21.3	3:32	21.2	3:24
1000	25.7	4:18	24.4	4:06	23.6	3:56	23.5	3:47

Fuel Required Adjustment (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG)				
	100	120	140	160	180
2	-0.3	-0.2	0.0	0.2	0.5
4	-0.7	-0.3	0.0	0.5	1.1
6	-1.0	-0.5	0.0	0.8	1.7
8	-1.4	-0.7	0.0	1.1	2.3
10	-1.8	-0.9	0.0	1.4	2.9
12	-2.1	-1.1	0.0	1.7	3.4
14	-2.5	-1.2	0.0	2.0	4.0
16	-2.9	-1.4	0.0	2.3	4.6
18	-3.2	-1.6	0.0	2.6	5.2
20	-3.6	-1.8	0.0	2.9	5.8
22	-4.0	-2.0	0.0	3.1	6.4
24	-4.4	-2.1	0.0	3.4	6.9
26	-4.7	-2.3	0.0	3.7	7.5
28	-5.1	-2.5	0.0	4.0	8.1
30	-5.5	-2.7	0.0	4.3	8.7

Includes APU fuel burn.

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GEAR DOWN

ENGINE INOP

MAX CONTINUOUS THRUST

**Holding
Flaps Up**

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)				
		1500	5000	10000	15000	20000
180	%N1	101.3				
	KIAS	241				
	FF/ENG	8700				
170	%N1	99.2	103.1			
	KIAS	234	234			
	FF/ENG	8130	8300			
160	%N1	96.9	100.4			
	KIAS	226	226			
	FF/ENG	7540	7640			
150	%N1	94.5	97.9	103.9		
	KIAS	218	218	218		
	FF/ENG	6970	7030	7280		
140	%N1	92.5	95.6	101.0		
	KIAS	212	212	212		
	FF/ENG	6480	6520	6690		
130	%N1	90.4	93.5	98.5	105.9	
	KIAS	207	207	207	207	
	FF/ENG	6040	6070	6170	6500	
120	%N1	88.2	91.2	95.9	102.0	
	KIAS	201	201	201	201	
	FF/ENG	5600	5610	5670	5870	
110	%N1	86.0	88.9	93.4	98.8	
	KIAS	195	195	195	195	
	FF/ENG	5170	5170	5210	5330	
100	%N1	83.5	86.5	90.8	95.8	102.8
	KIAS	189	189	189	189	189
	FF/ENG	4750	4750	4760	4830	5080

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

Performance Inflight - QRH

Chapter PI-QRH

Text

Section 35

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. Landing distances for slippery runways are 115% of the actual landing distances.

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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Performance Inflight - QRH

Chapter PI-QRH

General

Section 40

Flight With Unreliable Airspeed / Turbulent Air Penetration

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

Climb (290/.78)**Flaps Up, Set Max Climb Thrust**

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG)				
		100	120	140	160	180
40000	PITCH ATT	4.0	4.0			
	V/S (FT/MIN)	1600	1000			
30000	PITCH ATT	4.5	4.0	4.0	4.0	4.0
	V/S (FT/MIN)	2700	2100	1700	1300	1000
20000	PITCH ATT	7.0	6.5	6.0	6.0	5.5
	V/S (FT/MIN)	4200	3400	2700	2300	1900
10000	PITCH ATT	10.5	9.0	8.5	8.0	7.5
	V/S (FT/MIN)	5600	4500	3700	3200	2700
SEA LEVEL	PITCH ATT	13.5	11.5	10.5	9.5	9.0
	V/S (FT/MIN)	6300	5100	4300	3600	3100

Cruise (.78/290)**Flaps Up, Set Thrust for Level Flight**

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG)				
		100	120	140	160	180
40000	PITCH ATT	2.0	2.5	3.5		
	%N1	88.1	92.1	97.5		
35000	PITCH ATT	1.5	2.0	2.5	3.0	3.5
	%N1	85.1	87.3	90.0	93.6	98.2
30000	PITCH ATT	1.0	1.5	2.0	2.0	2.5
	%N1	84.2	85.7	87.4	89.4	91.9
25000	PITCH ATT	1.0	1.5	2.0	2.5	3.0
	%N1	80.7	82.2	83.8	85.8	87.9
20000	PITCH ATT	1.0	1.5	2.0	2.5	3.0
	%N1	76.7	78.2	79.8	81.9	83.9
15000	PITCH ATT	1.0	1.5	2.0	2.5	3.0
	%N1	72.7	74.3	76.1	77.9	79.9

Descent (.78/290)**Flaps Up, Set Idle Thrust**

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG)				
		100	120	140	160	180
40000	PITCH ATT	-1.5	-0.5	0.0	0.5	1.0
	V/S (FT/MIN)	-2600	-2600	-2700	-2800	-3100
30000	PITCH ATT	-2.5	-1.5	-1.0	-0.5	0.0
	V/S (FT/MIN)	-2700	-2400	-2200	-2100	-2000
20000	PITCH ATT	-2.5	-1.5	-1.0	0.0	0.5
	V/S (FT/MIN)	-2400	-2100	-2000	-1900	-1800
10000	PITCH ATT	-2.5	-1.5	-1.0	-0.5	0.5
	V/S (FT/MIN)	-2100	-1900	-1700	-1700	-1600
SEA LEVEL	PITCH ATT	-3.0	-2.0	-1.0	-0.5	0.0
	V/S (FT/MIN)	-2000	-1700	-1600	-1500	-1500

Flight With Unreliable Airspeed / Turbulent Air Penetration

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

Holding (VREF30+80)

Flaps Up, Set Thrust for Level Flight

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG)				
		100	120	140	160	180
10000	PITCH ATT	4.0	4.5	5.0	5.0	5.0
	%N1	58.7	63.4	67.3	70.9	74.4
	KIAS	199	211	222	236	251
5000	PITCH ATT	4.0	4.5	5.0	5.0	5.0
	%N1	54.8	59.0	63.1	66.8	69.9
	KIAS	199	211	222	236	251

Terminal Area (5000 FT)

Set Thrust for Level Flight

FLAP POSITION (GEAR POSITION) (VREF + INCREMENT)		WEIGHT (1000 KG)				
		100	120	140	160	180
FLAPS UP (GEAR UP) (VREF30+80)	PITCH ATT	4.0	4.5	5.0	5.0	5.0
	%N1	55.6	60.1	64.6	68.0	71.1
	KIAS	199	211	222	236	251
FLAPS 1 (GEAR UP) (VREF30+60)	PITCH ATT	6.0	6.5	6.5	6.5	6.5
	%N1	56.6	61.6	65.8	69.4	72.9
	KIAS	179	191	202	216	231
FLAPS 5 (GEAR UP) (VREF30+40)	PITCH ATT	4.5	4.5	5.0	4.5	4.5
	%N1	59.0	64.1	68.3	72.4	75.7
	KIAS	159	171	182	196	211
FLAPS 15 (GEAR UP) (VREF30+20)	PITCH ATT	5.5	5.5	6.0	6.0	5.5
	%N1	61.1	65.9	70.6	74.3	77.6
	KIAS	139	151	162	176	191
FLAPS 20 (GEAR DOWN) (VREF30+20)	PITCH ATT	4.0	4.5	4.5	4.0	3.5
	%N1	67.6	72.9	77.5	81.6	85.4
	KIAS	139	151	162	176	191

Final Approach (1500 FT)

Gear Down, Set Thrust for 3° Glideslope

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG)				
		100	120	140	160	180
FLAPS 20 (VREF20 +10)	PITCH ATT	1.5	1.5	1.5	1.5	1.5
	%N1	48.0	51.8	55.6	59.2	62.6
	KIAS	138	150	162	172	184

Go-Around (VREF 30 + 20)

Flaps 20, Gear Up, Set Go-Around Thrust

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG)				
		100	120	140	160	180
10000	PITCH ATT	18.5	15.0	12.5	10.5	9.0
	V/S (FT/MIN)	4000	3300	2700	2300	2000
	KIAS	139	151	162	176	191
5000	PITCH ATT	22.0	18.0	15.5	13.0	10.5
	V/S (FT/MIN)	4700	3900	3300	2900	2600
	KIAS	139	151	162	176	191
SEA LEVEL	PITCH ATT	26.0	21.0	18.0	15.0	12.5
	V/S (FT/MIN)	5200	4400	3800	3300	3000
	KIAS	139	151	162	176	191

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 KG)	FLAPS		
	30	25	20
190	179	170	179
180	171	166	173
170	164	161	168
160	156	156	162
150	148	151	157
140	142	146	151
130	137	141	146
120	131	135	141
110	125	129	135
100	119	123	128



Performance Inflight - QRH

Advisory Information

Chapter PI-QRH

Section 41

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	150000 KG LANDING WEIGHT	PER 5000 KG ABV/ BLW 150000 KG	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	3200	110/-60	80	-130	440	50	-40	80	-70	250	80	170
MAX AUTO	5370	130/-130	150	-250	840	0	0	160	-160	600	0	0
AUTOBRAKE 4	5540	140/-140	160	-260	880	0	0	160	-160	630	0	0
AUTOBRAKE 3	6370	160/-160	190	-300	1040	0	-20	190	-190	710	0	0
AUTOBRAKE 2	7090	190/-190	220	-350	1190	50	-120	220	-210	630	110	110
AUTOBRAKE 1	7740	220/-220	250	-390	1360	170	-220	250	-230	580	480	620

Good Reported Braking Action

MAX MANUAL	5060	120/-120	140	-240	830	140	-120	140	-130	400	300	660
MAX AUTO	6180	150/-150	180	-290	980	20	0	180	-180	700	20	90
AUTOBRAKE 4	6370	160/-160	180	-300	1010	10	0	190	-190	720	10	60
AUTOBRAKE 3	7320	190/-190	220	-350	1190	0	-20	220	-220	820	0	0

Medium Reported Braking Action

MAX MANUAL	6940	190/-190	220	-370	1360	340	-270	210	-190	510	790	1910
MAX AUTO	6970	190/-180	220	-380	1370	300	-180	210	-200	660	700	1820
AUTOBRAKE 4	7050	190/-190	220	-380	1380	280	-160	220	-200	710	610	1730
AUTOBRAKE 3	7670	210/-200	230	-400	1450	180	-120	230	-230	820	410	1270

Poor Reported Braking Action

MAX MANUAL	8960	270/-260	300	-550	2100	760	-500	290	-260	590	1670	4460
MAX AUTO	8960	270/-260	300	-550	2100	760	-500	290	-260	590	1670	4470
AUTOBRAKE 4	8960	270/-260	300	-550	2100	770	-500	290	-260	600	1670	4470
AUTOBRAKE 3	9050	270/-260	300	-550	2110	700	-410	290	-270	760	1530	4320

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 460 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).

Distances for GOOD, MEDIUM, and POOR are increased by 15%.

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	150000 KG LANDING WEIGHT	PER 5000 KG ABV/ BLW 150000 KG	PER 1000 FT ABV SEA LEVEL	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 10 KTS ABV VREF 30	ONE REV	NO REV
MAX MANUAL	3150	140/-70	80	-130	440	50	-40	80	-70	250	80	160
MAX AUTO	5220	210/-140	150	-240	830	0	0	150	-150	600	0	0
AUTOBRAKE 4	5380	220/-140	150	-250	870	0	0	160	-160	620	0	0
AUTOBRAKE 3	6180	260/-170	180	-300	1020	0	-10	190	-190	720	0	0
AUTOBRAKE 2	6930	280/-200	210	-340	1180	40	-110	210	-210	640	80	80
AUTOBRAKE 1	7590	300/-220	240	-390	1350	160	-210	240	-230	580	410	540

Good Reported Braking Action

MAX MANUAL	5000	180/-130	140	-240	830	140	-120	140	-130	400	280	620
MAX AUTO	6010	250/-160	170	-280	970	20	0	170	-170	690	20	90
AUTOBRAKE 4	6190	260/-170	180	-290	1000	10	0	180	-180	710	10	60
AUTOBRAKE 3	7110	300/-200	210	-340	1180	0	-10	210	-210	830	0	0

Medium Reported Braking Action

MAX MANUAL	6860	260/-190	210	-370	1370	350	-270	210	-190	510	740	1770
MAX AUTO	6860	280/-190	210	-380	1370	320	-190	210	-200	650	690	1720
AUTOBRAKE 4	6920	290/-200	220	-380	1380	300	-170	210	-200	690	620	1650
AUTOBRAKE 3	7480	320/-210	230	-400	1440	190	-110	230	-220	830	410	1220

Poor Reported Braking Action

MAX MANUAL	8870	360/-270	300	-550	2110	780	-510	290	-260	600	1580	4140
MAX AUTO	8870	360/-270	300	-550	2100	780	-510	290	-260	590	1580	4150
AUTOBRAKE 4	8870	360/-270	300	-550	2100	780	-510	290	-260	590	1580	4150
AUTOBRAKE 3	8920	380/-270	300	-550	2110	730	-420	290	-270	770	1480	4050

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 460 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).

Distances for GOOD, MEDIUM, and POOR are increased by 15%.

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	150000 KG LDG WT	PER 5000 KG ABV/BLW 150000KG	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	4210	90/-90	100	-170/570	90/-80	110/-110	420	0	0
AIR/GRD SYS (FLAPS 30)	VREF30	4130	160/-100	100	-170/570	90/-80	110/-110	440	0	0
ALL FLAPS AND SLATS UP LANDING	VREF30+50	4530	260/-110	130	-170/570	80/-70	130/-120	320	200	440
ANTI-SKID OFF (FLAPS 25)	VREF25	5920	160/-150	160	-290/1010	190/-160	160/-150	440	410	960
ANTI-SKID OFF (FLAPS 30)	VREF30	5770	230/-160	160	-290/1010	190/-160	160/-150	450	380	880
ENGINE FAILURE (FLAPS 20)	VREF20	3460	150/-80	90	-140/470	60/-50	90/-90	280	0	110
HYD SYS PRESS (C ONLY) (FLAPS 20)	VREF20	4140	110/-100	100	-160/530	70/-60	100/-100	380	140	300
HYD SYS PRESS (L ONLY) (FLAPS 25)	VREF25	3350	90/-80	80	-130/460	50/-50	80/-80	290	100	200
HYD SYS PRESS (L ONLY) (FLAPS 30)	VREF30	3300	130/-80	80	-130/460	60/-50	80/-80	300	90	190
HYD SYS PRESS (R ONLY) (FLAPS 25)	VREF25	3680	90/-90	90	-150/530	70/-60	90/-90	310	140	300
HYD SYS PRESS (R ONLY) (FLAPS 30)	VREF30	3620	140/-90	90	-150/530	70/-70	90/-90	330	130	280
HYD SYS PRESS (L AND C) (FLAPS 20)	VREF30+20	4890	190/-110	130	-180/600	100/-90	130/-130	510	230	510
HYD SYS PRESS (L AND R) (FLAPS 20)	VREF30+20	4570	180/-110	130	-180/610	110/-90	130/-120	420	260	570
HYD SYS PRESS (R AND C) (FLAPS 20)	VREF30+20	5800	240/-150	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	150000 KG LDG WT	PER 5000 KG ABV/BLW 150000KG	PER 1000FT 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	3670	180/-80	90	-140/480	60/-50	90/-90	270	120	260
LE SLAT ASYM (FLAPS = 20)	VREF30+30	4140	170/-90	110	-150/520	70/-60	110/-110	310	160	340
LE SLAT ASYM (5 < FLAPS < 20)	VREF30+40	4440	170/-100	120	-160/540	80/-70	120/-120	320	180	390
LE SLAT DISAGREE (FLAPS > 20)	VREF20	3390	140/-80	80	-130/450	50/-50	80/-80	260	100	220
LE SLAT DISAGREE - ALTN FLAP EXT ACCOMPLISHED (FLAPS = 20)	VREF20	3390	140/-80	80	-130/450	50/-50	80/-80	260	100	220
LE SLAT DISAGREE - ALTN FLAP EXT FAILED (FLAPS = 20)	VREF30+30	3940	180/-90	100	-150/500	60/-60	100/-100	280	140	290
REVERSER UNLOCKED (FLAPS 20)	VREF30+30	4260	180/-100	110	-160/540	80/-70	120/-110	330	0	180
TE FLAP ASYM (FLAPS ≥ 20)	VREF20	3390	140/-80	80	-130/450	50/-50	80/-80	260	100	220
TE FLAP ASYM (5 < FLAPS < 20)	VREF30+20	3670	180/-80	90	-140/480	60/-50	90/-90	270	120	260
TE FLAP ASYM (FLAPS ≤ 5)	VREF30+30	3890	210/-90	100	-150/490	60/-50	100/-100	270	130	290
TE FLAP DISAGREE (FLAPS ≥ 20)	VREF20	3390	140/-80	80	-130/450	50/-50	80/-80	260	100	220
TE FLAP DISAGREE (5 < FLAPS < 20)	VREF30+20	3670	180/-80	90	-140/480	60/-50	90/-90	270	120	260
TE FLAP DISAGREE (FLAPS ≤ 5)	VREF30+30	3890	210/-90	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	150000 KG LDG WT	PER 5000 KG ABV/BLW 150000KG	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	6240	150/-150	180	-300/1010	270/-220	180/-180	620	0	0
AIR/GRD SYS (FLAPS 30)	VREF30	6090	250/-150	180	-300/1010	280/-230	180/-180	640	0	0
ALL FLAPS AND SLATS UP LANDING	VREF30+50	6220	220/-160	190	-250/860	160/-150	190/-180	380	530	1220
ANTI-SKID OFF (FLAPS 25)	VREF25	6660	190/-180	190	-350/1240	290/-230	190/-180	490	630	1530
ANTI-SKID OFF (FLAPS 30)	VREF30	6500	260/-180	190	-350/1240	290/-230	190/-180	490	590	1410
ENGINE FAILURE (FLAPS 20)	VREF20	4980	150/-130	140	-230/800	160/-140	140/-140	410	0	410
HYD SYS PRESS (C ONLY) (FLAPS 20)	VREF20	5600	170/-150	160	-250/840	170/-150	160/-150	510	430	1010
HYD SYS PRESS (L ONLY) (FLAPS 25)	VREF25	4620	130/-120	130	-220/750	140/-120	130/-120	390	300	680
HYD SYS PRESS (L ONLY) (FLAPS 30)	VREF30	4550	190/-120	130	-220/750	140/-120	130/-120	400	280	640
HYD SYS PRESS (R ONLY) (FLAPS 25)	VREF25	4620	130/-120	130	-220/750	140/-120	130/-120	390	300	680
HYD SYS PRESS (R ONLY) (FLAPS 30)	VREF30	4550	190/-120	130	-220/750	140/-120	130/-120	400	280	640
HYD SYS PRESS (L AND C) (FLAPS 20)	VREF30+20	6580	280/-180	200	-280/940	230/-190	200/-190	640	650	1560
HYD SYS PRESS (L AND R) (FLAPS 20)	VREF30+20	5760	240/-160	180	-250/860	190/-170	180/-170	510	530	1250
HYD SYS PRESS (R AND C) (FLAPS 20)	VREF30+20	6580	280/-180	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 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	
		150000 KG LDG WT	PER 5000 KG ABV/BLW 150000KG	PER 1000FT 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	5130	200/-130	150	-230/790	150/-130	150/-140	380	380	860
LE SLAT ASYM (FLAPS = 20)	VREF30+30	5770	220/-150	170	-250/840	170/-150	170/-170	420	470	1080
LE SLAT ASYM (5 < FLAPS < 20)	VREF30+40	6180	230/-160	190	-260/870	180/-160	190/-180	430	520	1190
LE SLAT DISAGREE (FLAPS > 20)	VREF20	4730	140/-130	130	-220/750	130/-120	130/-130	370	330	750
LE SLAT DISAGREE - ALTN FLAP EXT ACCOMPLISHED (FLAPS = 20)	VREF20	4730	140/-130	130	-220/750	130/-120	130/-130	370	330	750
LE SLAT DISAGREE - ALTN FLAP EXT FAILED (FLAPS = 20)	VREF30+30	5500	200/-140	160	-240/810	150/-140	160/-160	380	420	950
REVERSER UNLOCKED (FLAPS 20)	VREF30+30	6160	230/-160	180	-270/900	210/-180	190/-180	470	0	590
TE FLAP ASYM (FLAPS ≥ 20)	VREF20	4730	140/-130	130	-220/750	130/-120	130/-130	370	330	750
TE FLAP ASYM (5 < FLAPS < 20)	VREF30+20	5140	200/-140	150	-230/790	140/-130	150/-140	380	380	880
TE FLAP ASYM (FLAPS ≤ 5)	VREF30+30	5470	200/-140	160	-230/810	150/-130	160/-150	370	430	980
TE FLAP DISAGREE (FLAPS ≥ 20)	VREF20	4730	140/-130	130	-220/750	130/-120	130/-130	370	330	750
TE FLAP DISAGREE (5 < FLAPS < 20)	VREF30+20	5140	200/-140	150	-230/790	140/-130	150/-140	380	380	880
TE FLAP DISAGREE (FLAPS ≤ 5)	VREF30+30	5470	200/-140	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	150000 KG LDG WT	PER 5000 KG ABV/BLW 150000KG	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	9940	240/-230	310	-560/1950	1000/-670	320/-320	870	0	0
AIR/GRD SYS (FLAPS 30)	VREF30	9650	370/-230	310	-550/1940	1000/-670	320/-320	870	0	0
ALL FLAPS AND SLATS UP LANDING	VREF30+50	8820	340/-250	300	-400/1400	410/-330	300/-270	520	1430	3670
ANTI-SKID OFF (FLAPS 25)	VREF25	8370	260/-250	260	-500/1870	640/-440	250/-230	560	1370	3680
ANTI-SKID OFF (FLAPS 30)	VREF30	8180	350/-250	260	-500/1870	650/-440	250/-230	560	1290	3390
ENGINE FAILURE (FLAPS 20)	VREF20	7250	240/-220	230	-390/1360	440/-340	230/-220	560	0	1250
HYD SYS PRESS (C ONLY) (FLAPS 20)	VREF20	7520	260/-230	240	-380/1340	400/-310	240/-220	630	1120	2890
HYD SYS PRESS (L ONLY) (FLAPS 25)	VREF25	6320	190/-190	200	-340/1220	330/-260	200/-180	490	780	1900
HYD SYS PRESS (L ONLY) (FLAPS 30)	VREF30	6220	280/-190	200	-340/1220	340/-260	200/-180	500	740	1780
HYD SYS PRESS (R ONLY) (FLAPS 25)	VREF25	6320	190/-190	200	-340/1220	330/-260	200/-180	490	780	1900
HYD SYS PRESS (R ONLY) (FLAPS 30)	VREF30	6220	280/-190	200	-340/1220	340/-260	200/-180	500	740	1780
HYD SYS PRESS (L AND C) (FLAPS 20)	VREF30+20	8720	390/-260	290	-420/1460	500/-390	290/-260	740	1530	4090
HYD SYS PRESS (L AND R) (FLAPS 20)	VREF30+20	7850	350/-240	270	-390/1370	430/-340	260/-240	620	1300	3370
HYD SYS PRESS (R AND C) (FLAPS 20)	VREF30+20	8720	390/-260	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 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	
		150000 KG LDG WT	PER 5000 KG ABV/BLW 150000 KG	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	7070	290/-210	230	-360/1280	350/-280	230/-210	490	980	2430
LE SLAT ASYM (FLAPS = 20)	VREF30+30	7900	320/-230	260	-380/1350	390/-320	260/-240	530	1170	2930
LE SLAT ASYM (5 < FLAPS < 20)	VREF30+40	8430	340/-250	290	-400/1380	410/-330	280/-260	540	1340	3430
LE SLAT DISAGREE (FLAPS > 20)	VREF20	6540	220/-200	210	-340/1230	330/-260	200/-190	490	880	2200
LE SLAT DISAGREE - ALTN FLAP EXT ACCOMPLISHED (FLAPS = 20)	VREF20	6540	220/-200	210	-340/1230	330/-260	200/-190	490	880	2200
LE SLAT DISAGREE - ALTN FLAP EXT FAILED (FLAPS = 20)	VREF30+30	7550	300/-220	250	-370/1310	360/-290	250/-230	490	1050	2620
REVERSER UNLOCKED (FLAPS 20)	VREF30+30	8860	360/-260	290	-430/1510	530/-420	290/-280	610	0	1680
TE FLAP ASYM (FLAPS ≥ 20)	VREF20	6540	220/-200	210	-340/1230	330/-260	200/-190	490	880	2200
TE FLAP ASYM (5 < FLAPS < 20)	VREF30+20	7120	300/-210	230	-360/1280	350/-280	230/-210	490	1010	2540
TE FLAP ASYM (FLAPS ≤ 5)	VREF30+30	7590	310/-220	250	-370/1310	360/-290	250/-230	490	1110	2810
TE FLAP DISAGREE (FLAPS ≥ 20)	VREF20	6540	220/-200	210	-340/1230	330/-260	200/-190	490	880	2200
TE FLAP DISAGREE (5 < FLAPS < 20)	VREF30+20	7120	300/-210	230	-360/1280	350/-280	230/-210	490	1010	2540
TE FLAP DISAGREE (FLAPS ≤ 5)	VREF30+30	7590	310/-220	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	
		150000 KG LDG WT	PER 5000 KG ABV/BLW 150000 KG	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	16490	320/-200	570	-1120/4230	6080/-2020	600/-590	1090	0	0
AIR/GRD SYS (FLAPS 30)	VREF30	15920	480/-200	550	-1100/4180	5960/-1970	580/-570	1080	0	0
ALL FLAPS AND SLATS UP LANDING	VREF30+50	11600	480/-370	430	-590/2140	900/-630	410/-370	640	3020	8970
ANTI-SKID OFF (FLAPS 25)	VREF25	10950	380/-360	370	-800/3310	3040/-940	350/-310	630	3540	14250
ANTI-SKID OFF (FLAPS 30)	VREF30	10760	480/-360	360	-800/3310	3040/-950	350/-310	630	3380	13380
ENGINE FAILURE (FLAPS 20)	VREF20	9970	360/-320	340	-600/2200	1100/-700	330/-310	690	0	3070
HYD SYS PRESS (C ONLY) (FLAPS 20)	VREF20	9560	360/-310	330	-550/2030	840/-570	320/-290	710	2280	6740
HYD SYS PRESS (L ONLY) (FLAPS 25)	VREF25	8130	280/-260	280	-500/1870	710/-480	270/-240	560	1610	4380
HYD SYS PRESS (L ONLY) (FLAPS 30)	VREF30	8030	370/-270	280	-500/1870	730/-490	270/-240	570	1530	4080
HYD SYS PRESS (R ONLY) (FLAPS 25)	VREF25	8130	280/-260	280	-500/1870	710/-480	270/-240	560	1610	4380
HYD SYS PRESS (R ONLY) (FLAPS 30)	VREF30	8030	370/-270	280	-500/1870	730/-490	270/-240	570	1530	4080
HYD SYS PRESS (L AND C) (FLAPS 20)	VREF30+20	10910	510/-360	400	-600/2160	990/-670	380/-340	800	2910	8920
HYD SYS PRESS (L AND R) (FLAPS 20)	VREF30+20	10000	460/-330	360	-560/2060	890/-610	350/-310	690	2540	7490
HYD SYS PRESS (R AND C) (FLAPS 20)	VREF30+20	10910	510/-360	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 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	
		150000 KG LDG WT	PER 5000 KG ABV/BLW 150000 KG	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	9120	400/-290	320	-530/1950	760/-520	310/-280	570	2010	5610
LE SLAT ASYM (FLAPS = 20)	VREF30+30	10100	430/-320	360	-560/2040	820/-570	350/-320	600	2310	6530
LE SLAT ASYM (5 < FLAPS < 20)	VREF30+40	10880	460/-350	400	-570/2100	870/-610	380/-340	630	2700	7890
LE SLAT DISAGREE (FLAPS > 20)	VREF20	8500	320/-280	290	-510/1900	730/-500	280/-260	580	1860	5230
LE SLAT DISAGREE - ALTN FLAP EXT ACCOMPLISHED (FLAPS = 20)	VREF20	8500	320/-280	290	-510/1900	730/-500	280/-260	580	1860	5230
LE SLAT DISAGREE - ALTN FLAP EXT FAILED (FLAPS = 20)	VREF30+30	9680	410/-310	340	-540/1990	780/-540	330/-300	560	2120	5910
REVERSER UNLOCKED (FLAPS 20)	VREF30+30	11960	500/-380	420	-660/2380	1260/-830	410/-390	730	0	3880
TE FLAP ASYM (FLAPS ≥ 20)	VREF20	8500	320/-280	290	-510/1900	730/-500	280/-260	580	1860	5230
TE FLAP ASYM (5 < FLAPS < 20)	VREF30+20	9250	410/-300	330	-530/1960	760/-520	320/-280	590	2160	6210
TE FLAP ASYM (FLAPS ≤ 5)	VREF30+30	9820	420/-310	350	-540/2000	780/-540	340/-300	580	2290	6540
TE FLAP DISAGREE (FLAPS ≥ 20)	VREF20	8500	320/-280	290	-510/1900	730/-500	280/-260	580	1860	5230
TE FLAP DISAGREE (5 < FLAPS < 20)	VREF30+20	9250	410/-300	330	-530/1960	760/-520	320/-280	590	2160	6210
TE FLAP DISAGREE (FLAPS ≤ 5)	VREF30+30	9820	420/-310	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 KG)	OAT (°C)	PRESSURE ALTITUDE (1000 FT)																				
		0	2	4	0	2	4	0	2	4	0	2	4	0	2	4	0	2	4			
180	0	15.1	16.1	17.0	22.8	24.3	25.8	31.8	33.9	35.9	41.8	44.6	47.4	52.7	56.3	59.9						
	10	15.7	16.6	17.6	23.6	25.1	26.6	32.9	35.0	37.2	43.2	46.1	49.1	54.5	58.3	62.0						
	20	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	60.3	64.2						
	30	16.7	17.7	18.7	25.2	26.8	28.4	35.0	37.4	39.7	46.1	49.2	52.3	58.2	62.2	66.2						
	40	16.9	18.0	19.0	25.6	27.3	29.0	35.8	38.2	40.5	47.2	50.4	53.6	59.6	63.7	67.9						
160	0	13.7	14.5	15.3	20.6	21.9	23.2	28.5	30.4	32.3	37.5	40.0	42.5	47.2	50.4	53.6	57.6	61.6	65.6			
	10	14.1	15.0	15.9	21.3	22.6	24.0	29.5	31.5	33.4	38.8	41.4	44.0	48.9	52.2	55.5	59.6	63.8	67.9			
	20	14.6	15.5	16.4	22.0	23.4	24.8	30.5	32.5	34.5	40.1	42.8	45.4	50.5	54.0	57.4	61.7	65.9	70.2			
	30	15.0	16.0	16.9	22.7	24.1	25.5	31.5	33.5	35.6	41.3	44.1	46.9	52.1	55.7	59.3	63.7	68.1	72.5			
	40	15.3	16.2	17.2	23.1	24.5	26.0	32.1	34.2	36.3	42.3	45.1	48.0	53.4	57.0	60.7	65.2	69.8	74.3			
140	0	12.2	13.0	13.7	18.3	19.4	20.6	25.3	26.9	28.6	33.1	35.3	37.4	41.5	44.3	47.1	50.6	54.0	57.5			
	10	12.7	13.4	14.2	18.9	20.1	21.3	26.2	27.9	29.5	34.2	36.5	38.8	43.0	45.9	48.8	52.4	56.0	59.6			
	20	13.1	13.9	14.6	19.6	20.8	22.0	27.0	28.8	30.5	35.4	37.7	40.1	44.4	47.4	50.5	54.1	57.8	61.6			
	30	13.5	14.3	15.1	20.2	21.4	22.7	27.9	29.7	31.5	36.5	38.9	41.3	45.9	49.0	52.1	55.9	59.7	63.6			
	40	13.7	14.5	15.3	20.5	21.8	23.1	28.4	30.3	32.1	37.3	39.8	42.2	46.9	50.1	53.3	57.2	61.2	65.1			
120	0	10.8	11.5	12.1	16.0	17.0	18.0	22.0	23.4	24.8	28.6	30.5	32.3	35.7	38.1	40.5	43.3	46.2	49.1			
	10	11.2	11.9	12.5	16.6	17.6	18.6	22.8	24.2	25.7	29.6	31.5	33.4	37.0	39.4	41.9	44.8	47.8	50.9			
	20	11.6	12.2	12.9	17.1	18.2	19.3	23.5	25.0	26.5	30.6	32.6	34.6	38.2	40.7	43.3	46.3	49.4	52.6			
	30	11.9	12.6	13.3	17.7	18.8	19.9	24.2	25.8	27.3	31.5	33.6	35.7	39.4	42.0	44.7	47.8	51.0	54.3			
	40	12.1	12.8	13.5	18.0	19.1	20.2	24.7	26.3	27.9	32.2	34.3	36.4	40.3	43.0	45.7	48.9	52.2	55.6			
100	0	9.4	10.0	10.5	13.8	14.6	15.5	18.7	19.8	21.0	24.0	25.5	27.1	29.7	31.6	33.6	35.7	38.0	40.4			
	10	9.8	10.3	10.9	14.3	15.1	16.0	19.3	20.5	21.7	24.8	26.4	28.0	30.7	32.7	34.7	36.9	39.4	41.8			
	20	10.1	10.7	11.2	14.7	15.6	16.5	20.0	21.2	22.5	25.7	27.3	29.0	31.7	33.8	35.9	38.2	40.7	43.2			
	30	10.4	11.0	11.6	15.2	16.1	17.0	20.6	21.9	23.2	26.5	28.2	29.9	32.7	34.9	37.0	39.4	42.0	44.6			
	40	10.5	11.1	11.7	15.4	16.4	17.3	20.9	22.3	23.6	27.0	28.7	30.5	33.4	35.6	37.8	40.2	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
LANDING	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
	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	NO SPECIAL	PROCEDURE REQUIRED	1	1	2	2	3	4	6	CAUTION	FUSE PLUG MELT ZONE		
GEAR DOWN			11	15	19	24	34	44	59				
GROUND													

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 42

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 THRUST

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)	
KLAS	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)	
KLAS	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)	
KLAS	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)	
KLAS	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)	
KLAS	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)	
KLAS	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 THRUST

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)														
CIAS	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)														
CIAS	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)														
CIAS	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)														
CIAS	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)														
CIAS	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)														
CIAS	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 THRUST

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)							
KLAS	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	103.8	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)							
KLAS	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)							
KLAS	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)							
KLAS	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 KG)		OPTIMUM DRIFTDOWN SPEED (KIAS)	LEVEL OFF ALTITUDE (FT)		
START DRIFT DOWN	LEVEL OFF		ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
190	183	276	18400	17400	15600
180	174	269	20000	19100	17700
170	165	262	21200	20600	19700
160	155	254	22600	21900	21000
150	145	247	24000	23200	22300
140	135	238	25500	24700	23700
130	126	230	27200	26700	25500
120	116	221	29100	28900	28100
110	106	212	30900	30900	30500
100	97	202	32900	32800	32600

Includes APU fuel burn.

ENGINE INOP

MAX CONTINUOUS THRUST

Driftdown/LRC Cruise Range Capability Ground to Air Miles Conversion

AIR DISTANCE (NM)					GROUND DISTANCE (NM)	AIR DISTANCE (NM)				
HEADWIND COMPONENT (KTS)						TAILWIND COMPONENT (KTS)				
100	80	60	40	20		20	40	60	80	100
274	255	239	224	211	200	190	180	172	164	157
547	510	477	448	423	400	380	361	344	329	315
819	763	715	672	634	600	570	542	517	494	473
1090	1016	952	895	845	800	760	723	690	660	632
1361	1269	1189	1119	1056	1000	950	904	863	825	790
1632	1522	1426	1342	1267	1200	1140	1085	1036	990	949
1902	1775	1664	1565	1478	1400	1330	1266	1208	1156	1107
2174	2029	1901	1789	1689	1600	1520	1447	1381	1321	1266
2447	2283	2139	2013	1900	1800	1710	1628	1554	1486	1424

Driftdown/Cruise Fuel and Time

AIR DIST (NM)	FUEL REQUIRED (1000 KG)										TIME (HR:MIN)
	WEIGHT AT START OF DRIFTDOWN (1000 KG)										
	100	110	120	130	140	150	160	170	180	190	
200	1.5	1.7	1.8	1.9	2.1	2.1	2.3	2.4	2.5	2.6	0:33
400	3.4	3.7	4.0	4.3	4.6	4.9	5.2	5.4	5.8	6.0	1:05
600	5.2	5.7	6.1	6.6	7.0	7.5	7.9	8.3	8.8	9.3	1:36
800	6.9	7.5	8.1	8.8	9.4	10.0	10.6	11.2	11.8	12.4	2:08
1000	8.6	9.4	10.1	10.9	11.7	12.4	13.2	13.9	14.7	15.5	2:39
1200	10.2	11.2	12.1	13.1	14.0	14.9	15.8	16.7	17.6	18.5	3:10
1400	11.9	13.0	14.0	15.2	16.3	17.3	18.4	19.4	20.5	21.5	3:42
1600	13.5	14.8	16.0	17.2	18.5	19.6	20.9	22.0	23.3	24.5	4:14
1800	15.1	16.5	17.8	19.2	20.6	22.0	23.3	24.6	26.0	27.4	4:45

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 KG)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
190	15400	13000	10200
185	16300	14200	11400
180	17200	15300	12700
175	18200	16500	13900
170	19100	17600	15200
165	20000	18700	16400
160	20700	19700	17800
155	21400	20500	19100
150	22100	21200	20200
145	22800	21900	20900
140	23600	22600	21600
135	24300	23400	22300
130	25100	24100	23000
125	26100	24900	23700
120	27200	26200	24500
115	28300	27600	25700
110	29400	29000	27400
105	30500	30300	29100
100	31400	31300	30500

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 KG)		PRESSURE ALTITUDE (1000 FT)								
		10	14	18	21	23	25	27	29	31
190	%N1	98.8	102.4							
	MACH	.583	.616							
	KIAS	324	318							
	FF/ENG	6358	6418							
180	%N1	97.2	100.7	105.0						
	MACH	.572	.605	.641						
	KIAS	317	312	307						
	FF/ENG	6000	6034	6176						
170	%N1	95.6	99.0	102.9						
	MACH	.559	.593	.628						
	KIAS	310	306	300						
	FF/ENG	5646	5675	5766						
160	%N1	93.9	97.2	100.8	104.3					
	MACH	.545	.580	.614	.643					
	KIAS	303	299	294	290					
	FF/ENG	5286	5313	5367	5482					
150	%N1	92.1	95.3	98.8	101.9	104.6				
	MACH	.532	.567	.601	.628	.647				
	KIAS	295	292	287	283	281				
	FF/ENG	4945	4965	4991	5067	5157				
140	%N1	90.3	93.4	96.8	99.6	101.8				
	MACH	.518	.551	.587	.612	.632				
	KIAS	287	283	280	276	273				
	FF/ENG	4609	4607	4633	4669	4732				
130	%N1	88.4	91.4	94.7	97.3	99.3	101.6			
	MACH	.503	.535	.571	.597	.615	.635			
	KIAS	278	275	272	268	266	263			
	FF/ENG	4279	4262	4280	4301	4328	4393			
120	%N1	86.3	89.3	92.4	95.0	96.8	98.8	101.3		
	MACH	.487	.518	.553	.580	.598	.616	.636		
	KIAS	269	266	263	261	258	255	253		
	FF/ENG	3955	3927	3928	3944	3959	3986	4051		
110	%N1	84.0	87.1	90.1	92.6	94.3	96.2	98.2	100.7	
	MACH	.470	.501	.534	.562	.580	.598	.617	.637	
	KIAS	260	257	254	252	250	248	245	243	
	FF/ENG	3634	3599	3585	3597	3606	3617	3642	3703	
100	%N1	81.5	84.6	87.6	90.0	91.7	93.4	95.3	97.3	99.9
	MACH	.450	.482	.514	.540	.559	.578	.597	.615	.636
	KIAS	249	247	244	242	241	239	237	234	232
	FF/ENG	3300	3279	3253	3247	3260	3267	3277	3297	3350

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
287	264	244	227	213	200	190	181	173	166	159
575	529	489	455	426	400	381	363	347	332	319
864	796	735	684	640	600	571	544	520	498	478
1155	1063	982	913	853	800	761	726	693	664	637
1446	1331	1228	1142	1067	1000	952	907	866	829	796
1738	1598	1475	1370	1281	1200	1142	1088	1039	995	955
2032	1868	1723	1600	1495	1400	1332	1269	1212	1160	1113
2327	2138	1971	1830	1709	1600	1522	1451	1385	1325	1271
2623	2409	2219	2060	1923	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		26	
	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)
200	2.6	0:41	2.3	0:40	2.0	0:38	1.9	0:37	1.7	0:36
400	5.4	1:17	4.9	1:15	4.6	1:12	4.3	1:09	4.2	1:07
600	8.1	1:54	7.6	1:50	7.1	1:45	6.8	1:41	6.6	1:37
800	10.8	2:32	10.2	2:25	9.6	2:19	9.2	2:14	8.9	2:08
1000	13.5	3:09	12.7	3:01	12.1	2:53	11.5	2:46	11.3	2:39
1200	16.2	3:47	15.3	3:37	14.5	3:27	13.9	3:19	13.6	3:11
1400	18.8	4:26	17.8	4:14	16.9	4:02	16.2	3:52	15.8	3:42
1600	21.4	5:04	20.2	4:50	19.3	4:36	18.5	4:25	18.1	4:14
1800	24.0	5:43	22.7	5:27	21.6	5:12	20.7	4:58	20.3	4:45

Fuel Required Adjustment (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG)				
	100	120	140	160	180
2	-0.3	-0.1	0.0	0.2	0.4
4	-0.6	-0.3	0.0	0.5	0.9
6	-1.0	-0.5	0.0	0.7	1.4
8	-1.3	-0.6	0.0	1.0	2.0
10	-1.6	-0.8	0.0	1.3	2.5
12	-2.0	-1.0	0.0	1.6	3.0
14	-2.3	-1.2	0.0	1.8	3.6
16	-2.7	-1.3	0.0	2.1	4.1
18	-3.0	-1.5	0.0	2.4	4.7
20	-3.4	-1.7	0.0	2.6	5.2
22	-3.7	-1.8	0.0	2.9	5.7
24	-4.1	-2.0	0.0	3.1	6.3
26	-4.4	-2.2	0.0	3.4	6.8
28	-4.8	-2.3	0.0	3.6	7.4
30	-5.1	-2.5	0.0	3.8	7.9

Includes APU fuel burn.

ENGINE INOP

MAX CONTINUOUS THRUST

**Holding
Flaps Up**

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)						
		1500	5000	10000	15000	20000	25000	30000
190	%N1	87.3	90.3	94.9	100.2			
	KIAS	259	259	259	259			
	FF/ENG	5450	5490	5600	5810			
180	%N1	85.5	88.7	93.1	98.2	105.4		
	KIAS	251	251	251	251	251		
	FF/ENG	5140	5170	5250	5410	5770		
170	%N1	83.8	86.9	91.3	96.2	102.4		
	KIAS	244	244	244	244	244		
	FF/ENG	4840	4850	4910	5040	5310		
160	%N1	82.0	85.0	89.4	94.2	99.9		
	KIAS	236	236	236	236	236		
	FF/ENG	4530	4540	4580	4680	4890		
150	%N1	79.8	83.0	87.5	92.1	97.5		
	KIAS	228	228	228	228	228		
	FF/ENG	4230	4240	4260	4330	4490		
140	%N1	77.6	81.0	85.4	90.0	95.0	101.7	
	KIAS	222	222	222	222	222	222	
	FF/ENG	3940	3940	3950	4000	4120	4370	
130	%N1	75.5	78.6	83.2	87.7	92.5	98.4	
	KIAS	217	217	217	217	217	217	
	FF/ENG	3660	3650	3660	3690	3770	3950	
120	%N1	73.2	76.2	81.0	85.5	90.1	95.4	
	KIAS	211	211	211	211	211	211	
	FF/ENG	3380	3370	3370	3390	3440	3560	
110	%N1	70.6	73.9	78.4	83.0	87.6	92.6	99.0
	KIAS	205	205	205	205	205	205	205
	FF/ENG	3120	3100	3090	3100	3140	3220	3410
100	%N1	67.9	71.2	75.7	80.5	85.0	89.7	95.3
	KIAS	199	199	199	199	199	199	199
	FF/ENG	2850	2840	2830	2820	2840	2890	3020

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



Performance Inflight - QRH

Chapter PI-QRH

Gear Down

Section 43

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

GEAR DOWN

Long Range Cruise Altitude Capability

WEIGHT (1000 KG)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
190	19800	18200	14800
185	20700	19300	17400
180	21700	20300	18600
175	22700	21200	19800
170	23700	22200	20800
165	24800	23200	21700
160	25800	24100	22700
155	26800	25200	23700
150	27600	26400	24800
145	28500	27700	26100
140	29300	29000	27500
135	30000	30000	29000
130	30700	30700	30100
125	31400	31400	30900
120	32200	32100	31700
115	32900	32900	32500
110	33700	33600	33300
105	34500	34400	34200
100	35300	35200	35000
95	36100	36100	35800
90	36900	36900	36600

GEAR DOWN

Long Range Cruise Control

WEIGHT (1000 KG)		PRESSURE ALTITUDE (1000 FT)										
		10	14	18	21	23	25	27	29	31	33	35
190	%N1	91.6	95.1	99.1								
	MACH	.472	.508	.546								
	KIAS	261	261	260								
	FF/ENG	4765	4811	4928								
180	%N1	90.0	93.4	97.3	100.6							
	MACH	.461	.495	.534	.563							
	KIAS	255	254	254	253							
	FF/ENG	4490	4522	4612	4715							
170	%N1	88.4	91.7	95.4	98.5	101.0						
	MACH	.449	.483	.520	.550	.571						
	KIAS	248	248	247	246	246						
	FF/ENG	4225	4241	4295	4386	4471						
160	%N1	86.8	89.9	93.5	96.5	98.6	101.4					
	MACH	.437	.469	.506	.536	.555	.577					
	KIAS	241	240	240	240	239	238					
	FF/ENG	3963	3961	4000	4072	4126	4222					
150	%N1	84.8	88.1	91.5	94.3	96.4	98.7	101.6				
	MACH	.424	.456	.491	.520	.540	.561	.583				
	KIAS	234	233	233	232	232	231	231				
	FF/ENG	3703	3693	3717	3758	3812	3868	3966				
140	%N1	82.8	86.2	89.5	92.2	94.2	96.3	98.7	101.9			
	MACH	.411	.442	.476	.504	.524	.544	.565	.587			
	KIAS	227	226	225	225	225	224	224	223			
	FF/ENG	3443	3434	3440	3465	3502	3549	3611	3704			
130	%N1	81.0	84.1	87.3	90.0	91.8	93.9	96.0	98.6	102.0		
	MACH	.398	.427	.460	.487	.506	.527	.548	.570	.591		
	KIAS	220	219	218	217	217	217	216	216	214		
	FF/ENG	3205	3176	3170	3187	3205	3244	3286	3353	3436		
120	%N1	78.7	81.8	85.2	87.7	89.5	91.3	93.4	95.6	98.3	101.8	
	MACH	.385	.411	.443	.469	.488	.508	.529	.550	.572	.593	
	KIAS	212	210	210	209	209	209	209	208	207	206	
	FF/ENG	2974	2918	2912	2913	2927	2944	2981	3022	3090	3165	
110	%N1	76.1	79.6	82.8	85.3	87.0	88.8	90.7	92.7	95.0	97.7	101.5
	MACH	.369	.396	.426	.451	.469	.488	.508	.529	.551	.574	.595
	KIAS	203	203	201	201	200	200	200	200	199	199	197
	FF/ENG	2726	2685	2658	2653	2654	2668	2682	2717	2759	2822	2895
100	%N1	73.5	76.9	80.1	82.7	84.4	86.0	87.9	89.8	91.9	94.1	96.9
	MACH	.353	.380	.408	.432	.449	.467	.487	.507	.528	.550	.574
	KIAS	195	194	192	192	192	191	191	191	191	190	190
	FF/ENG	2489	2454	2407	2400	2397	2397	2408	2421	2454	2495	2553

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
650	581	521	474	434	400	378	357	339	323	308
981	875	784	711	652	600	567	536	509	484	462
1317	1173	1049	951	870	800	755	714	677	644	615
1656	1472	1315	1190	1089	1000	944	893	846	805	768
2000	1775	1583	1431	1308	1200	1132	1070	1014	964	920
2349	2082	1854	1674	1527	1400	1320	1248	1182	1124	1072
2703	2391	2125	1916	1747	1600	1508	1425	1349	1282	1223
3062	2705	2400	2161	1968	1800	1696	1602	1517	1441	1374
3427	3021	2675	2406	2188	2000	1884	1779	1684	1599	1524

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT)									
	10		14		18		22		28	
	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)
200	4.8	0:49	4.4	0:47	4.0	0:45	3.7	0:44	3.3	0:41
400	9.9	1:36	9.2	1:32	8.6	1:27	8.0	1:23	7.5	1:17
600	14.9	2:24	13.9	2:17	13.0	2:09	12.2	2:03	11.5	1:53
800	19.8	3:12	18.5	3:02	17.4	2:52	16.4	2:43	15.4	2:30
1000	24.6	4:02	23.0	3:49	21.6	3:36	20.4	3:24	19.2	3:07
1200	29.3	4:52	27.4	4:36	25.8	4:20	24.4	4:05	23.0	3:45
1400	33.9	5:43	31.8	5:24	29.9	5:06	28.3	4:48	26.6	4:23
1600	38.5	6:36	36.0	6:13	33.9	5:51	32.1	5:31	30.1	5:02
1800	42.9	7:29	40.2	7:03	37.8	6:38	35.8	6:14	33.6	5:41
2000	47.2	8:24	44.2	7:54	41.6	7:26	39.4	6:58	37.0	6:21

Fuel Required Adjustment (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG)				
	100	120	140	160	180
5	-0.7	-0.4	0.0	0.6	1.3
10	-1.5	-0.8	0.0	1.3	2.7
15	-2.4	-1.2	0.0	1.9	4.0
20	-3.2	-1.6	0.0	2.5	5.3
25	-4.0	-2.0	0.0	3.1	6.6
30	-4.8	-2.4	0.0	3.7	7.8
35	-5.6	-2.8	0.0	4.3	8.9
40	-6.4	-3.2	0.0	4.8	10.1
45	-7.2	-3.6	0.0	5.3	11.1
50	-8.0	-4.0	0.0	5.8	12.1
55	-8.9	-4.5	0.0	6.3	13.1
60	-9.7	-4.9	0.0	6.7	14.0

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	68	71	74
TIME (MINUTES)	7	10	12	13	14	15	16	16	17	18	19	19	20

GEAR DOWN

Holding Flaps Up

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)						
		1500	5000	10000	15000	20000	25000	30000
190	%N1	83.1	85.9	90.1	94.6	100.0		
	KIAS	249	249	249	249	249		
	FF/ENG	4710	4690	4710	4790	4980		
180	%N1	81.2	84.2	88.4	92.8	97.9		
	KIAS	241	241	241	241	241		
	FF/ENG	4440	4410	4420	4470	4610		
170	%N1	79.4	82.5	86.7	91.0	95.9	102.5	
	KIAS	234	234	234	234	234	234	
	FF/ENG	4180	4160	4150	4180	4280	4550	
160	%N1	77.4	80.5	84.7	89.0	93.7	99.6	
	KIAS	226	226	226	226	226	226	
	FF/ENG	3910	3890	3860	3880	3950	4140	
150	%N1	75.4	78.3	82.7	87.0	91.5	96.9	
	KIAS	218	218	218	218	218	218	
	FF/ENG	3650	3620	3590	3590	3640	3770	
140	%N1	73.6	76.4	80.9	85.2	89.5	94.6	102.0
	KIAS	212	212	212	212	212	212	212
	FF/ENG	3420	3390	3360	3350	3380	3470	3710
130	%N1	71.5	74.6	79.0	83.2	87.6	92.4	98.6
	KIAS	207	207	207	207	207	207	207
	FF/ENG	3210	3180	3150	3120	3140	3210	3380
120	%N1	69.4	72.6	76.8	81.2	85.6	90.2	95.7
	KIAS	201	201	201	201	201	201	201
	FF/ENG	3000	2970	2930	2900	2910	2950	3060
110	%N1	67.3	70.3	74.7	79.2	83.6	88.0	93.1
	KIAS	195	195	195	195	195	195	195
	FF/ENG	2800	2760	2730	2690	2680	2710	2790
100	%N1	65.1	68.0	72.5	76.8	81.2	85.7	90.5
	KIAS	189	189	189	189	189	189	189
	FF/ENG	2590	2560	2520	2490	2470	2480	2520

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

Intentionally
Blank



Performance Inflight - QRH

Chapter PI-QRH

Gear Down, Engine Inop

Section 44

GEAR DOWN

ENGINE INOP

MAX CONTINUOUS THRUST

Initial Max Continuous %N1

29000 FT to 10000 FT Pressure Altitudes

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

29000 FT PRESS ALT								TAT (°C)					
MACH	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	
0.6	102.6	103.6	104.7	105.8	106.8	107.9	108.6	107.7	106.8	106.1	105.5	104.9	
0.5	102.6	103.6	104.7	105.8	106.8	107.9	108.4	107.4	106.8	106.1	105.5	102.8	
0.4	102.6	103.6	104.7	105.8	106.8	107.9	108.2	107.5	106.8	106.2	103.6	100.5	
27000 FT PRESS ALT								TAT (°C)					
MACH	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	
0.6	102.6	103.6	104.7	105.8	106.8	107.9	108.6	107.6	106.7	105.7	105.0	104.3	
0.5	102.6	103.6	104.7	105.8	106.8	107.9	108.2	107.2	106.3	105.6	104.8	104.0	
0.4	102.6	103.6	104.7	105.8	106.8	107.9	108.0	107.0	106.3	105.6	104.7	101.8	
25000 FT PRESS ALT								TAT (°C)					
MACH	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	20	
0.6	102.3	103.2	104.2	105.2	106.1	106.9	107.3	106.4	105.4	104.4	103.6	102.9	
0.5	103.6	104.7	105.8	106.8	107.6	107.8	106.9	105.9	104.9	104.1	103.4	102.1	
0.4	103.6	104.7	105.8	106.8	107.9	107.7	106.7	105.7	104.9	104.1	102.8	100.0	
23000 FT PRESS ALT								TAT (°C)					
MACH	-30	-25	-20	-15	-10	-5	0	5	10	15	20	25	
0.6	103.2	104.2	105.2	106.1	107.0	107.9	108.0	107.2	106.2	105.3	104.5	103.7	
0.5	104.7	105.8	106.8	107.8	108.7	108.6	107.7	106.7	105.8	105.0	104.2	102.7	
0.4	104.7	105.8	106.8	107.9	108.9	108.6	107.6	106.6	105.8	105.0	103.4	100.8	
21000 FT PRESS ALT								TAT (°C)					
MACH	-30	-25	-20	-15	-10	-5	0	5	10	15	20	25	
0.6	103.9	104.8	105.8	106.8	107.7	108.6	109.5	109.4	108.5	107.5	106.6	105.7	
0.5	104.7	105.8	106.8	107.9	108.9	109.9	109.9	109.0	108.0	107.0	106.1	105.3	
0.4	104.7	105.8	106.8	107.9	108.9	109.9	109.8	108.8	107.8	106.9	106.1	104.2	
19000 FT PRESS ALT								TAT (°C)					
MACH	-25	-20	-15	-10	-5	0	5	10	15	20	25	30	
0.6	104.3	105.3	106.2	107.2	108.1	109.0	110.0	109.6	108.7	107.7	106.8	105.9	
0.5	105.8	106.8	107.9	108.9	109.8	110.7	110.1	109.2	108.2	107.3	106.4	105.5	
0.4	105.8	106.8	107.9	108.9	109.9	110.9	110.1	109.1	108.2	107.2	106.4	104.3	
15000 FT PRESS ALT								TAT (°C)					
MACH	-20	-15	-10	-5	0	5	10	15	20	25	30	35	
0.6	102.8	103.8	104.7	105.6	106.6	107.5	108.4	109.2	108.2	107.3	106.4	105.7	
0.5	104.3	105.2	106.2	107.1	108.1	109.0	109.4	108.4	107.5	106.7	105.9	105.1	
0.4	105.2	106.2	107.2	108.2	109.2	110.2	109.5	108.6	107.7	106.9	106.1	105.1	
10000 FT PRESS ALT								TAT (°C)					
MACH	-15	-10	-5	0	5	10	15	20	25	30	35	40	
0.6	100.3	101.2	102.1	103.0	103.9	104.8	105.6	106.5	107.4	106.7	106.0	105.2	
0.5	101.4	102.4	103.3	104.2	105.1	106.0	106.9	107.5	106.8	106.0	105.2	104.5	
0.4	102.6	103.5	104.4	105.4	106.3	107.2	107.8	107.0	106.2	105.4	104.7	104.1	

GEAR DOWN

ENGINE INOP

MAX CONTINUOUS THRUST

Driftdown Speed/Level Off Altitude

100 ft/min residual rate of climb

WEIGHT (1000 KG)		OPTIMUM DRIFTDOWN SPEED (KIAS)	LEVEL OFF ALTITUDE (FT)		
START DRIFT DOWN	LEVEL OFF		ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
180	171	238	2900		
170	162	231	5500	3700	1600
160	153	223	8200	6600	4700
150	143	215	10600	9200	7600
140	134	210	12800	11800	10100
130	125	205	14900	14400	12900
120	115	199	16700	16500	15600
110	106	193	18900	18800	18100
100	96	188	21000	20800	20400

Includes APU fuel burn.

GEAR DOWN
ENGINE INOP

MAX CONTINUOUS THRUST

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

WEIGHT (1000 KG)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
160	4300	1700	
155	5800	3400	
150	7400	5000	2500
145	8900	6700	4200
140	10300	8400	6000
135	11700	9900	7800
130	13100	11700	9500
125	14600	13600	11400
120	15700	15300	13400
115	16700	16600	15300
110	17900	17800	17000
105	19100	19000	18400
100	20300	20200	19700
95	21300	21200	20700
90	22300	22200	21600

With engine anti-ice on, decrease altitude capability by 1200 ft.
With engine and wing anti-ice on, decrease altitude capability by 2500 ft.



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GEAR DOWN

ENGINE INOP

MAX CONTINUOUS THRUST

Long Range Cruise Control

WEIGHT (1000 KG)		PRESSURE ALTITUDE (1000 FT)							
		6	8	10	12	14	16	18	20
160	%N1	103.3							
	MACH	.398							
	KIAS	237							
	FF/ENG	7736							
150	%N1	101.0	103.1						
	MACH	.389	.400						
	KIAS	231	229						
	FF/ENG	7195	7225						
140	%N1	98.6	100.6	102.7	105.3				
	MACH	.379	.390	.401	.412				
	KIAS	225	223	221	219				
	FF/ENG	6672	6685	6714	6765				
130	%N1	96.2	98.0	100.0	102.2	104.8			
	MACH	.367	.379	.391	.402	.412			
	KIAS	218	217	215	213	211			
	FF/ENG	6167	6164	6175	6200	6251			
120	%N1	93.8	95.5	97.3	99.2	101.5	104.2		
	MACH	.355	.367	.379	.390	.402	.412		
	KIAS	211	210	209	207	205	203		
	FF/ENG	5671	5660	5658	5666	5686	5740		
110	%N1	91.2	92.8	94.5	96.3	98.3	100.5	103.4	
	MACH	.342	.353	.365	.377	.389	.401	.413	
	KIAS	203	202	201	200	199	197	195	
	FF/ENG	5188	5169	5157	5156	5159	5177	5259	
100	%N1	88.4	90.1	91.6	93.3	95.2	97.1	99.5	102.8
	MACH	.328	.339	.351	.363	.375	.387	.400	.417
	KIAS	195	194	193	192	191	190	189	189
	FF/ENG	4697	4689	4671	4659	4657	4658	4700	4837

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
164	146	131	118	109	100	94	89	84	79	75
334	296	264	239	218	200	187	175	165	156	148
505	447	398	359	327	300	281	263	247	234	222
677	598	531	479	437	400	374	350	329	311	295
850	751	666	600	546	500	467	438	411	388	368
1025	904	801	720	656	600	560	524	493	465	441
1200	1057	936	841	766	700	653	611	574	541	513
1377	1212	1072	963	876	800	746	698	655	618	586
1554	1367	1208	1085	986	900	839	785	737	694	658
1733	1523	1345	1207	1096	1000	932	872	818	771	731

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT)							
	6		10		14		18	
	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)
100	2.5	0:27	2.2	0:27	2.0	0:26	1.8	0:26
200	5.2	0:52	4.8	0:50	4.6	0:49	4.4	0:47
300	7.8	1:17	7.4	1:14	7.1	1:12	7.0	1:09
400	10.5	1:42	9.9	1:38	9.5	1:35	9.5	1:31
500	13.1	2:08	12.4	2:02	12.0	1:58	11.9	1:54
600	15.7	2:33	14.9	2:27	14.4	2:22	14.3	2:16
700	18.2	2:59	17.3	2:51	16.7	2:45	16.7	2:39
800	20.7	3:25	19.7	3:16	19.0	3:09	19.0	3:01
900	23.2	3:51	22.1	3:41	21.3	3:32	21.2	3:24
1000	25.7	4:18	24.4	4:06	23.6	3:56	23.5	3:47

Fuel Required Adjustment (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG)				
	100	120	140	160	180
2	-0.3	-0.2	0.0	0.2	0.5
4	-0.7	-0.3	0.0	0.5	1.1
6	-1.0	-0.5	0.0	0.8	1.7
8	-1.4	-0.7	0.0	1.1	2.3
10	-1.8	-0.9	0.0	1.4	2.9
12	-2.1	-1.1	0.0	1.7	3.4
14	-2.5	-1.2	0.0	2.0	4.0
16	-2.9	-1.4	0.0	2.3	4.6
18	-3.2	-1.6	0.0	2.6	5.2
20	-3.6	-1.8	0.0	2.9	5.8
22	-4.0	-2.0	0.0	3.1	6.4
24	-4.4	-2.1	0.0	3.4	6.9
26	-4.7	-2.3	0.0	3.7	7.5
28	-5.1	-2.5	0.0	4.0	8.1
30	-5.5	-2.7	0.0	4.3	8.7

Includes APU fuel burn.

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GEAR DOWN

ENGINE INOP

MAX CONTINUOUS THRUST

**Holding
Flaps Up**

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)				
		1500	5000	10000	15000	20000
180	%N1	101.3				
	KIAS	241				
	FF/ENG	8700				
170	%N1	99.2	103.1			
	KIAS	234	234			
	FF/ENG	8130	8300			
160	%N1	96.9	100.4			
	KIAS	226	226			
	FF/ENG	7540	7640			
150	%N1	94.5	97.9	103.9		
	KIAS	218	218	218		
	FF/ENG	6970	7030	7280		
140	%N1	92.5	95.6	101.0		
	KIAS	212	212	212		
	FF/ENG	6480	6520	6690		
130	%N1	90.4	93.5	98.5	105.9	
	KIAS	207	207	207	207	
	FF/ENG	6040	6070	6170	6500	
120	%N1	88.2	91.2	95.9	102.0	
	KIAS	201	201	201	201	
	FF/ENG	5600	5610	5670	5870	
110	%N1	86.0	88.9	93.4	98.8	
	KIAS	195	195	195	195	
	FF/ENG	5170	5170	5210	5330	
100	%N1	83.5	86.5	90.8	95.8	102.8
	KIAS	189	189	189	189	189
	FF/ENG	4750	4750	4760	4830	5080

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

Performance Inflight - QRH

Chapter PI-QRH

Text

Section 45

Introduction

This chapter contains information to supplement performance data from the Flight Management Computer (FMC). In addition, sufficient inflight data is provided to complete a flight with the FMC inoperative. In the event of conflict between data presented in this chapter and that contained in the approved Airplane Flight Manual, the Flight Manual shall always take precedence.

General

Flight with Unreliable Airspeed / Turbulent Air Penetration

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

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

Max Climb %N1

This table shows Max Climb %N1 for a 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. Landing distances for slippery runways are 115% of the actual landing distances.

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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Performance Inflight - QRH

Chapter PI-QRH

General

Section 50

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 KG)				
		100	120	140	160	180
40000	PITCH ATT	4.0	4.0			
	V/S (FT/MIN)	1500	900			
30000	PITCH ATT	4.0	4.0	3.5	3.5	4.0
	V/S (FT/MIN)	2600	2000	1600	1200	900
20000	PITCH ATT	6.5	6.0	6.0	5.5	5.5
	V/S (FT/MIN)	4000	3200	2600	2100	1700
10000	PITCH ATT	10.0	8.5	8.0	7.5	7.5
	V/S (FT/MIN)	5300	4300	3500	3000	2500
SEA LEVEL	PITCH ATT	12.5	11.0	10.0	9.5	9.0
	V/S (FT/MIN)	6000	4900	4100	3500	3000

Cruise (.78/290)**Flaps Up, Set Thrust for Level Flight**

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG)				
		100	120	140	160	180
40000	PITCH ATT	2.0	2.5	3.5		
	EPR	1.20	1.31	1.52		
	(Alt Mode %N1)	(82.7)	(86.3)	(93.0)		
35000	PITCH ATT	1.5	2.0	2.5	3.0	3.5
	EPR	1.11	1.16	1.23	1.34	1.53
	(Alt Mode %N1)	(79.8)	(81.8)	(84.3)	(87.8)	(93.7)
30000	PITCH ATT	1.0	1.5	2.0	2.0	2.5
	EPR	1.06	1.09	1.13	1.18	1.24
	(Alt Mode %N1)	(78.8)	(80.2)	(81.9)	(83.8)	(86.0)
25000	PITCH ATT	1.0	1.5	2.0	2.5	3.0
	EPR	1.02	1.04	1.07	1.10	1.14
	(Alt Mode %N1)	(75.1)	(76.5)	(78.2)	(80.1)	(82.2)
20000	PITCH ATT	1.0	1.5	2.0	2.5	3.0
	EPR	1.00	1.01	1.03	1.06	1.08
	(Alt Mode %N1)	(72.5)	(73.4)	(74.7)	(76.4)	(78.4)
15000	PITCH ATT	1.0	1.5	2.0	2.5	3.0
	EPR	0.99	1.00	1.01	1.03	1.05
	(Alt Mode %N1)	(70.1)	(70.5)	(71.4)	(73.0)	(74.8)

Flight With Unreliable Airspeed / Turbulent Air Penetration

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

Descent (.78/290)

Flaps Up, Set Idle Thrust

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG)				
		100	120	140	160	180
40000	PITCH ATT	-1.0	-0.5	0.0	0.5	0.5
	V/S (FT/MIN)	-2400	-2400	-2500	-3000	-3500
30000	PITCH ATT	-2.5	-2.0	-1.0	-0.5	0.0
	V/S (FT/MIN)	-2800	-2500	-2300	-2200	-2100
20000	PITCH ATT	-3.0	-2.0	-1.0	-0.5	0.0
	V/S (FT/MIN)	-2600	-2300	-2100	-2000	-1900
10000	PITCH ATT	-3.0	-2.0	-1.0	-0.5	0.0
	V/S (FT/MIN)	-2300	-2000	-1900	-1800	-1700
SEA LEVEL	PITCH ATT	-3.0	-2.0	-1.0	-0.5	0.0
	V/S (FT/MIN)	-2000	-1700	-1600	-1500	-1500

Holding (VREF30 + 80)

Flaps Up, Set Thrust for Level Flight

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG)				
		100	120	140	160	180
10000	PITCH ATT	4.0	4.5	4.5	5.0	5.0
	EPR	1.01	1.02	1.04	1.05	1.05
	(Alt Mode %N1)	(54.8)	(59.3)	(63.5)	(67.1)	(70.1)
	KIAS	199	211	222	236	251
5000	PITCH ATT	4.0	4.5	5.0	5.0	4.5
	EPR	1.00	1.01	1.02	1.03	1.04
	(Alt Mode %N1)	(51.3)	(55.1)	(59.2)	(62.7)	(66.2)
	KIAS	199	211	222	236	251

Terminal Area (5000 FT)

Set Thrust for Level Flight

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG)				
		100	120	140	160	180
FLAPS UP (VREF30+80) (GEAR UP)	PITCH ATT	4.0	4.5	5.0	5.0	5.0
	EPR	1.02	1.03	1.04	1.05	1.06
	(Alt Mode %N1)	(51.9)	(56.0)	(60.2)	(63.8)	(67.2)
	KIAS	199	211	222	236	251
FLAPS 1 (VREF30+60) (GEAR UP)	PITCH ATT	6.0	6.5	6.5	6.5	6.5
	EPR	1.04	1.05	1.06	1.07	1.08
	(Alt Mode %N1)	(52.3)	(57.6)	(61.7)	(65.2)	(68.5)
	KIAS	179	191	202	216	231
FLAPS 5 (VREF30+40) (GEAR UP)	PITCH ATT	4.5	4.5	5.0	4.5	4.5
	EPR	1.05	1.07	1.08	1.10	1.11
	(Alt Mode %N1)	(55.2)	(60.2)	(64.2)	(67.9)	(71.3)
	KIAS	159	171	182	196	211
FLAPS 15 (VREF30+20) (GEAR UP)	PITCH ATT	5.5	5.5	6.0	6.0	5.5
	EPR	1.07	1.09	1.11	1.12	1.14
	(Alt Mode %N1)	(56.8)	(61.7)	(66.0)	(69.6)	(73.0)
	KIAS	139	151	162	176	191
FLAPS 20 (VREF30+20) (GEAR DOWN)	PITCH ATT	4.0	4.5	4.5	4.0	3.5
	EPR	1.10	1.12	1.15	1.18	1.21
	(Alt Mode %N1)	(63.3)	(68.0)	(72.3)	(76.5)	(80.3)
	KIAS	139	151	162	176	191

Flight With Unreliable Airspeed / Turbulent Air Penetration

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

Final Approach (1500 FT)**Gear Down, Set Thrust for a 3° Glideslope**

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG)				
		100	120	140	160	180
FLAPS 20 (VREF20 + 10)	PITCH ATT	1.5	1.5	1.5	1.5	1.5
	EPR	1.03	1.04	1.04	1.05	1.05
	(Alt Mode %N1)	(43.3)	(47.9)	(52.1)	(55.7)	(59.2)
	KIAS	138	150	162	172	184

Go-Around (VREF 30 + 20)**Flaps 20, Gear Up, Set Go-Around Thrust****Normal Mode EEC**

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG)				
		100	120	140	160	180
10000	PITCH ATT	18.0	15.0	12.5	10.5	8.5
	V/S (FT/MIN)	3900	3200	2700	2300	1900
	KIAS	139	151	162	176	191
5000	PITCH ATT	21.5	17.5	15.0	12.5	10.5
	V/S (FT/MIN)	4500	3800	3200	2800	2400
	KIAS	139	151	162	176	191
SEA LEVEL	PITCH ATT	25.0	20.5	17.5	14.5	12.5
	V/S (FT/MIN)	5100	4300	3700	3200	2900
	KIAS	139	151	162	176	191

Alternate Mode EEC

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG)				
		100	120	140	160	180
10000	PITCH ATT	17.0	14.0	11.5	10.0	8.0
	V/S (FT/MIN)	3600	2900	2400	2000	1700
	KIAS	139	151	162	176	191
5000	PITCH ATT	20.0	16.5	14.0	11.5	9.5
	V/S (FT/MIN)	4100	3400	2900	2500	2100
	KIAS	139	151	162	176	191
SEA LEVEL	PITCH ATT	23.0	19.0	16.0	13.5	11.0
	V/S (FT/MIN)	4600	3900	3300	2900	2500
	KIAS	139	151	162	176	191



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	0.01	0.02	0.02
ENGINE ANTI-ICE ON	-0.01	-0.02	-0.02	-0.03	-0.03	-0.03	-0.03	-0.04	-0.04
ENGINE & WING ANTI-ICE ON	-0.02	-0.03	-0.04	-0.05	-0.05	-0.05	-0.05	-0.07	-0.07



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VREF (KIAS)

WEIGHT (1000 KG)	FLAPS		
	30	25	20
190	179	170	179
180	171	166	174
170	164	161	168
160	156	156	162
150	148	151	157
140	142	146	152
130	137	140	146
120	131	135	140
110	125	129	134
100	119	123	128

Intentionally
Blank



Performance Inflight - QRH

Advisory Information

Chapter PI-QRH

Section 51

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	150000 KG LANDING WEIGHT	PER 5000 KG ABV/ BLW 150000 KG	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	3220	110/-70	80	-130	440	50	-40	80	-80	250	70	140
MAX AUTO	5370	130/-130	150	-250	840	0	0	160	-160	600	0	0
AUTOBRAKE 4	5540	140/-140	160	-260	880	0	0	160	-160	630	0	0
AUTOBRAKE 3	6370	160/-160	190	-300	1040	0	0	190	-190	740	0	0
AUTOBRAKE 2	7150	190/-190	220	-350	1190	30	-110	230	-210	660	60	60
AUTOBRAKE 1	7840	220/-220	260	-400	1370	170	-220	270	-230	580	430	520

Good Reported Braking Action

MAX MANUAL	4460	110/-100	130	-210	740	130	-110	130	-120	350	230	520
MAX AUTO	5380	130/-130	150	-250	860	20	-10	160	-160	600	20	80
AUTOBRAKE 4	5540	140/-140	160	-260	880	10	0	160	-160	630	10	50
AUTOBRAKE 3	6370	160/-160	190	-300	1040	0	0	190	-190	740	0	0

Medium Reported Braking Action

MAX MANUAL	6140	170/-160	200	-330	1220	310	-240	210	-180	450	640	1540
MAX AUTO	6140	170/-160	200	-330	1220	300	-170	210	-180	570	610	1510
AUTOBRAKE 4	6190	170/-160	200	-340	1220	270	-150	210	-190	620	550	1450
AUTOBRAKE 3	6710	180/-180	210	-360	1280	170	-90	220	-210	740	350	1080

Poor Reported Braking Action

MAX MANUAL	8000	240/-230	280	-500	1910	720	-460	310	-250	520	1400	3700
MAX AUTO	8000	240/-230	280	-500	1910	720	-460	310	-250	510	1400	3710
AUTOBRAKE 4	8000	240/-230	280	-500	1910	720	-460	310	-250	510	1400	3710
AUTOBRAKE 3	8010	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	150000 KG LANDING WEIGHT	PER 5000 KG ABV/ BLW 150000 KG	PER 1000 FT ABOVE SEA LEVEL	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 10 KTS ABOVE VREF30	ONE REV	NO REV
MAX MANUAL	3170	140/-70	80	-130	440	50	-50	80	-80	260	60	130
MAX AUTO	5220	210/-140	150	-240	830	0	0	150	-150	600	0	0
AUTOBRAKE 4	5380	220/-140	150	-250	870	0	0	160	-160	620	0	0
AUTOBRAKE 3	6180	260/-170	180	-300	1020	0	0	190	-190	730	0	0
AUTOBRAKE 2	6970	280/-200	210	-350	1180	10	-100	220	-210	670	30	30
AUTOBRAKE 1	7690	300/-220	250	-400	1360	160	-210	260	-230	580	350	440

Good Reported Braking Action

MAX MANUAL	4400	160/-110	120	-210	740	130	-110	130	-120	350	220	480
MAX AUTO	5230	210/-140	150	-250	850	20	-10	150	-150	600	20	80
AUTOBRAKE 4	5390	220/-140	160	-250	870	10	0	160	-160	620	10	50
AUTOBRAKE 3	6180	260/-170	180	-300	1020	0	0	190	-190	730	0	0

Medium Reported Braking Action

MAX MANUAL	6070	230/-170	200	-330	1220	320	-250	210	-180	450	600	1430
MAX AUTO	6070	250/-170	190	-330	1220	310	-190	210	-180	550	600	1420
AUTOBRAKE 4	6080	250/-170	200	-330	1220	290	-160	200	-190	600	550	1380
AUTOBRAKE 3	6550	280/-190	210	-350	1280	180	-100	210	-200	730	360	1030

Poor Reported Braking Action

MAX MANUAL	7920	310/-240	280	-500	1920	730	-470	300	-250	520	1320	3420
MAX AUTO	7920	310/-240	280	-500	1910	730	-470	300	-250	520	1320	3430
AUTOBRAKE 4	7920	310/-240	280	-500	1910	730	-470	300	-250	520	1320	3430
AUTOBRAKE 3	7920	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	150000 KG LDG WT	PER 5000 KG ABV/BLW 150000 KG	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	4180	90/-90	110	-170/560	80/-70	100/-100	420	0	0
AIR/GRD SYS (FLAPS 30)	VREF30	4100	160/-100	110	-170/570	90/-80	100/-100	440	0	0
ALL FLAPS AND SLATS UP LANDING	VREF30+50	4580	260/-110	130	-170/570	80/-70	130/-130	330	180	390
ANTI-SKID OFF (FLAPS 25)	VREF25	6020	160/-150	170	-300/1040	200/-170	170/-160	450	380	870
ANTI-SKID OFF (FLAPS 30)	VREF30	5870	230/-160	160	-290/1030	200/-170	170/-160	450	350	800
ENGINE FAILURE (FLAPS 20)	VREF20	3480	150/-80	90	-140/470	60/-50	90/-90	280	0	90
HYD SYS PRESS (C ONLY) (FLAPS 20)	VREF20	4180	110/-100	100	-160/540	70/-60	110/-100	390	120	260
HYD SYS PRESS (L ONLY) (FLAPS 25)	VREF25	3460	90/-80	90	-140/480	60/-60	90/-80	300	0	90
HYD SYS PRESS (L ONLY) (FLAPS 30)	VREF30	3400	130/-80	90	-140/480	60/-60	90/-80	310	0	80
HYD SYS PRESS (R ONLY) (FLAPS 25)	VREF25	3830	90/-90	100	-160/560	80/-70	100/-100	340	0	130
HYD SYS PRESS (R ONLY) (FLAPS 30)	VREF30	3760	150/-90	100	-160/560	80/-80	100/-100	350	0	130
HYD SYS PRESS (L AND C) (FLAPS 20)	VREF30+20	5140	200/-120	140	-190/640	120/-110	140/-140	570	0	250
HYD SYS PRESS (L AND R) (FLAPS 20)	VREF30+20	5110	200/-120	140	-210/700	150/-130	150/-140	520	0	0
HYD SYS PRESS (R AND C) (FLAPS 20)	VREF30+20	6260	260/-150	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 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	150000 KG LDG WT	PER 5000 KG ABV/BLW 150000 KG	PER 1000FT 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	3710	180/-80	100	-140/490	60/-50	100/-90	280	100	220
LE SLAT ASYM (FLAPS = 20)	VREF30+30	4180	170/-90	110	-160/520	70/-60	120/-110	310	140	290
LE SLAT ASYM (5 < FLAPS < 20)	VREF30+40	4490	170/-100	120	-160/540	80/-70	130/-120	320	160	340
LE SLAT DISAGREE (FLAPS > 20)	VREF20	3420	140/-80	80	-130/460	50/-50	90/-80	270	80	180
LE SLAT DISAGREE - ALTN FLAP EXT ACOMPLISHED (FLAPS = 20)	VREF20	3420	140/-80	80	-130/460	50/-50	90/-80	270	80	180
LE SLAT DISAGREE - ALTN FLAP EXT FAILED (FLAPS = 20)	VREF30+30	3980	180/-90	100	-150/500	60/-60	110/-100	280	120	250
REVERSER UNLOCKED (FLAPS 20)	VREF30+30	4280	180/-100	110	-160/540	80/-70	120/-110	330	0	150
TE FLAP ASYM (FLAPS ≥ 20)	VREF20	3420	140/-80	80	-130/460	50/-50	90/-80	270	80	180
TE FLAP ASYM (5 < FLAPS < 20)	VREF30+20	3710	180/-80	100	-140/490	60/-50	100/-90	280	100	220
TE FLAP ASYM (FLAPS ≤ 5)	VREF30+30	3930	220/-90	100	-150/500	60/-60	110/-100	270	110	250
TE FLAP DISAGREE (FLAPS ≥ 20)	VREF20	3420	140/-80	80	-130/460	50/-50	90/-80	270	80	180
TE FLAP DISAGREE (5 < FLAPS < 20)	VREF30+20	3710	180/-80	100	-140/490	60/-50	100/-90	280	100	220
TE FLAP DISAGREE (FLAPS ≤ 5)	VREF30+30	3930	220/-90	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 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	150000 KG LDG WT	PER 5000 KG ABV/BLW 150000 KG	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	6140	150/-150	180	-290/990	260/-220	170/-170	620	0	0
AIR/GRD SYS (FLAPS 30)	VREF30	5990	250/-150	180	-290/990	270/-220	170/-170	630	0	0
ALL FLAPS AND SLATS UP LANDING	VREF30+50	6310	220/-160	200	-260/870	170/-150	210/-180	380	490	1120
ANTI-SKID OFF (FLAPS 25)	VREF25	6800	190/-180	200	-360/1280	300/-240	210/-190	490	590	1410
ANTI-SKID OFF (FLAPS 30)	VREF30	6630	260/-180	200	-360/1280	310/-240	200/-180	490	550	1290
ENGINE FAILURE (FLAPS 20)	VREF20	5030	150/-130	140	-230/810	160/-140	150/-140	410	0	360
HYD SYS PRESS (C ONLY) (FLAPS 20)	VREF20	5690	170/-150	170	-250/860	180/-150	170/-150	510	400	920
HYD SYS PRESS (L ONLY) (FLAPS 25)	VREF25	4950	130/-130	140	-240/820	170/-140	140/-140	430	0	330
HYD SYS PRESS (L ONLY) (FLAPS 30)	VREF30	4860	200/-130	140	-240/820	170/-150	140/-140	440	0	310
HYD SYS PRESS (R ONLY) (FLAPS 25)	VREF25	4950	130/-130	140	-240/820	170/-140	140/-140	430	0	330
HYD SYS PRESS (R ONLY) (FLAPS 30)	VREF30	4860	200/-130	140	-240/820	170/-150	140/-140	440	0	310
HYD SYS PRESS (L AND C) (FLAPS 20)	VREF30+20	7270	300/-190	220	-310/1050	310/-260	230/-210	750	0	850
HYD SYS PRESS (L AND R) (FLAPS 20)	VREF30+20	6970	280/-170	210	-310/1050	330/-270	210/-210	690	0	0
HYD SYS PRESS (R AND C) (FLAPS 20)	VREF30+20	7270	300/-190	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 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	
		150000 KG LDG WT	PER 5000 KG ABV/BLW 150000 KG	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	5210	200/-130	160	-230/800	150/-130	160/-150	380	340	770
LE SLAT ASYM (FLAPS = 20)	VREF30+30	5860	220/-150	180	-250/860	180/-150	190/-170	430	430	990
LE SLAT ASYM (5 < FLAPS < 20)	VREF30+40	6280	230/-160	200	-260/890	190/-160	210/-180	430	480	1100
LE SLAT DISAGREE (FLAPS > 20)	VREF20	4800	140/-130	140	-220/770	140/-120	140/-130	380	290	670
LE SLAT DISAGREE - ALTN FLAP EXT ACOMPLISHED (FLAPS = 20)	VREF20	4800	140/-130	140	-220/770	140/-120	140/-130	380	290	670
LE SLAT DISAGREE - ALTN FLAP EXT FAILED (FLAPS = 20)	VREF30+30	5580	200/-140	170	-240/830	160/-140	180/-160	390	380	860
REVERSER UNLOCKED (FLAPS 20)	VREF30+30	6210	230/-160	190	-270/910	210/-180	200/-180	470	0	540
TE FLAP ASYM (FLAPS ≥ 20)	VREF20	4800	140/-130	140	-220/770	140/-120	140/-130	380	290	670
TE FLAP ASYM (5 < FLAPS < 20)	VREF30+20	5220	200/-140	160	-230/800	150/-130	160/-150	380	350	790
TE FLAP ASYM (FLAPS ≤ 5)	VREF30+30	5560	200/-140	170	-240/820	150/-140	180/-160	380	390	890
TE FLAP DISAGREE (FLAPS ≥ 20)	VREF20	4800	140/-130	140	-220/770	140/-120	140/-130	380	290	670
TE FLAP DISAGREE (5 < FLAPS < 20)	VREF30+20	5220	200/-140	160	-230/800	150/-130	160/-150	380	350	790
TE FLAP DISAGREE (FLAPS ≤ 5)	VREF30+30	5560	200/-140	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 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	150000 KG LDG WT	PER 5000 KG ABV/BLW 150000 KG	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	9630	240/-240	330	-530/1860	920/-630	290/-300	850	0	0
AIR/GRD SYS (FLAPS 30)	VREF30	9340	380/-240	330	-530/1850	910/-620	290/-290	860	0	0
ALL FLAPS AND SLATS UP LANDING	VREF30+50	9020	340/-250	320	-410/1450	430/-350	340/-280	520	1370	3500
ANTI-SKID OFF (FLAPS 25)	VREF25	8640	260/-250	280	-530/1980	720/-470	290/-260	560	1310	3460
ANTI-SKID OFF (FLAPS 30)	VREF30	8450	350/-250	280	-530/1980	730/-480	290/-260	570	1230	3170
ENGINE FAILURE (FLAPS 20)	VREF20	7350	240/-220	240	-390/1390	450/-350	250/-220	570	0	1150
HYD SYS PRESS (C ONLY) (FLAPS 20)	VREF20	7710	260/-230	260	-390/1390	420/-330	270/-230	630	1060	2730
HYD SYS PRESS (L ONLY) (FLAPS 25)	VREF25	7180	210/-200	230	-400/1410	470/-350	240/-210	560	0	1030
HYD SYS PRESS (L ONLY) (FLAPS 30)	VREF30	7030	300/-210	230	-400/1410	470/-360	230/-210	570	0	950
HYD SYS PRESS (R ONLY) (FLAPS 25)	VREF25	7180	210/-200	230	-400/1410	470/-350	240/-210	560	0	1030
HYD SYS PRESS (R ONLY) (FLAPS 30)	VREF30	7030	300/-210	230	-400/1410	470/-360	230/-210	570	0	950
HYD SYS PRESS (L AND C) (FLAPS 20)	VREF30+20	10360	440/-300	350	-510/1750	790/-580	370/-320	920	0	2440
HYD SYS PRESS (L AND R) (FLAPS 20)	VREF30+20	11150	440/-290	350	-570/1950	1090/-760	360/-350	960	0	0
HYD SYS PRESS (R AND C) (FLAPS 20)	VREF30+20	10360	440/-300	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 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	150000 KG LDG WT	PER 5000 KG ABV/BLW 150000 KG	PER 1000FT 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	7230	290/-210	250	-370/1320	370/-290	260/-220	490	920	2270	
LE SLAT ASYM (FLAPS = 20)	VREF30+30	8070	320/-230	280	-400/1390	410/-330	300/-250	530	1110	2770	
LE SLAT ASYM (5 < FLAPS < 20)	VREF30+40	8630	340/-250	310	-410/1430	430/-350	320/-270	540	1280	3250	
LE SLAT DISAGREE (FLAPS > 20)	VREF20	6700	220/-200	220	-360/1270	350/-280	230/-200	490	830	2040	
LE SLAT DISAGREE - ALTN FLAP EXT ACOMPLISHED (FLAPS = 20)	VREF20	6700	220/-200	220	-360/1270	350/-280	230/-200	490	830	2040	
LE SLAT DISAGREE - ALTN FLAP EXT FAILED (FLAPS = 20)	VREF30+30	7720	300/-220	260	-380/1360	380/-310	280/-240	490	1000	2460	
REVERSER UNLOCKED (FLAPS 20)	VREF30+30	8970	350/-260	300	-440/1530	550/-430	320/-280	620	0	1580	
TE FLAP ASYM (FLAPS ≥ 20)	VREF20	6700	220/-200	220	-360/1270	350/-280	230/-200	490	830	2040	
TE FLAP ASYM (5 < FLAPS < 20)	VREF30+20	7290	300/-210	250	-370/1320	370/-290	260/-220	490	950	2370	
TE FLAP ASYM (FLAPS ≤ 5)	VREF30+30	7770	300/-220	270	-380/1360	380/-310	280/-240	490	1050	2640	
TE FLAP DISAGREE (FLAPS ≥ 20)	VREF20	6700	220/-200	220	-360/1270	350/-280	230/-200	490	830	2040	
TE FLAP DISAGREE (5 < FLAPS < 20)	VREF30+20	7290	300/-210	250	-370/1320	370/-290	260/-220	490	950	2370	
TE FLAP DISAGREE (FLAPS ≤ 5)	VREF30+30	7770	300/-220	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	150000 KG LDG WT	PER 5000 KG ABV/BLW 150000 KG	PER 1000 FT ABV S.L.	PER 10KTS 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	15350	340/-300	640	-1010/3750	4210/-1740	490/-490	1060	0	0
AIR/GRD SYS (FLAPS 30)	VREF30	14810	500/-300	620	-990/3710	4120/-1700	480/-480	1050	0	0
ALL FLAPS AND SLATS UP LANDING	VREF30+50	11980	480/-370	470	-620/2260	990/-680	500/-390	640	2960	8700
ANTI-SKID OFF (FLAPS 25)	VREF25	11670	390/-370	420	-890/3770	4840/-1110	430/-410	630	3680	14100
ANTI-SKID OFF (FLAPS 30)	VREF30	11470	490/-370	410	-890/3770	4800/-1120	420/-410	630	3500	13210
ENGINE FAILURE (FLAPS 20)	VREF20	10180	360/-320	360	-620/2270	1170/-740	370/-330	700	0	2870
HYD SYS PRESS (C ONLY) (FLAPS 20)	VREF20	9910	360/-320	370	-580/2140	950/-620	380/-310	720	2220	6470
HYD SYS PRESS (L ONLY) (FLAPS 25)	VREF25	9940	300/-300	340	-640/2380	1280/-760	360/-310	670	0	2580
HYD SYS PRESS (L ONLY) (FLAPS 30)	VREF30	9740	410/-300	340	-640/2380	1290/-760	350/-310	670	0	2360
HYD SYS PRESS (R ONLY) (FLAPS 25)	VREF25	9940	300/-300	340	-640/2380	1280/-760	360/-310	670	0	2580
HYD SYS PRESS (R ONLY) (FLAPS 30)	VREF30	9740	410/-300	340	-640/2380	1290/-760	350/-310	670	0	2360
HYD SYS PRESS (L AND C) (FLAPS 20)	VREF30+20	14070	600/-420	520	-800/2860	1980/-1170	550/-450	1040	0	5800
HYD SYS PRESS (L AND R) (FLAPS 20)	VREF30+20	17420	620/-430	550	-1020/3640	3920/-1910	580/-540	1190	0	0
HYD SYS PRESS (R AND C) (FLAPS 20)	VREF30+20	14070	600/-420	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	150000 KG LDG WT	PER 5000 KG ABV/BLW 150000 KG	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	9440	400/-290	350	-550/2060	850/-560	370/-310	570	1940	5350
LE SLAT ASYM (FLAPS = 20)	VREF30+30	10430	430/-320	400	-580/2150	920/-620	420/-340	610	2250	6270
LE SLAT ASYM (5 < FLAPS < 20)	VREF30+40	11250	460/-350	440	-610/2210	970/-650	460/-370	630	2640	7610
LE SLAT DISAGREE (FLAPS > 20)	VREF20	8820	320/-280	320	-540/2010	820/-540	340/-280	580	1800	4970
LE SLAT DISAGREE - ALTN FLAP EXT ACOMPLISHED (FLAPS = 20)	VREF20	8820	320/-280	320	-540/2010	820/-540	340/-280	580	1800	4970
LE SLAT DISAGREE - ALTN FLAP EXT FAILED (FLAPS = 20)	VREF30+30	10000	410/-310	370	-570/2100	870/-580	390/-330	560	2050	5650
REVERSER UNLOCKED (FLAPS 20)	VREF30+30	12190	500/-380	440	-680/2450	1340/-860	470/-400	730	0	3680
TE FLAP ASYM (FLAPS ≥ 20)	VREF20	8820	320/-280	320	-540/2010	820/-540	340/-280	580	1800	4970
TE FLAP ASYM (5 < FLAPS < 20)	VREF30+20	9590	410/-300	360	-560/2070	850/-570	380/-310	590	2100	5920
TE FLAP ASYM (FLAPS ≤ 5)	VREF30+30	10170	420/-310	380	-570/2120	870/-590	410/-330	580	2220	6260
TE FLAP DISAGREE (FLAPS ≥ 20)	VREF20	8820	320/-280	320	-540/2010	820/-540	340/-280	580	1800	4970
TE FLAP DISAGREE (5 < FLAPS < 20)	VREF30+20	9590	410/-300	360	-560/2070	850/-570	380/-310	590	2100	5920
TE FLAP DISAGREE (FLAPS ≤ 5)	VREF30+30	10170	420/-310	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 KG)	OAT (°C)	PRESSURE ALTITUDE (1000 FT)																	
		0	2	4	0	2	4	0	2	4	0	2	4	0	2	4	0	2	4
180	0	14.9	15.8	16.7	22.4	23.9	25.4	31.3	33.4	35.5	41.2	44.0	46.8	52.0	55.6	59.2			
	10	15.4	16.4	17.3	23.2	24.7	26.3	32.3	34.5	36.7	42.6	45.5	48.5	53.8	57.6	61.3			
	20	15.9	16.9	17.9	24.0	25.6	27.1	33.4	35.7	37.9	44.0	47.1	50.1	55.6	59.5	63.4			
	30	16.4	17.4	18.4	24.7	26.4	28.0	34.5	36.8	39.1	45.5	48.6	51.7	57.4	61.5	65.5			
	40	16.7	17.7	18.8	25.2	26.9	28.6	35.3	37.7	40.1	46.5	49.8	53.0	58.9	63.0	67.2			
	50	16.9	18.0	19.0	25.7	27.4	29.1	35.9	38.4	40.8	47.5	50.8	54.1	60.2	64.5	68.7			
160	0	13.4	14.3	15.1	20.2	21.5	22.8	28.1	30.0	31.8	36.9	39.4	41.9	46.5	49.8	53.0	56.8	60.8	64.8
	10	13.9	14.8	15.6	20.9	22.3	23.6	29.1	31.0	32.9	38.2	40.8	43.4	48.2	51.5	54.9	58.9	63.0	67.1
	20	14.4	15.2	16.1	21.6	23.0	24.4	30.0	32.0	34.0	39.5	42.2	44.9	49.8	53.3	56.7	60.9	65.2	69.4
	30	14.8	15.7	16.6	22.3	23.7	25.2	31.0	33.1	35.1	40.8	43.5	46.3	51.4	55.0	58.6	62.8	67.3	71.7
	40	15.0	16.0	16.9	22.7	24.2	25.7	31.7	33.8	35.9	41.7	44.6	47.4	52.7	56.4	60.1	64.5	69.0	73.6
	50	15.2	16.2	17.1	23.1	24.6	26.1	32.2	34.4	36.6	42.5	45.5	48.4	53.8	57.6	61.4	65.9	70.7	75.4
140	0	12.0	12.8	13.5	18.0	19.1	20.3	24.9	26.5	28.1	32.6	34.7	36.9	40.9	43.7	46.5	49.9	53.3	56.8
	10	12.4	13.2	13.9	18.6	19.8	21.0	25.7	27.4	29.1	33.7	36.0	38.2	42.4	45.3	48.2	51.6	55.2	58.8
	20	12.8	13.6	14.4	19.2	20.4	21.7	26.6	28.3	30.1	34.8	37.2	39.5	43.8	46.8	49.8	53.4	57.1	60.8
	30	13.2	14.0	14.8	19.8	21.1	22.3	27.4	29.2	31.0	35.9	38.4	40.8	45.2	48.3	51.4	55.1	58.9	62.8
	40	13.4	14.3	15.1	20.2	21.5	22.8	28.0	29.9	31.7	36.7	39.2	41.7	46.3	49.5	52.7	56.5	60.5	64.4
	50	13.6	14.4	15.3	20.5	21.8	23.1	28.5	30.4	32.3	37.4	40.0	42.6	47.2	50.5	53.8	57.7	61.8	65.9
120	0	10.6	11.2	11.9	15.7	16.7	17.7	21.6	23.0	24.4	28.1	29.9	31.8	35.1	37.5	39.9	42.6	45.5	48.4
	10	11.0	11.6	12.3	16.2	17.3	18.3	22.3	23.8	25.2	29.0	31.0	32.9	36.3	38.8	41.3	44.1	47.1	50.2
	20	11.3	12.0	12.7	16.8	17.8	18.9	23.1	24.6	26.1	30.0	32.0	34.0	37.5	40.1	42.7	45.6	48.7	51.8
	30	11.6	12.4	13.1	17.3	18.4	19.5	23.8	25.3	26.9	31.0	33.0	35.1	38.7	41.4	44.0	47.0	50.3	53.5
	40	11.8	12.5	13.3	17.6	18.7	19.9	24.3	25.9	27.4	31.6	33.8	35.9	39.6	42.4	45.1	48.2	51.5	54.9
	50	11.9	12.7	13.4	17.8	19.0	20.1	24.6	26.3	27.9	32.2	34.4	36.6	40.4	43.2	46.0	49.2	52.6	56.1
100	0	9.2	9.7	10.3	13.4	14.3	15.1	18.2	19.4	20.6	23.5	25.0	26.6	29.1	31.0	33.0	35.0	37.4	39.7
	10	9.5	10.0	10.6	13.9	14.7	15.6	18.9	20.1	21.3	24.3	25.9	27.5	30.1	32.1	34.1	36.2	38.7	41.1
	20	9.8	10.4	10.9	14.3	15.2	16.1	19.5	20.7	22.0	25.1	26.7	28.4	31.1	33.2	35.3	37.4	40.0	42.5
	30	10.1	10.7	11.3	14.8	15.7	16.6	20.1	21.4	22.7	25.9	27.6	29.3	32.1	34.2	36.4	38.6	41.3	43.9
	40	10.2	10.8	11.4	15.0	16.0	16.9	20.5	21.8	23.1	26.4	28.2	29.9	32.8	35.0	37.2	39.5	42.2	44.9
	50	10.3	10.9	11.6	15.2	16.2	17.1	20.8	22.1	23.5	26.8	28.6	30.4	33.4	35.7	37.9	40.3	43.1	45.8

*To correct for wind, enter table with the brakes on speed minus one half the headwind or plus 1.5 times the tailwind.

If ground speed is used for brakes on speed, ignore wind, 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	NO SPECIAL	PROCEDURE REQUIRED	1	1	2	2	3	4	6	CAUTION	FUSE PLUG MELT ZONE
GEAR DOWN			11	15	19	24	34	44	59		
GROUND											

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

Engine Inoperative

Chapter PI-QRH

Section 52

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 THRUST

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 THRUST

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	1.41	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 KG)		OPTIMUM DRIFTDOWN SPEED (KIAS)	LEVEL OFF ALTITUDE (FT)		
START DRIFT DOWN	LEVEL OFF		ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
190	184	276	18600	17700	16900
180	174	269	20000	19100	18300
170	165	261	21300	20500	19700
160	155	254	22700	22100	21200
150	145	246	24100	23700	22800
140	136	238	25700	25400	24500
130	126	230	27200	27100	26200
120	116	221	28900	28900	28100
110	106	212	30700	30700	30000
100	97	202	32700	32700	32000

Includes APU fuel burn.

ENGINE INOP

MAX CONTINUOUS THRUST

Driftdown/LRC Cruise Range Capability

Ground to Air Miles Conversion

AIR DISTANCE (NM)					GROUND DISTANCE (NM)	AIR DISTANCE (NM)				
HEADWIND COMPONENT (KTS)						TAILWIND COMPONENT (KTS)				
100	80	60	40	20		20	40	60	80	100
274	255	239	224	211	200	190	180	172	164	157
548	510	477	448	423	400	380	361	344	329	315
819	763	715	672	634	600	570	542	517	494	473
1088	1015	951	895	845	800	760	723	690	660	633
1357	1266	1187	1118	1055	1000	950	905	864	826	792
1625	1518	1424	1340	1266	1200	1140	1086	1037	992	951
1896	1770	1661	1564	1477	1400	1330	1267	1210	1158	1110
2168	2025	1899	1787	1689	1600	1520	1448	1383	1323	1268
2445	2281	2138	2012	1900	1800	1710	1628	1554	1486	1424

Driftdown/Cruise Fuel and Time

AIR DIST (NM)	FUEL REQUIRED (1000 KG)										TIME (HR:MIN)
	WEIGHT AT START OF DRIFTDOWN (1000 KG)										
	100	110	120	130	140	150	160	170	180	190	
200	1.7	1.9	2.0	2.2	2.4	2.5	2.7	2.8	2.9	3.0	0:32
400	3.8	4.2	4.5	4.9	5.2	5.5	5.9	6.3	6.5	6.9	1:05
600	5.7	6.3	6.8	7.3	7.9	8.4	8.9	9.4	9.9	10.4	1:36
800	7.6	8.3	9.0	9.8	10.5	11.1	11.8	12.5	13.2	13.9	2:07
1000	9.5	10.4	11.2	12.1	13.0	13.8	14.7	15.6	16.4	17.3	2:38
1200	11.3	12.4	13.4	14.5	15.5	16.5	17.5	18.6	19.6	20.6	3:08
1400	13.1	14.3	15.5	16.7	17.9	19.1	20.3	21.5	22.7	23.9	3:40
1600	14.8	16.2	17.6	19.0	20.3	21.7	23.0	24.4	25.7	27.2	4:12
1800	16.6	18.1	19.6	21.2	22.7	24.2	25.7	27.2	28.7	30.3	4:45

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 KG)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
190	15700	14700	13500
185	16500	15600	14700
180	17300	16400	15600
175	18000	17200	16400
170	18800	17900	17200
165	19600	18700	18000
160	20300	19500	18800
155	21100	20400	19600
150	21900	21200	20400
145	22700	22100	21300
140	23500	23000	22200
135	24300	23900	23100
130	25200	24900	24000
125	26000	25800	25000
120	26900	26700	25900
115	27800	27600	26900
110	28700	28600	27900
105	29700	29700	29000
100	30700	30700	30000

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 KG)		PRESSURE ALTITUDE (1000 FT)								
		10	14	18	21	23	25	27	29	31
190	EPR	1.35	1.49							
	MACH	.559	.607							
	KIAS	310	313							
	FF/ENG	6670	7115							
180	EPR	1.32	1.44	1.64						
	MACH	.548	.588	.654						
	KIAS	304	303	313						
	FF/ENG	6254	6515	7071						
170	EPR	1.29	1.39	1.56						
	MACH	.538	.570	.628						
	KIAS	298	294	300						
	FF/ENG	5879	5999	6427						
160	EPR	1.26	1.35	1.49	1.65					
	MACH	.528	.556	.603	.657					
	KIAS	292	286	288	297					
	FF/ENG	5521	5547	5795	6219					
150	EPR	1.24	1.31	1.43	1.57					
	MACH	.517	.543	.581	.628					
	KIAS	286	279	277	283					
	FF/ENG	5167	5145	5265	5573					
140	EPR	1.21	1.28	1.37	1.49	1.60				
	MACH	.505	.532	.562	.600	.635				
	KIAS	279	273	268	270	275				
	FF/ENG	4822	4780	4784	4977	5237				
130	EPR	1.19	1.25	1.33	1.42	1.51	1.62			
	MACH	.493	.519	.547	.576	.604	.640			
	KIAS	273	267	260	258	261	266			
	FF/ENG	4492	4427	4366	4460	4637	4891			
120	EPR	1.17	1.22	1.29	1.36	1.42	1.52	1.63		
	MACH	.480	.505	.533	.556	.577	.607	.644		
	KIAS	266	259	253	249	249	251	257		
	FF/ENG	4178	4078	3996	4005	4119	4292	4534		
110	EPR	1.15	1.19	1.25	1.31	1.36	1.43	1.52	1.64	
	MACH	.466	.491	.518	.539	.555	.577	.607	.645	
	KIAS	258	252	246	241	239	239	241	246	
	FF/ENG	3866	3754	3646	3606	3655	3771	3929	4158	
100	EPR	1.13	1.16	1.21	1.26	1.31	1.36	1.43	1.52	1.64
	MACH	.448	.477	.502	.523	.538	.554	.575	.605	.643
	KIAS	248	244	238	234	231	228	228	230	235
	FF/ENG	3508	3456	3318	3262	3261	3305	3405	3552	3759

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
290	266	245	228	213	200	191	182	174	167	160
581	534	492	457	427	400	381	364	348	334	321
873	802	739	686	641	600	572	546	522	501	482
1166	1071	987	916	855	800	763	728	697	668	642
1461	1341	1235	1146	1069	1000	953	909	870	833	801
1756	1611	1483	1375	1283	1200	1144	1092	1044	1000	960
2052	1882	1732	1605	1497	1400	1334	1273	1217	1165	1119
2349	2153	1981	1836	1711	1600	1524	1453	1388	1330	1277
2647	2426	2231	2067	1926	1800	1714	1634	1561	1495	1435

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT)									
	10		14		18		22		26	
	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)
200	2.7	0:42	2.4	0:40	2.2	0:39	2.0	0:38	1.9	0:35
400	5.7	1:19	5.3	1:17	4.9	1:14	4.7	1:10	4.6	1:05
600	8.7	1:57	8.1	1:53	7.6	1:49	7.4	1:43	7.3	1:34
800	11.6	2:35	10.9	2:30	10.3	2:24	10.0	2:16	9.9	2:04
1000	14.5	3:14	13.6	3:07	12.9	3:00	12.5	2:49	12.5	2:34
1200	17.3	3:52	16.3	3:44	15.4	3:36	15.0	3:23	15.0	3:05
1400	20.1	4:31	18.9	4:21	17.9	4:12	17.5	3:58	17.5	3:37
1600	22.9	5:11	21.6	4:59	20.4	4:48	19.9	4:32	19.9	4:08
1800	25.6	5:50	24.1	5:37	22.9	5:25	22.3	5:07	22.3	4:41

Fuel Required Adjustment (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG)				
	100	120	140	160	180
2	-0.3	-0.1	0.0	0.2	0.4
4	-0.6	-0.3	0.0	0.6	1.0
6	-1.0	-0.5	0.0	0.9	1.6
8	-1.3	-0.6	0.0	1.2	2.3
10	-1.7	-0.8	0.0	1.5	2.9
12	-2.1	-1.0	0.0	1.8	3.5
14	-2.4	-1.2	0.0	2.1	4.1
16	-2.8	-1.3	0.0	2.4	4.7
18	-3.2	-1.5	0.0	2.7	5.3
20	-3.6	-1.7	0.0	3.0	5.9
22	-4.0	-1.8	0.0	3.2	6.6
24	-4.4	-2.0	0.0	3.5	7.2
26	-4.7	-2.2	0.0	3.8	7.8

Includes APU fuel burn.

ENGINE INOP

MAX CONTINUOUS THRUST

Holding

Flaps Up

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)						
		1500	5000	10000	15000	20000	25000	30000
190	EPR	1.19	1.24	1.33	1.49			
	KIAS	259	259	259	259			
	FF/ENG	5820	5860	6040	6480			
180	EPR	1.18	1.22	1.30	1.44	1.69		
	KIAS	251	251	251	252	254		
	FF/ENG	5490	5500	5630	5980	6490		
170	EPR	1.16	1.20	1.27	1.39	1.61		
	KIAS	244	244	244	245	246		
	FF/ENG	5160	5160	5240	5490	5900		
160	EPR	1.15	1.18	1.25	1.35	1.53		
	KIAS	236	236	236	238	239		
	FF/ENG	4830	4820	4870	5030	5370		
150	EPR	1.13	1.16	1.22	1.31	1.47		
	KIAS	228	228	229	230	231		
	FF/ENG	4510	4500	4530	4600	4870		
140	EPR	1.12	1.15	1.20	1.28	1.41	1.65	
	KIAS	222	222	222	222	223	225	
	FF/ENG	4200	4180	4200	4220	4400	4850	
130	EPR	1.11	1.13	1.18	1.24	1.35	1.55	
	KIAS	217	217	217	217	217	217	
	FF/ENG	3900	3880	3890	3870	3960	4340	
120	EPR	1.09	1.11	1.16	1.21	1.30	1.47	
	KIAS	211	211	211	211	211	211	
	FF/ENG	3600	3580	3590	3560	3560	3870	
110	EPR	1.08	1.10	1.14	1.19	1.26	1.39	1.63
	KIAS	205	205	205	205	205	205	205
	FF/ENG	3300	3290	3290	3270	3230	3430	3790
100	EPR	1.07	1.09	1.12	1.16	1.22	1.33	1.52
	KIAS	199	199	199	199	199	199	199
	FF/ENG	3010	2990	3000	2980	2920	3030	3320

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

Intentionally
Blank



Performance Inflight - QRH

Chapter PI-QRH

Gear Down

Section 53

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	0.01	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	-0.03	-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	-0.05	-0.06	-0.07	-0.07	

GEAR DOWN

Long Range Cruise Altitude Capability

WEIGHT (1000 KG)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
190	18500	18500	16600
185	19500	19500	17600
180	20500	20400	18700
175	21300	21300	19700
170	22200	22200	20700
165	23200	23100	21700
160	24100	24100	22700
155	25100	25000	23700
150	26000	25900	24700
145	26900	26900	25700
140	27900	27900	26700
135	28900	28900	27700
130	29800	29800	28600
125	30700	30600	29600
120	31600	31600	30600
115	32700	32700	31600
110	33600	33500	32800
105	34400	34400	33700
100	35200	35200	34600
95	36000	36000	35400
90	36800	36800	36300



GEAR DOWN

Long Range Cruise Control

WEIGHT (1000 KG)		PRESSURE ALTITUDE (1000 FT)										
		10	14	18	21	23	25	27	29	31	33	35
190	EPR	1.25	1.32	1.43								
	MACH	.472	.506	.545								
	KIAS	261	260	259								
	FF/ENG	4961	5001	5116								
180	EPR	1.23	1.30	1.39								
	MACH	.462	.495	.532								
	KIAS	255	254	253								
	FF/ENG	4683	4690	4762								
170	EPR	1.21	1.27	1.35	1.45							
	MACH	.451	.482	.518	.549							
	KIAS	249	247	246	246							
	FF/ENG	4420	4386	4405	4512							
160	EPR	1.19	1.24	1.32	1.40	1.47						
	MACH	.440	.469	.504	.534	.555						
	KIAS	243	240	239	239	239						
	FF/ENG	4159	4093	4079	4162	4261						
150	EPR	1.17	1.22	1.29	1.36	1.42	1.49					
	MACH	.428	.457	.490	.518	.539	.560					
	KIAS	237	234	232	231	232	231					
	FF/ENG	3896	3827	3769	3809	3907	4007					
140	EPR	1.16	1.20	1.26	1.32	1.37	1.43	1.51				
	MACH	.415	.445	.475	.503	.522	.543	.565				
	KIAS	229	228	225	224	224	224	223				
	FF/ENG	3623	3576	3480	3481	3555	3655	3746				
130	EPR	1.14	1.18	1.23	1.28	1.32	1.38	1.45	1.53			
	MACH	.402	.431	.461	.486	.505	.525	.547	.569			
	KIAS	222	221	218	217	216	216	216	216			
	FF/ENG	3368	3327	3221	3188	3221	3299	3390	3483			
120	EPR	1.13	1.16	1.20	1.25	1.28	1.33	1.39	1.46	1.55		
	MACH	.388	.415	.446	.469	.487	.506	.527	.549	.572		
	KIAS	214	212	211	209	209	208	208	208	207		
	FF/ENG	3117	3061	2975	2917	2926	2964	3034	3120	3209		
110	EPR	1.11	1.14	1.18	1.22	1.25	1.29	1.33	1.39	1.46	1.56	
	MACH	.371	.400	.430	.453	.469	.487	.506	.528	.550	.574	
	KIAS	205	204	203	202	200	200	199	199	199	199	
	FF/ENG	2850	2814	2736	2674	2658	2669	2699	2767	2848	2929	
100	EPR	1.10	1.12	1.16	1.19	1.21	1.24	1.28	1.33	1.39	1.46	1.56
	MACH	.356	.383	.412	.436	.451	.467	.486	.505	.527	.549	.573
	KIAS	196	196	194	194	193	191	191	190	190	190	190
	FF/ENG	2600	2569	2488	2444	2421	2406	2410	2435	2497	2571	2646

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
320	287	259	236	217	200	189	179	170	161	154
646	578	520	473	434	400	378	357	339	323	308
976	872	782	711	652	600	567	536	509	484	462
1310	1168	1046	949	870	800	755	714	677	644	615
1649	1468	1312	1189	1088	1000	943	892	845	804	768
1992	1770	1580	1430	1307	1200	1132	1070	1014	964	920
2340	2076	1850	1671	1526	1400	1320	1247	1181	1122	1071
2694	2386	2122	1915	1746	1600	1508	1424	1348	1281	1222
3053	2698	2396	2159	1967	1800	1696	1601	1515	1439	1372
3417	3014	2671	2403	2187	2000	1883	1777	1682	1596	1522

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT)									
	10		14		18		22		28	
	FUEL	TIME	FUEL	TIME	FUEL	TIME	FUEL	TIME	FUEL	TIME
	(1000 KG)	(HR:MIN)	(1000 KG)	(HR:MIN)	(1000 KG)	(HR:MIN)	(1000 KG)	(HR:MIN)	(1000 KG)	(HR:MIN)
200	5.0	0:49	4.5	0:47	4.0	0:45	3.7	0:44	3.4	0:41
400	10.3	1:36	9.5	1:31	8.6	1:27	8.1	1:23	7.7	1:17
600	15.5	2:23	14.4	2:16	13.2	2:09	12.3	2:03	11.9	1:53
800	20.6	3:11	19.1	3:01	17.6	2:52	16.4	2:43	15.9	2:30
1000	25.6	4:00	23.8	3:47	21.9	3:36	20.5	3:24	19.8	3:07
1200	30.4	4:50	28.4	4:34	26.1	4:20	24.5	4:06	23.7	3:45
1400	35.2	5:41	32.9	5:22	30.3	5:04	28.3	4:48	27.4	4:24
1600	39.8	6:34	37.2	6:11	34.4	5:50	32.1	5:31	31.0	5:03
1800	44.4	7:27	41.5	7:00	38.3	6:36	35.9	6:14	34.4	5:42
2000	48.8	8:21	45.7	7:51	42.3	7:24	39.5	6:58	37.8	6:22

Fuel Required Adjustment (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG)				
	100	120	140	160	180
5	-0.7	-0.4	0.0	0.6	1.2
10	-1.6	-0.8	0.0	1.3	2.6
15	-2.4	-1.2	0.0	1.9	3.9
20	-3.2	-1.6	0.0	2.6	5.3
25	-4.0	-2.0	0.0	3.2	6.6
30	-4.9	-2.4	0.0	3.9	7.9
35	-5.6	-2.8	0.0	4.6	9.2
40	-6.4	-3.2	0.0	5.2	10.5
45	-7.2	-3.7	0.0	5.9	11.8
50	-8.0	-4.1	0.0	6.6	13.1
55	-8.7	-4.5	0.0	7.2	14.4
60	-9.5	-4.9	0.0	7.9	15.7

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	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 KG)		PRESSURE ALTITUDE (FT)						
		1500	5000	10000	15000	20000	25000	30000
190	EPR	1.14	1.17	1.24	1.33			
	KIAS	249	249	249	249			
	FF/ENG	4930	4890	4910	4980			
180	EPR	1.13	1.16	1.22	1.30	1.43		
	KIAS	241	241	241	241	241		
	FF/ENG	4640	4600	4600	4630	4770		
170	EPR	1.12	1.15	1.20	1.27	1.39		
	KIAS	234	234	234	234	234		
	FF/ENG	4360	4320	4300	4300	4390		
160	EPR	1.11	1.13	1.18	1.24	1.35	1.52	
	KIAS	226	226	226	226	226	226	
	FF/ENG	4080	4040	4010	3980	4020	4300	
150	EPR	1.10	1.12	1.16	1.22	1.31	1.46	
	KIAS	218	218	218	218	218	218	
	FF/ENG	3790	3750	3730	3680	3660	3910	
140	EPR	1.09	1.11	1.15	1.20	1.28	1.41	
	KIAS	212	212	212	212	212	212	
	FF/ENG	3560	3530	3500	3450	3400	3580	
130	EPR	1.08	1.10	1.13	1.18	1.25	1.36	1.55
	KIAS	207	207	207	207	207	207	207
	FF/ENG	3320	3300	3280	3230	3160	3270	3520
120	EPR	1.07	1.09	1.12	1.16	1.22	1.32	1.48
	KIAS	201	201	201	201	201	201	201
	FF/ENG	3100	3070	3050	3000	2920	2970	3190
110	EPR	1.06	1.08	1.11	1.14	1.19	1.28	1.41
	KIAS	195	195	195	195	195	195	195
	FF/ENG	2880	2840	2830	2780	2700	2720	2860
100	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	2670	2630	2610	2570	2500	2490	2560

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

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Performance Inflight - QRH

Chapter PI-QRH

Gear Down, Engine Inop

Section 54

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 KG)		OPTIMUM DRIFTDOWN SPEED (KIAS)	LEVEL OFF ALTITUDE (FT)		
START DRIFT DOWN	LEVEL OFF		ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
170	161	230	3200		
160	152	222	6000	4200	2300
150	142	215	8500	6900	5100
140	133	210	11000	9500	7800
130	123	205	13500	12100	10500
120	114	199	16200	14700	13300
110	105	193	18700	17600	16200
100	96	187	20900	20200	19000

Includes APU fuel burn.

Long Range Cruise Altitude Capability

100 ft/min residual rate of climb

WEIGHT (1000 KG)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
155	3000		
150	4700		
145	6400	3800	
140	8100	5700	3000
135	9800	7500	5000
130	11400	9400	7000
125	12900	11200	8900
120	14400	12900	10800
115	16000	14600	12800
110	17500	16000	14600
105	18800	17500	16100
100	20100	19000	17600
95	21200	20400	19200
90	22300	21700	20700

GEAR DOWN**ENGINE INOP****MAX CONTINUOUS THRUST****Long Range Cruise Control**

WEIGHT (1000 KG)		PRESSURE ALTITUDE (1000 FT)							
		6	8	10	12	14	16	18	20
150	EPR	1.45							
	MACH	.383							
	KIAS	228							
	FF/ENG	7577							
140	EPR	1.40	1.45	1.52					
	MACH	.375	.384	.394					
	KIAS	223	220	217					
	FF/ENG	7003	7032	7128					
130	EPR	1.37	1.41	1.46	1.53				
	MACH	.365	.375	.384	.395				
	KIAS	217	215	212	210				
	FF/ENG	6464	6465	6489	6590				
120	EPR	1.33	1.36	1.41	1.46	1.53	1.63		
	MACH	.354	.365	.375	.384	.395	.409		
	KIAS	211	209	207	204	202	201		
	FF/ENG	5951	5930	5931	5966	6046	6250		
110	EPR	1.29	1.32	1.36	1.40	1.45	1.53	1.64	
	MACH	.342	.353	.363	.373	.383	.397	.413	
	KIAS	203	202	200	198	196	195	195	
	FF/ENG	5446	5422	5405	5408	5416	5541	5742	
100	EPR	1.25	1.28	1.32	1.35	1.39	1.45	1.54	1.64
	MACH	.328	.339	.350	.361	.371	.385	.400	.417
	KIAS	195	194	193	192	190	189	189	189
	FF/ENG	4937	4921	4900	4890	4858	4919	5043	5244

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	94	89	84	79	75
336	297	264	239	218	200	187	175	165	156	149
508	449	399	359	328	300	281	263	247	234	222
681	601	533	480	437	400	374	350	329	311	295
855	754	667	600	547	500	467	438	411	388	368
1030	908	803	722	657	600	560	524	493	465	441
1207	1062	938	843	766	700	653	611	574	541	513
1384	1217	1075	964	876	800	746	698	655	618	586
1563	1372	1211	1086	986	900	839	785	737	694	658
1742	1529	1348	1208	1097	1000	933	872	818	771	730

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT)							
	6		10		14		18	
	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)
100	2.6	0:28	2.4	0:27	2.2	0:26	2.0	0:26
200	5.5	0:53	5.2	0:51	5.0	0:49	4.9	0:47
300	8.3	1:18	7.9	1:15	7.8	1:12	7.7	1:09
400	11.1	1:43	10.6	1:40	10.5	1:36	10.5	1:31
500	13.8	2:09	13.3	2:04	13.2	1:59	13.2	1:54
600	16.5	2:34	15.9	2:29	15.8	2:23	15.8	2:16
700	19.2	3:00	18.4	2:54	18.3	2:47	18.4	2:39
800	21.8	3:26	21.0	3:19	20.8	3:11	20.9	3:02
900	24.4	3:53	23.4	3:44	23.2	3:35	23.4	3:25
1000	26.9	4:20	25.9	4:10	25.6	4:00	25.8	3:48

Fuel Required Adjustment (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG)				
	100	120	140	160	180
2	-0.3	-0.2	0.0	0.2	0.4
4	-0.7	-0.4	0.0	0.5	1.0
6	-1.1	-0.6	0.0	0.8	1.5
8	-1.5	-0.7	0.0	1.0	2.0
10	-1.8	-0.9	0.0	1.3	2.6
12	-2.2	-1.1	0.0	1.6	3.1
14	-2.6	-1.3	0.0	1.9	3.7
16	-2.9	-1.5	0.0	2.2	4.2
18	-3.3	-1.7	0.0	2.5	4.8
20	-3.7	-1.9	0.0	2.8	5.4
22	-4.1	-2.1	0.0	3.1	6.0
24	-4.4	-2.2	0.0	3.4	6.5
26	-4.8	-2.4	0.0	3.7	7.1
28	-5.2	-2.6	0.0	4.0	7.7

Includes APU fuel burn.

GEAR DOWN**ENGINE INOP****MAX CONTINUOUS THRUST****Holding****Flaps Up**

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)				
		1500	5000	10000	15000	20000
170	EPR	1.40				
	KIAS	234				
	FF/ENG	8600				
160	EPR	1.36	1.44			
	KIAS	226	226			
	FF/ENG	7960	8190			
150	EPR	1.32	1.40			
	KIAS	218	218			
	FF/ENG	7350	7460			
140	EPR	1.29	1.36	1.50		
	KIAS	212	212	212		
	FF/ENG	6850	6910	7260		
130	EPR	1.27	1.32	1.44		
	KIAS	207	207	207		
	FF/ENG	6370	6400	6610		
120	EPR	1.24	1.29	1.39	1.57	
	KIAS	201	201	201	201	
	FF/ENG	5900	5900	6010	6440	
110	EPR	1.21	1.26	1.35	1.49	
	KIAS	195	195	195	195	
	FF/ENG	5440	5430	5480	5730	
100	EPR	1.19	1.23	1.31	1.42	1.64
	KIAS	189	189	189	189	189
	FF/ENG	5000	4980	5000	5110	5510

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

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Performance Inflight - QRH**Chapter PI-QRH****Text****Section 55**

Introduction

This chapter contains information to supplement performance data from the Flight Management Computer (FMC). In addition, sufficient inflight data is provided to complete a flight with the FMC inoperative. In the event of conflict between data presented in this chapter and that contained in the approved Airplane Flight Manual, the Flight Manual shall always take precedence.

General**Flight with Unreliable Airspeed / Turbulent Air Penetration**

Pitch attitude and average 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

Section 60

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 KG)				
		100	120	140	160	180
40000	PITCH ATT	4.0	4.0			
	V/S (FT/MIN)	1500	900			
30000	PITCH ATT	4.0	4.0	3.5	3.5	4.0
	V/S (FT/MIN)	2600	2000	1600	1200	900
20000	PITCH ATT	6.5	6.0	6.0	5.5	5.5
	V/S (FT/MIN)	4000	3200	2600	2100	1700
10000	PITCH ATT	10.0	8.5	8.0	7.5	7.5
	V/S (FT/MIN)	5300	4300	3500	3000	2500
SEA LEVEL	PITCH ATT	12.5	11.0	10.0	9.5	9.0
	V/S (FT/MIN)	6000	4900	4100	3500	3000

Cruise (.78/290)**Flaps Up, Set Thrust for Level Flight**

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG)				
		100	120	140	160	180
40000	PITCH ATT	2.0	2.5	3.5		
	EPR	1.20	1.31	1.52		
	(Alt Mode %N1)	(82.7)	(86.3)	(93.0)		
35000	PITCH ATT	1.5	2.0	2.5	3.0	3.5
	EPR	1.11	1.16	1.23	1.34	1.53
	(Alt Mode %N1)	(79.8)	(81.8)	(84.3)	(87.8)	(93.7)
30000	PITCH ATT	1.0	1.5	2.0	2.0	2.5
	EPR	1.06	1.09	1.13	1.18	1.24
	(Alt Mode %N1)	(78.8)	(80.2)	(81.9)	(83.8)	(86.0)
25000	PITCH ATT	1.0	1.5	2.0	2.5	3.0
	EPR	1.02	1.04	1.07	1.10	1.14
	(Alt Mode %N1)	(75.1)	(76.5)	(78.2)	(80.1)	(82.2)
20000	PITCH ATT	1.0	1.5	2.0	2.5	3.0
	EPR	1.00	1.01	1.03	1.06	1.08
	(Alt Mode %N1)	(72.5)	(73.4)	(74.7)	(76.4)	(78.4)
15000	PITCH ATT	1.0	1.5	2.0	2.5	3.0
	EPR	0.99	1.00	1.01	1.03	1.05
	(Alt Mode %N1)	(70.1)	(70.5)	(71.4)	(73.0)	(74.8)

Flight With Unreliable Airspeed / Turbulent Air Penetration

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

Descent (.78/290)

Flaps Up, Set Idle Thrust

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG)				
		100	120	140	160	180
40000	PITCH ATT	-1.0	-0.5	0.0	0.5	0.5
	V/S (FT/MIN)	-2400	-2400	-2500	-3000	-3500
30000	PITCH ATT	-2.5	-2.0	-1.0	-0.5	0.0
	V/S (FT/MIN)	-2800	-2500	-2300	-2200	-2100
20000	PITCH ATT	-3.0	-2.0	-1.0	-0.5	0.0
	V/S (FT/MIN)	-2600	-2300	-2100	-2000	-1900
10000	PITCH ATT	-3.0	-2.0	-1.0	-0.5	0.0
	V/S (FT/MIN)	-2300	-2000	-1900	-1800	-1700
SEA LEVEL	PITCH ATT	-3.0	-2.0	-1.0	-0.5	0.0
	V/S (FT/MIN)	-2000	-1700	-1600	-1500	-1500

Holding (VREF30 + 80)

Flaps Up, Set Thrust for Level Flight

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG)				
		100	120	140	160	180
10000	PITCH ATT	4.0	4.5	4.5	5.0	5.0
	EPR	1.01	1.02	1.04	1.05	1.05
	(Alt Mode %N1)	(54.8)	(59.3)	(63.5)	(67.1)	(70.1)
	KIAS	199	211	222	236	251
5000	PITCH ATT	4.0	4.5	5.0	5.0	4.5
	EPR	1.00	1.01	1.02	1.03	1.04
	(Alt Mode %N1)	(51.3)	(55.1)	(59.2)	(62.7)	(66.2)
	KIAS	199	211	222	236	251

Terminal Area (5000 FT)

Set Thrust for Level Flight

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG)				
		100	120	140	160	180
FLAPS UP (VREF30+80) (GEAR UP)	PITCH ATT	4.0	4.5	5.0	5.0	5.0
	EPR	1.02	1.03	1.04	1.05	1.06
	(Alt Mode %N1)	(51.9)	(56.0)	(60.2)	(63.8)	(67.2)
	KIAS	199	211	222	236	251
FLAPS 1 (VREF30+60) (GEAR UP)	PITCH ATT	6.0	6.5	6.5	6.5	6.5
	EPR	1.04	1.05	1.06	1.07	1.08
	(Alt Mode %N1)	(52.3)	(57.6)	(61.7)	(65.2)	(68.5)
	KIAS	179	191	202	216	231
FLAPS 5 (VREF30+40) (GEAR UP)	PITCH ATT	4.5	4.5	5.0	4.5	4.5
	EPR	1.05	1.07	1.08	1.10	1.11
	(Alt Mode %N1)	(55.2)	(60.2)	(64.2)	(67.9)	(71.3)
	KIAS	159	171	182	196	211
FLAPS 15 (VREF30+20) (GEAR UP)	PITCH ATT	5.5	5.5	6.0	6.0	5.5
	EPR	1.07	1.09	1.11	1.12	1.14
	(Alt Mode %N1)	(56.8)	(61.7)	(66.0)	(69.6)	(73.0)
	KIAS	139	151	162	176	191
FLAPS 20 (VREF30+20) (GEAR DOWN)	PITCH ATT	4.0	4.5	4.5	4.0	3.5
	EPR	1.10	1.12	1.15	1.18	1.21
	(Alt Mode %N1)	(63.3)	(68.0)	(72.3)	(76.5)	(80.3)
	KIAS	139	151	162	176	191

Flight With Unreliable Airspeed / Turbulent Air Penetration

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

Final Approach (1500 FT)**Gear Down, Set Thrust for a 3° Glideslope**

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG)				
		100	120	140	160	180
FLAPS 20 (VREF20 + 10)	PITCH ATT	1.5	1.5	1.5	1.5	1.5
	EPR	1.03	1.04	1.04	1.05	1.05
	(Alt Mode %N1)	(43.3)	(47.9)	(52.1)	(55.7)	(59.2)
	KIAS	138	150	162	172	184

Go-Around (VREF 30 + 20)**Flaps 20, Gear Up, Set Go-Around Thrust****Normal Mode EEC**

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG)				
		100	120	140	160	180
10000	PITCH ATT	18.5	15.5	13.0	11.0	9.0
	V/S (FT/MIN)	4100	3400	2800	2400	2000
	KIAS	139	151	162	176	191
5000	PITCH ATT	23.0	18.5	16.0	13.0	11.0
	V/S (FT/MIN)	4800	4100	3500	3000	2700
	KIAS	139	151	162	176	191
SEA LEVEL	PITCH ATT	26.5	21.5	18.5	15.5	13.0
	V/S (FT/MIN)	5400	4600	3900	3500	3100
	KIAS	139	151	162	176	191

Alternate Mode EEC

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG)				
		100	120	140	160	180
10000	PITCH ATT	17.5	14.5	12.0	10.0	8.5
	V/S (FT/MIN)	3800	3100	2600	2100	1800
	KIAS	139	151	162	176	191
5000	PITCH ATT	21.5	17.5	15.0	12.5	10.5
	V/S (FT/MIN)	4500	3800	3200	2800	2400
	KIAS	139	151	162	176	191
SEA LEVEL	PITCH ATT	24.5	20.0	17.0	14.5	12.0
	V/S (FT/MIN)	4900	4200	3600	3200	2800
	KIAS	139	151	162	176	191



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	0.01	0.02	0.02
ENGINE ANTI-ICE ON	-0.01	-0.02	-0.02	-0.03	-0.03	-0.03	-0.03	-0.04	-0.04
ENGINE & WING ANTI-ICE ON	-0.02	-0.03	-0.04	-0.05	-0.05	-0.05	-0.05	-0.07	-0.07



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VREF (KIAS)

WEIGHT (1000 KG)	FLAPS		
	30	25	20
190	179	170	179
180	171	166	174
170	164	161	168
160	156	156	162
150	148	151	157
140	142	146	152
130	137	140	146
120	131	135	140
110	125	129	134
100	119	123	128

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Advisory Information

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Section 61

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	150000 KG LANDING WEIGHT	PER 5000 KG ABV/ BLW 150000 KG	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	3220	110/-70	80	-130	440	50	-40	80	-80	250	70	140
MAX AUTO	5370	130/-130	150	-250	840	0	0	160	-160	600	0	0
AUTOBRAKE 4	5540	140/-140	160	-260	880	0	0	160	-160	630	0	0
AUTOBRAKE 3	6370	160/-160	190	-300	1040	0	0	190	-190	740	0	0
AUTOBRAKE 2	7150	190/-190	220	-350	1190	30	-110	230	-210	660	60	60
AUTOBRAKE 1	7840	220/-220	260	-400	1370	170	-220	270	-230	580	430	520

Good Reported Braking Action

MAX MANUAL	4460	110/-100	130	-210	740	130	-110	130	-120	350	230	520
MAX AUTO	5380	130/-130	150	-250	860	20	-10	160	-160	600	20	80
AUTOBRAKE 4	5540	140/-140	160	-260	880	10	0	160	-160	630	10	50
AUTOBRAKE 3	6370	160/-160	190	-300	1040	0	0	190	-190	740	0	0

Medium Reported Braking Action

MAX MANUAL	6140	170/-160	200	-330	1220	310	-240	210	-180	450	640	1540
MAX AUTO	6140	170/-160	200	-330	1220	300	-170	210	-180	570	610	1510
AUTOBRAKE 4	6190	170/-160	200	-340	1220	270	-150	210	-190	620	550	1450
AUTOBRAKE 3	6710	180/-180	210	-360	1280	170	-90	220	-210	740	350	1080

Poor Reported Braking Action

MAX MANUAL	8000	240/-230	280	-500	1910	720	-460	310	-250	520	1400	3700
MAX AUTO	8000	240/-230	280	-500	1910	720	-460	310	-250	510	1400	3710
AUTOBRAKE 4	8000	240/-230	280	-500	1910	720	-460	310	-250	510	1400	3710
AUTOBRAKE 3	8010	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	150000 KG LANDING WEIGHT	PER 5000 KG ABV/ BLW 150000 KG	PER 1000 FT ABOVE SEA LEVEL	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 10 KTS ABOVE VREF30	ONE REV	NO REV
MAX MANUAL	3170	140/-70	80	-130	440	50	-50	80	-80	260	60	130
MAX AUTO	5220	210/-140	150	-240	830	0	0	150	-150	600	0	0
AUTOBRAKE 4	5380	220/-140	150	-250	870	0	0	160	-160	620	0	0
AUTOBRAKE 3	6180	260/-170	180	-300	1020	0	0	190	-190	730	0	0
AUTOBRAKE 2	6970	280/-200	210	-350	1180	10	-100	220	-210	670	30	30
AUTOBRAKE 1	7690	300/-220	250	-400	1360	160	-210	260	-230	580	350	440

Good Reported Braking Action

MAX MANUAL	4400	160/-110	120	-210	740	130	-110	130	-120	350	220	480
MAX AUTO	5230	210/-140	150	-250	850	20	-10	150	-150	600	20	80
AUTOBRAKE 4	5390	220/-140	160	-250	870	10	0	160	-160	620	10	50
AUTOBRAKE 3	6180	260/-170	180	-300	1020	0	0	190	-190	730	0	0

Medium Reported Braking Action

MAX MANUAL	6070	230/-170	200	-330	1220	320	-250	210	-180	450	600	1430
MAX AUTO	6070	250/-170	190	-330	1220	310	-190	210	-180	550	600	1420
AUTOBRAKE 4	6080	250/-170	200	-330	1220	290	-160	200	-190	600	550	1380
AUTOBRAKE 3	6550	280/-190	210	-350	1280	180	-100	210	-200	730	360	1030

Poor Reported Braking Action

MAX MANUAL	7920	310/-240	280	-500	1920	730	-470	300	-250	520	1320	3420
MAX AUTO	7920	310/-240	280	-500	1910	730	-470	300	-250	520	1320	3430
AUTOBRAKE 4	7920	310/-240	280	-500	1910	730	-470	300	-250	520	1320	3430
AUTOBRAKE 3	7920	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	150000 KG LDG WT	PER 5000 KG ABV/BLW 150000 KG	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	4180	90/-90	110	-170/560	80/-70	100/-100	420	0	0
AIR/GRD SYS (FLAPS 30)	VREF30	4100	160/-100	110	-170/570	90/-80	100/-100	440	0	0
ALL FLAPS AND SLATS UP LANDING	VREF30+50	4580	260/-110	130	-170/570	80/-70	130/-130	330	180	390
ANTI-SKID OFF (FLAPS 25)	VREF25	6020	160/-150	170	-300/1040	200/-170	170/-160	450	380	870
ANTI-SKID OFF (FLAPS 30)	VREF30	5870	230/-160	160	-290/1030	200/-170	170/-160	450	350	800
ENGINE FAILURE (FLAPS 20)	VREF20	3480	150/-80	90	-140/470	60/-50	90/-90	280	0	90
HYD SYS PRESS (C ONLY) (FLAPS 20)	VREF20	4180	110/-100	100	-160/540	70/-60	110/-100	390	120	260
HYD SYS PRESS (L ONLY) (FLAPS 25)	VREF25	3460	90/-80	90	-140/480	60/-60	90/-80	300	0	90
HYD SYS PRESS (L ONLY) (FLAPS 30)	VREF30	3400	130/-80	90	-140/480	60/-60	90/-80	310	0	80
HYD SYS PRESS (R ONLY) (FLAPS 25)	VREF25	3830	90/-90	100	-160/560	80/-70	100/-100	340	0	130
HYD SYS PRESS (R ONLY) (FLAPS 30)	VREF30	3760	150/-90	100	-160/560	80/-80	100/-100	350	0	130
HYD SYS PRESS (L AND C) (FLAPS 20)	VREF30+20	5140	200/-120	140	-190/640	120/-110	140/-140	570	0	250
HYD SYS PRESS (L AND R) (FLAPS 20)	VREF30+20	5110	200/-120	140	-210/700	150/-130	150/-140	520	0	0
HYD SYS PRESS (R AND C) (FLAPS 20)	VREF30+20	6260	260/-150	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 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	150000 KG LDG WT	PER 5000 KG ABV/BLW 150000 KG	PER 1000FT 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	3710	180/-80	100	-140/490	60/-50	100/-90	280	100	220
LE SLAT ASYM (FLAPS = 20)	VREF30+30	4180	170/-90	110	-160/520	70/-60	120/-110	310	140	290
LE SLAT ASYM (5 < FLAPS < 20)	VREF30+40	4490	170/-100	120	-160/540	80/-70	130/-120	320	160	340
LE SLAT DISAGREE (FLAPS > 20)	VREF20	3420	140/-80	80	-130/460	50/-50	90/-80	270	80	180
LE SLAT DISAGREE - ALTN FLAP EXT ACOMPLISHED (FLAPS = 20)	VREF20	3420	140/-80	80	-130/460	50/-50	90/-80	270	80	180
LE SLAT DISAGREE - ALTN FLAP EXT FAILED (FLAPS = 20)	VREF30+30	3980	180/-90	100	-150/500	60/-60	110/-100	280	120	250
REVERSER UNLOCKED (FLAPS 20)	VREF30+30	4280	180/-100	110	-160/540	80/-70	120/-110	330	0	150
TE FLAP ASYM (FLAPS ≥ 20)	VREF20	3420	140/-80	80	-130/460	50/-50	90/-80	270	80	180
TE FLAP ASYM (5 < FLAPS < 20)	VREF30+20	3710	180/-80	100	-140/490	60/-50	100/-90	280	100	220
TE FLAP ASYM (FLAPS ≤ 5)	VREF30+30	3930	220/-90	100	-150/500	60/-60	110/-100	270	110	250
TE FLAP DISAGREE (FLAPS ≥ 20)	VREF20	3420	140/-80	80	-130/460	50/-50	90/-80	270	80	180
TE FLAP DISAGREE (5 < FLAPS < 20)	VREF30+20	3710	180/-80	100	-140/490	60/-50	100/-90	280	100	220
TE FLAP DISAGREE (FLAPS ≤ 5)	VREF30+30	3930	220/-90	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 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	150000 KG LDG WT	PER 5000 KG ABV/BLW 150000 KG	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	6140	150/-150	180	-290/990	260/-220	170/-170	620	0	0
AIR/GRD SYS (FLAPS 30)	VREF30	5990	250/-150	180	-290/990	270/-220	170/-170	630	0	0
ALL FLAPS AND SLATS UP LANDING	VREF30+50	6310	220/-160	200	-260/870	170/-150	210/-180	380	490	1120
ANTI-SKID OFF (FLAPS 25)	VREF25	6800	190/-180	200	-360/1280	300/-240	210/-190	490	590	1410
ANTI-SKID OFF (FLAPS 30)	VREF30	6630	260/-180	200	-360/1280	310/-240	200/-180	490	550	1290
ENGINE FAILURE (FLAPS 20)	VREF20	5030	150/-130	140	-230/810	160/-140	150/-140	410	0	360
HYD SYS PRESS (C ONLY) (FLAPS 20)	VREF20	5690	170/-150	170	-250/860	180/-150	170/-150	510	400	920
HYD SYS PRESS (L ONLY) (FLAPS 25)	VREF25	4950	130/-130	140	-240/820	170/-140	140/-140	430	0	330
HYD SYS PRESS (L ONLY) (FLAPS 30)	VREF30	4860	200/-130	140	-240/820	170/-150	140/-140	440	0	310
HYD SYS PRESS (R ONLY) (FLAPS 25)	VREF25	4950	130/-130	140	-240/820	170/-140	140/-140	430	0	330
HYD SYS PRESS (R ONLY) (FLAPS 30)	VREF30	4860	200/-130	140	-240/820	170/-150	140/-140	440	0	310
HYD SYS PRESS (L AND C) (FLAPS 20)	VREF30+20	7270	300/-190	220	-310/1050	310/-260	230/-210	750	0	850
HYD SYS PRESS (L AND R) (FLAPS 20)	VREF30+20	6970	280/-170	210	-310/1050	330/-270	210/-210	690	0	0
HYD SYS PRESS (R AND C) (FLAPS 20)	VREF30+20	7270	300/-190	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 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	
		150000 KG LDG WT	PER 5000 KG ABV/BLW 150000 KG	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	5210	200/-130	160	-230/800	150/-130	160/-150	380	340	770
LE SLAT ASYM (FLAPS = 20)	VREF30+30	5860	220/-150	180	-250/860	180/-150	190/-170	430	430	990
LE SLAT ASYM (5 < FLAPS < 20)	VREF30+40	6280	230/-160	200	-260/890	190/-160	210/-180	430	480	1100
LE SLAT DISAGREE (FLAPS > 20)	VREF20	4800	140/-130	140	-220/770	140/-120	140/-130	380	290	670
LE SLAT DISAGREE - ALTN FLAP EXT ACOMPLISHED (FLAPS = 20)	VREF20	4800	140/-130	140	-220/770	140/-120	140/-130	380	290	670
LE SLAT DISAGREE - ALTN FLAP EXT FAILED (FLAPS = 20)	VREF30+30	5580	200/-140	170	-240/830	160/-140	180/-160	390	380	860
REVERSER UNLOCKED (FLAPS 20)	VREF30+30	6210	230/-160	190	-270/910	210/-180	200/-180	470	0	540
TE FLAP ASYM (FLAPS ≥ 20)	VREF20	4800	140/-130	140	-220/770	140/-120	140/-130	380	290	670
TE FLAP ASYM (5 < FLAPS < 20)	VREF30+20	5220	200/-140	160	-230/800	150/-130	160/-150	380	350	790
TE FLAP ASYM (FLAPS ≤ 5)	VREF30+30	5560	200/-140	170	-240/820	150/-140	180/-160	380	390	890
TE FLAP DISAGREE (FLAPS ≥ 20)	VREF20	4800	140/-130	140	-220/770	140/-120	140/-130	380	290	670
TE FLAP DISAGREE (5 < FLAPS < 20)	VREF30+20	5220	200/-140	160	-230/800	150/-130	160/-150	380	350	790
TE FLAP DISAGREE (FLAPS ≤ 5)	VREF30+30	5560	200/-140	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 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	150000 KG LDG WT	PER 5000 KG ABV/BLW 150000 KG	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	9630	240/-240	330	-530/1860	920/-630	290/-300	850	0	0
AIR/GRD SYS (FLAPS 30)	VREF30	9340	380/-240	330	-530/1850	910/-620	290/-290	860	0	0
ALL FLAPS AND SLATS UP LANDING	VREF30+50	9020	340/-250	320	-410/1450	430/-350	340/-280	520	1370	3500
ANTI-SKID OFF (FLAPS 25)	VREF25	8640	260/-250	280	-530/1980	720/-470	290/-260	560	1310	3460
ANTI-SKID OFF (FLAPS 30)	VREF30	8450	350/-250	280	-530/1980	730/-480	290/-260	570	1230	3170
ENGINE FAILURE (FLAPS 20)	VREF20	7350	240/-220	240	-390/1390	450/-350	250/-220	570	0	1150
HYD SYS PRESS (C ONLY) (FLAPS 20)	VREF20	7710	260/-230	260	-390/1390	420/-330	270/-230	630	1060	2730
HYD SYS PRESS (L ONLY) (FLAPS 25)	VREF25	7180	210/-200	230	-400/1410	470/-350	240/-210	560	0	1030
HYD SYS PRESS (L ONLY) (FLAPS 30)	VREF30	7030	300/-210	230	-400/1410	470/-360	230/-210	570	0	950
HYD SYS PRESS (R ONLY) (FLAPS 25)	VREF25	7180	210/-200	230	-400/1410	470/-350	240/-210	560	0	1030
HYD SYS PRESS (R ONLY) (FLAPS 30)	VREF30	7030	300/-210	230	-400/1410	470/-360	230/-210	570	0	950
HYD SYS PRESS (L AND C) (FLAPS 20)	VREF30+20	10360	440/-300	350	-510/1750	790/-580	370/-320	920	0	2440
HYD SYS PRESS (L AND R) (FLAPS 20)	VREF30+20	11150	440/-290	350	-570/1950	1090/-760	360/-350	960	0	0
HYD SYS PRESS (R AND C) (FLAPS 20)	VREF30+20	10360	440/-300	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 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	150000 KG LDG WT	PER 5000 KG ABV/BLW 150000 KG	PER 1000FT 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	7230	290/-210	250	-370/1320	370/-290	260/-220	490	920	2270	
LE SLAT ASYM (FLAPS = 20)	VREF30+30	8070	320/-230	280	-400/1390	410/-330	300/-250	530	1110	2770	
LE SLAT ASYM (5 < FLAPS < 20)	VREF30+40	8630	340/-250	310	-410/1430	430/-350	320/-270	540	1280	3250	
LE SLAT DISAGREE (FLAPS > 20)	VREF20	6700	220/-200	220	-360/1270	350/-280	230/-200	490	830	2040	
LE SLAT DISAGREE - ALTN FLAP EXT ACOMPLISHED (FLAPS = 20)	VREF20	6700	220/-200	220	-360/1270	350/-280	230/-200	490	830	2040	
LE SLAT DISAGREE - ALTN FLAP EXT FAILED (FLAPS = 20)	VREF30+30	7720	300/-220	260	-380/1360	380/-310	280/-240	490	1000	2460	
REVERSER UNLOCKED (FLAPS 20)	VREF30+30	8970	350/-260	300	-440/1530	550/-430	320/-280	620	0	1580	
TE FLAP ASYM (FLAPS ≥ 20)	VREF20	6700	220/-200	220	-360/1270	350/-280	230/-200	490	830	2040	
TE FLAP ASYM (5 < FLAPS < 20)	VREF30+20	7290	300/-210	250	-370/1320	370/-290	260/-220	490	950	2370	
TE FLAP ASYM (FLAPS ≤ 5)	VREF30+30	7770	300/-220	270	-380/1360	380/-310	280/-240	490	1050	2640	
TE FLAP DISAGREE (FLAPS ≥ 20)	VREF20	6700	220/-200	220	-360/1270	350/-280	230/-200	490	830	2040	
TE FLAP DISAGREE (5 < FLAPS < 20)	VREF30+20	7290	300/-210	250	-370/1320	370/-290	260/-220	490	950	2370	
TE FLAP DISAGREE (FLAPS ≤ 5)	VREF30+30	7770	300/-220	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	150000 KG LDG WT	PER 5000 KG ABV/BLW 150000 KG	PER 1000 FT ABV S.L.	PER 10KTS 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	15350	340/-300	640	-1010/3750	4210/-1740	490/-490	1060	0	0
AIR/GRD SYS (FLAPS 30)	VREF30	14810	500/-300	620	-990/3710	4120/-1700	480/-480	1050	0	0
ALL FLAPS AND SLATS UP LANDING	VREF30+50	11980	480/-370	470	-620/2260	990/-680	500/-390	640	2960	8700
ANTI-SKID OFF (FLAPS 25)	VREF25	11670	390/-370	420	-890/3770	4840/-1110	430/-410	630	3680	14100
ANTI-SKID OFF (FLAPS 30)	VREF30	11470	490/-370	410	-890/3770	4800/-1120	420/-410	630	3500	13210
ENGINE FAILURE (FLAPS 20)	VREF20	10180	360/-320	360	-620/2270	1170/-740	370/-330	700	0	2870
HYD SYS PRESS (C ONLY) (FLAPS 20)	VREF20	9910	360/-320	370	-580/2140	950/-620	380/-310	720	2220	6470
HYD SYS PRESS (L ONLY) (FLAPS 25)	VREF25	9940	300/-300	340	-640/2380	1280/-760	360/-310	670	0	2580
HYD SYS PRESS (L ONLY) (FLAPS 30)	VREF30	9740	410/-300	340	-640/2380	1290/-760	350/-310	670	0	2360
HYD SYS PRESS (R ONLY) (FLAPS 25)	VREF25	9940	300/-300	340	-640/2380	1280/-760	360/-310	670	0	2580
HYD SYS PRESS (R ONLY) (FLAPS 30)	VREF30	9740	410/-300	340	-640/2380	1290/-760	350/-310	670	0	2360
HYD SYS PRESS (L AND C) (FLAPS 20)	VREF30+20	14070	600/-420	520	-800/2860	1980/-1170	550/-450	1040	0	5800
HYD SYS PRESS (L AND R) (FLAPS 20)	VREF30+20	17420	620/-430	550	-1020/3640	3920/-1910	580/-540	1190	0	0
HYD SYS PRESS (R AND C) (FLAPS 20)	VREF30+20	14070	600/-420	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	150000 KG LDG WT	PER 5000 KG ABV/BLW 150000 KG	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	9440	400/-290	350	-550/2060	850/-560	370/-310	570	1940	5350
LE SLAT ASYM (FLAPS = 20)	VREF30+30	10430	430/-320	400	-580/2150	920/-620	420/-340	610	2250	6270
LE SLAT ASYM (5 < FLAPS < 20)	VREF30+40	11250	460/-350	440	-610/2210	970/-650	460/-370	630	2640	7610
LE SLAT DISAGREE (FLAPS > 20)	VREF20	8820	320/-280	320	-540/2010	820/-540	340/-280	580	1800	4970
LE SLAT DISAGREE - ALTN FLAP EXT ACOMPLISHED (FLAPS = 20)	VREF20	8820	320/-280	320	-540/2010	820/-540	340/-280	580	1800	4970
LE SLAT DISAGREE - ALTN FLAP EXT FAILED (FLAPS = 20)	VREF30+30	10000	410/-310	370	-570/2100	870/-580	390/-330	560	2050	5650
REVERSER UNLOCKED (FLAPS 20)	VREF30+30	12190	500/-380	440	-680/2450	1340/-860	470/-400	730	0	3680
TE FLAP ASYM (FLAPS ≥ 20)	VREF20	8820	320/-280	320	-540/2010	820/-540	340/-280	580	1800	4970
TE FLAP ASYM (5 < FLAPS < 20)	VREF30+20	9590	410/-300	360	-560/2070	850/-570	380/-310	590	2100	5920
TE FLAP ASYM (FLAPS ≤ 5)	VREF30+30	10170	420/-310	380	-570/2120	870/-590	410/-330	580	2220	6260
TE FLAP DISAGREE (FLAPS ≥ 20)	VREF20	8820	320/-280	320	-540/2010	820/-540	340/-280	580	1800	4970
TE FLAP DISAGREE (5 < FLAPS < 20)	VREF30+20	9590	410/-300	360	-560/2070	850/-570	380/-310	590	2100	5920
TE FLAP DISAGREE (FLAPS ≤ 5)	VREF30+30	10170	420/-310	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 KG)	OAT (°C)	PRESSURE ALTITUDE (1000 FT)																	
		0	2	4	0	2	4	0	2	4	0	2	4	0	2	4	0	2	4
180	0	14.9	15.8	16.7	22.4	23.9	25.4	31.3	33.4	35.5	41.2	44.0	46.8	52.0	55.6	59.2			
	10	15.4	16.4	17.3	23.2	24.7	26.3	32.3	34.5	36.7	42.6	45.5	48.5	53.8	57.6	61.3			
	20	15.9	16.9	17.9	24.0	25.6	27.1	33.4	35.7	37.9	44.0	47.1	50.1	55.6	59.5	63.4			
	30	16.4	17.4	18.4	24.7	26.4	28.0	34.5	36.8	39.1	45.5	48.6	51.7	57.4	61.5	65.5			
	40	16.7	17.7	18.8	25.2	26.9	28.6	35.3	37.7	40.1	46.5	49.8	53.0	58.9	63.0	67.2			
	50	16.9	18.0	19.0	25.7	27.4	29.1	35.9	38.4	40.8	47.5	50.8	54.1	60.2	64.5	68.7			
160	0	13.4	14.3	15.1	20.2	21.5	22.8	28.1	30.0	31.8	36.9	39.4	41.9	46.5	49.8	53.0	56.8	60.8	64.8
	10	13.9	14.8	15.6	20.9	22.3	23.6	29.1	31.0	32.9	38.2	40.8	43.4	48.2	51.5	54.9	58.9	63.0	67.1
	20	14.4	15.2	16.1	21.6	23.0	24.4	30.0	32.0	34.0	39.5	42.2	44.9	49.8	53.3	56.7	60.9	65.2	69.4
	30	14.8	15.7	16.6	22.3	23.7	25.2	31.0	33.1	35.1	40.8	43.5	46.3	51.4	55.0	58.6	62.8	67.3	71.7
	40	15.0	16.0	16.9	22.7	24.2	25.7	31.7	33.8	35.9	41.7	44.6	47.4	52.7	56.4	60.1	64.5	69.0	73.6
	50	15.2	16.2	17.1	23.1	24.6	26.1	32.2	34.4	36.6	42.5	45.5	48.4	53.8	57.6	61.4	65.9	70.7	75.4
140	0	12.0	12.8	13.5	18.0	19.1	20.3	24.9	26.5	28.1	32.6	34.7	36.9	40.9	43.7	46.5	49.9	53.3	56.8
	10	12.4	13.2	13.9	18.6	19.8	21.0	25.7	27.4	29.1	33.7	36.0	38.2	42.4	45.3	48.2	51.6	55.2	58.8
	20	12.8	13.6	14.4	19.2	20.4	21.7	26.6	28.3	30.1	34.8	37.2	39.5	43.8	46.8	49.8	53.4	57.1	60.8
	30	13.2	14.0	14.8	19.8	21.1	22.3	27.4	29.2	31.0	35.9	38.4	40.8	45.2	48.3	51.4	55.1	58.9	62.8
	40	13.4	14.3	15.1	20.2	21.5	22.8	28.0	29.9	31.7	36.7	39.2	41.7	46.3	49.5	52.7	56.5	60.5	64.4
	50	13.6	14.4	15.3	20.5	21.8	23.1	28.5	30.4	32.3	37.4	40.0	42.6	47.2	50.5	53.8	57.7	61.8	65.9
120	0	10.6	11.2	11.9	15.7	16.7	17.7	21.6	23.0	24.4	28.1	29.9	31.8	35.1	37.5	39.9	42.6	45.5	48.4
	10	11.0	11.6	12.3	16.2	17.3	18.3	22.3	23.8	25.2	29.0	31.0	32.9	36.3	38.8	41.3	44.1	47.1	50.2
	20	11.3	12.0	12.7	16.8	17.8	18.9	23.1	24.6	26.1	30.0	32.0	34.0	37.5	40.1	42.7	45.6	48.7	51.8
	30	11.6	12.4	13.1	17.3	18.4	19.5	23.8	25.3	26.9	31.0	33.0	35.1	38.7	41.4	44.0	47.0	50.3	53.5
	40	11.8	12.5	13.3	17.6	18.7	19.9	24.3	25.9	27.4	31.6	33.8	35.9	39.6	42.4	45.1	48.2	51.5	54.9
	50	11.9	12.7	13.4	17.8	19.0	20.1	24.6	26.3	27.9	32.2	34.4	36.6	40.4	43.2	46.0	49.2	52.6	56.1
100	0	9.2	9.7	10.3	13.4	14.3	15.1	18.2	19.4	20.6	23.5	25.0	26.6	29.1	31.0	33.0	35.0	37.4	39.7
	10	9.5	10.0	10.6	13.9	14.7	15.6	18.9	20.1	21.3	24.3	25.9	27.5	30.1	32.1	34.1	36.2	38.7	41.1
	20	9.8	10.4	10.9	14.3	15.2	16.1	19.5	20.7	22.0	25.1	26.7	28.4	31.1	33.2	35.3	37.4	40.0	42.5
	30	10.1	10.7	11.3	14.8	15.7	16.6	20.1	21.4	22.7	25.9	27.6	29.3	32.1	34.2	36.4	38.6	41.3	43.9
	40	10.2	10.8	11.4	15.0	16.0	16.9	20.5	21.8	23.1	26.4	28.2	29.9	32.8	35.0	37.2	39.5	42.2	44.9
	50	10.3	10.9	11.6	15.2	16.2	17.1	20.8	22.1	23.5	26.8	28.6	30.4	33.4	35.7	37.9	40.3	43.1	45.8

*To correct for wind, enter table with the brakes on speed minus one half the headwind or plus 1.5 times the tailwind.

If ground speed is used for brakes on speed, ignore wind, 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	NO SPECIAL	PROCEDURE REQUIRED	1	1	2	2	3	4	6	CAUTION	FUSE PLUG MELT ZONE		
GEAR DOWN			11	15	19	24	34	44	59				
GROUND													

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

Engine Inoperative

Chapter PI-QRH

Section 62

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/SAT	-14/-38	-11/-38	-10/-40
	EPR CORR	0.09	0.09	0.10
37000	EPR	1.70	1.69	1.69
	MAX TAT/SAT	-14/-38	-11/-38	-10/-40
	EPR CORR	0.09	0.09	0.10
35000	EPR	1.70	1.69	1.69
	MAX TAT/SAT	-13/-37	-11/-38	-9/-39
	EPR CORR	0.09	0.09	0.10
33000	EPR	1.70	1.70	1.69
	MAX TAT/SAT	-9/-34	-8/-35	-5/-35
	EPR CORR	0.09	0.09	0.10
31000	EPR	1.70	1.70	1.68
	MAX TAT/SAT	-5/-30	-4/-32	0/-31
	EPR CORR	0.10	0.10	0.11
29000	EPR	1.70	1.69	1.68
	MAX TAT/SAT	-2/-27	1/-27	3/-28
	EPR CORR	0.09	0.10	0.10
27000	EPR	1.71	1.70	1.68
	MAX TAT/SAT	1/-25	3/-26	7/-25
	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 THRUST

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	-0.03	-0.04	-0.06	-0.07	-0.08

ENGINE INOP

MAX CONTINUOUS THRUST

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	1.41	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	-0.03	-0.04	-0.06	-0.07	-0.08

ENGINE INOP

MAX CONTINUOUS THRUST

Driftdown Speed/Level Off Altitude

100 ft/min residual rate of climb

WEIGHT (1000 KG)		OPTIMUM DRIFTDOWN SPEED (KIAS)	LEVEL OFF ALTITUDE (FT)		
START DRIFT DOWN	LEVEL OFF		ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
190	184	276	18600	17700	16900
180	174	269	20000	19100	18200
170	165	262	21300	20500	19700
160	155	254	22700	22100	21200
150	145	246	24100	23700	22800
140	136	238	25700	25400	24500
130	126	230	27200	27100	26200
120	116	221	28900	28900	28100
110	107	212	30700	30700	30000
100	97	202	32700	32700	32000

Includes APU fuel burn.

ENGINE INOP

MAX CONTINUOUS THRUST

Driftdown/LRC Cruise Range Capability

Ground to Air Miles Conversion

AIR DISTANCE (NM)					GROUND DISTANCE (NM)	AIR DISTANCE (NM)				
HEADWIND COMPONENT (KTS)						TAILWIND COMPONENT (KTS)				
100	80	60	40	20		20	40	60	80	100
275	256	239	225	212	200	190	180	172	164	157
548	510	477	448	423	400	380	361	344	329	315
818	762	714	671	634	600	570	542	517	495	474
1086	1014	950	894	845	800	760	724	691	661	633
1354	1265	1186	1117	1055	1000	950	905	864	827	793
1622	1516	1422	1339	1266	1200	1141	1087	1038	993	952
1892	1768	1659	1562	1477	1400	1331	1268	1211	1159	1111
2163	2021	1896	1786	1688	1600	1521	1449	1384	1324	1270
2437	2276	2135	2010	1899	1800	1711	1630	1556	1489	1427

Driftdown/Cruise Fuel and Time

AIR DIST (NM)	FUEL REQUIRED (1000 KG)										TIME (HR:MIN)
	WEIGHT AT START OF DRIFTDOWN (1000 KG)										
	100	110	120	130	140	150	160	170	180	190	
200	1.7	1.9	2.0	2.2	2.4	2.5	2.6	2.8	2.9	2.9	0:33
400	3.8	4.1	4.5	4.8	5.2	5.5	5.7	6.1	6.3	6.6	1:05
600	5.7	6.2	6.7	7.2	7.8	8.2	8.7	9.1	9.6	10.0	1:36
800	7.6	8.3	9.0	9.6	10.3	10.9	11.5	12.1	12.7	13.3	2:06
1000	9.4	10.3	11.1	12.0	12.8	13.6	14.3	15.1	15.8	16.6	2:37
1200	11.2	12.3	13.3	14.3	15.2	16.2	17.1	18.0	18.9	19.8	3:07
1400	13.0	14.2	15.4	16.5	17.7	18.8	19.8	20.9	21.9	23.0	3:38
1600	14.7	16.1	17.4	18.7	20.0	21.3	22.5	23.7	24.9	26.1	4:10
1800	16.4	17.9	19.4	20.9	22.3	23.8	25.1	26.5	27.8	29.2	4:42

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 KG)	PRESSURE ALTITUDE (FT)		
	ISA + 10C & BELOW	ISA + 15°C	ISA + 20°C
190	15400	14200	12900
185	16200	15300	14200
180	17000	16100	15300
175	17800	16900	16100
170	18600	17700	16900
165	19400	18500	17700
160	20200	19300	18500
155	20900	20100	19300
150	21700	20900	20100
145	22500	21800	21000
140	23300	22700	21900
135	24100	23700	22800
130	25000	24600	23800
125	25800	25600	24800
120	26700	26500	25700
115	27600	27400	26700
110	28600	28400	27700
105	29500	29500	28700
100	30500	30500	29800

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 KG)		PRESSURE ALTITUDE (1000 FT)								
		10	14	18	21	23	25	27	29	31
190	EPR	1.36	1.52							
	MACH	.561	.617							
	KIAS	312	319							
	FF/ENG	6558	6954							
180	EPR	1.32	1.46	1.67						
	MACH	.547	.597	.661						
	KIAS	303	308	317						
	FF/ENG	6121	6454	6811						
170	EPR	1.29	1.40	1.60						
	MACH	.533	.576	.638						
	KIAS	296	297	305						
	FF/ENG	5704	5958	6272						
160	EPR	1.26	1.35	1.52	1.69					
	MACH	.520	.557	.613	.664					
	KIAS	288	287	293	300					
	FF/ENG	5298	5485	5757	6056					
150	EPR	1.24	1.31	1.45	1.61					
	MACH	.508	.541	.589	.638					
	KIAS	281	278	281	288					
	FF/ENG	4921	5052	5240	5526					
140	EPR	1.21	1.28	1.38	1.52	1.64				
	MACH	.496	.525	.566	.610	.644				
	KIAS	274	270	270	275	279				
	FF/ENG	4575	4643	4734	5000	5207				
130	EPR	1.19	1.25	1.33	1.43	1.54	1.66			
	MACH	.483	.510	.545	.583	.614	.650			
	KIAS	267	262	259	262	265	270			
	FF/ENG	4228	4255	4288	4475	4651	4877			
120	EPR	1.17	1.22	1.29	1.36	1.44	1.55	1.68		
	MACH	.469	.496	.527	.557	.585	.617	.653		
	KIAS	259	255	250	250	252	256	260		
	FF/ENG	3875	3906	3885	3998	4125	4299	4529		
110	EPR	1.15	1.19	1.25	1.31	1.37	1.45	1.56	1.68	
	MACH	.453	.482	.509	.535	.557	.585	.617	.654	
	KIAS	251	247	242	240	240	242	245	250	
	FF/ENG	3541	3559	3509	3579	3649	3765	3933	4165	
100	EPR	1.13	1.17	1.22	1.26	1.31	1.36	1.44	1.56	1.68
	MACH	.436	.465	.493	.515	.533	.554	.582	.615	.652
	KIAS	241	238	234	230	229	229	231	234	238
	FF/ENG	3213	3206	3177	3198	3233	3295	3400	3554	3774

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
292	268	247	229	214	200	191	182	174	167	160
585	537	494	458	427	400	381	364	348	334	321
880	807	742	688	641	600	572	546	522	501	481
1176	1078	991	918	856	800	763	728	697	668	642
1472	1349	1240	1149	1070	1000	953	910	871	834	801
1770	1621	1489	1379	1284	1200	1144	1091	1044	1000	961
2069	1894	1739	1610	1499	1400	1334	1273	1217	1166	1120
2370	2168	1990	1841	1714	1600	1524	1454	1390	1331	1279
2672	2443	2241	2072	1928	1800	1714	1635	1563	1496	1437

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT)									
	10		14		18		22		26	
	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)
200	2.6	0:42	2.4	0:41	2.2	0:39	2.0	0:37	1.9	0:36
400	5.5	1:20	5.2	1:18	4.8	1:14	4.7	1:09	4.5	1:05
600	8.4	1:59	7.9	1:54	7.5	1:49	7.3	1:41	7.1	1:34
800	11.2	2:38	10.7	2:32	10.1	2:24	9.8	2:14	9.7	2:04
1000	13.9	3:17	13.3	3:09	12.7	3:00	12.4	2:47	12.2	2:34
1200	16.6	3:56	16.0	3:47	15.2	3:36	14.8	3:20	14.7	3:05
1400	19.3	4:36	18.6	4:25	17.7	4:12	17.3	3:54	17.2	3:35
1600	22.0	5:16	21.1	5:04	20.1	4:49	19.7	4:28	19.5	4:07
1800	24.6	5:57	23.6	5:42	22.5	5:26	22.1	5:03	21.9	4:38

Fuel Required Adjustment (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG)				
	100	120	140	160	180
2	-0.3	-0.2	0.0	0.2	0.5
4	-0.7	-0.4	0.0	0.5	1.1
6	-1.1	-0.6	0.0	0.7	1.6
8	-1.5	-0.8	0.0	1.0	2.2
10	-1.9	-1.0	0.0	1.3	2.8
12	-2.2	-1.2	0.0	1.6	3.4
14	-2.6	-1.4	0.0	1.8	3.9
16	-3.0	-1.6	0.0	2.1	4.5
18	-3.4	-1.7	0.0	2.4	5.0
20	-3.7	-1.9	0.0	2.6	5.6
22	-4.1	-2.1	0.0	2.9	6.1
24	-4.5	-2.3	0.0	3.2	6.6
26	-4.8	-2.5	0.0	3.4	7.1
28	-5.2	-2.7	0.0	3.7	7.6
30	-5.6	-2.9	0.0	4.0	8.1

Includes APU fuel burn.

ENGINE INOP

MAX CONTINUOUS THRUST

Holding

Flaps Up

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)						
		1500	5000	10000	15000	20000	25000	30000
190	EPR	1.20	1.24	1.34	1.51			
	KIAS	259	259	259	259			
	FF/ENG	5680	5740	5900	6220			
180	EPR	1.18	1.22	1.31	1.45	1.72		
	KIAS	251	251	251	252	254		
	FF/ENG	5350	5380	5480	5760	6280		
170	EPR	1.17	1.20	1.28	1.40	1.64		
	KIAS	244	244	244	245	246		
	FF/ENG	5030	5040	5070	5290	5770		
160	EPR	1.15	1.19	1.25	1.36	1.56		
	KIAS	236	236	236	238	239		
	FF/ENG	4710	4710	4690	4850	5280		
150	EPR	1.14	1.17	1.23	1.32	1.48		
	KIAS	228	228	229	230	231		
	FF/ENG	4400	4400	4330	4430	4810		
140	EPR	1.13	1.15	1.20	1.28	1.42	1.68	
	KIAS	222	222	222	222	223	225	
	FF/ENG	4090	4090	4000	4050	4350	4810	
130	EPR	1.12	1.14	1.18	1.25	1.36	1.58	
	KIAS	217	217	217	217	217	217	
	FF/ENG	3800	3790	3700	3700	3940	4290	
120	EPR	1.10	1.12	1.16	1.22	1.31	1.48	
	KIAS	211	211	211	211	211	211	
	FF/ENG	3520	3500	3410	3380	3560	3840	
110	EPR	1.09	1.11	1.14	1.19	1.27	1.40	1.66
	KIAS	205	205	205	205	205	205	205
	FF/ENG	3240	3220	3130	3090	3200	3430	3740
100	EPR	1.08	1.10	1.12	1.17	1.23	1.34	1.54
	KIAS	199	199	199	199	199	199	199
	FF/ENG	2960	2950	2850	2820	2890	3040	3270

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

Intentionally
Blank



Performance Inflight - QRH

Chapter PI-QRH

Gear Down

Section 63

GEAR DOWN

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	0.01	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	-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	-0.07	

GEAR DOWN

Long Range Cruise Altitude Capability

WEIGHT (1000 KG)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
190	18500	18500	16600
185	19500	19500	17600
180	20500	20400	18700
175	21300	21300	19700
170	22200	22200	20700
165	23200	23100	21700
160	24100	24100	22700
155	25100	25000	23700
150	26000	25900	24700
145	26900	26900	25700
140	27900	27900	26700
135	28900	28900	27700
130	29800	29800	28600
125	30700	30600	29600
120	31600	31600	30600
115	32700	32700	31600
110	33600	33500	32800
105	34400	34400	33700
100	35200	35200	34600



GEAR DOWN

Long Range Cruise Control

WEIGHT (1000 KG)		PRESSURE ALTITUDE (1000 FT)										
		10	14	18	21	23	25	27	29	31	33	35
190	EPR	1.26	1.33	1.45								
	MACH	.472	.506	.545								
	KIAS	261	260	259								
	FF/ENG	4861	4976	5059								
180	EPR	1.24	1.31	1.41								
	MACH	.462	.495	.532								
	KIAS	255	254	253								
	FF/ENG	4570	4669	4713								
170	EPR	1.22	1.28	1.37	1.47							
	MACH	.451	.482	.517	.549							
	KIAS	249	247	246	246							
	FF/ENG	4295	4345	4363	4505							
160	EPR	1.20	1.25	1.33	1.42	1.50						
	MACH	.440	.469	.504	.534	.555						
	KIAS	243	240	239	239	239						
	FF/ENG	4023	4034	4056	4171	4246						
150	EPR	1.18	1.23	1.30	1.37	1.44	1.52					
	MACH	.428	.457	.490	.517	.539	.560					
	KIAS	237	234	232	231	232	231					
	FF/ENG	3753	3752	3751	3829	3912	3983					
140	EPR	1.17	1.21	1.27	1.33	1.38	1.45	1.55				
	MACH	.415	.445	.475	.503	.522	.543	.565				
	KIAS	229	228	225	224	224	224	223				
	FF/ENG	3482	3481	3447	3528	3578	3649	3725				
130	EPR	1.15	1.19	1.24	1.29	1.34	1.39	1.47	1.57			
	MACH	.402	.431	.461	.486	.505	.525	.547	.569			
	KIAS	222	221	218	217	216	216	216	216			
	FF/ENG	3236	3212	3169	3226	3264	3319	3380	3460			
120	EPR	1.14	1.17	1.21	1.26	1.29	1.34	1.40	1.48	1.59		
	MACH	.388	.415	.446	.469	.487	.506	.527	.549	.572		
	KIAS	214	212	211	209	209	208	208	208	207		
	FF/ENG	2994	2941	2913	2936	2967	2999	3051	3108	3188		
110	EPR	1.12	1.15	1.19	1.23	1.26	1.30	1.34	1.40	1.48	1.60	
	MACH	.371	.400	.430	.453	.469	.487	.506	.528	.550	.574	
	KIAS	205	204	203	202	200	200	199	199	199	199	
	FF/ENG	2735	2699	2658	2680	2684	2705	2731	2779	2838	2911	
100	EPR	1.11	1.13	1.17	1.20	1.22	1.25	1.29	1.34	1.40	1.48	1.60
	MACH	.356	.383	.412	.436	.451	.467	.486	.505	.527	.549	.573
	KIAS	196	196	194	194	193	191	191	190	190	190	190
	FF/ENG	2503	2457	2404	2432	2431	2429	2439	2464	2511	2567	2629

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
320	287	259	236	217	200	189	179	170	161	154
646	578	520	473	434	400	378	357	339	323	308
976	871	781	710	651	600	567	536	509	484	462
1309	1167	1045	949	869	800	755	714	677	644	615
1647	1467	1312	1189	1088	1000	943	892	845	804	768
1989	1768	1579	1429	1307	1200	1132	1070	1014	964	920
2336	2073	1848	1671	1526	1400	1320	1247	1181	1122	1071
2688	2381	2119	1913	1746	1600	1508	1424	1348	1281	1222
3045	2693	2393	2157	1966	1800	1696	1601	1515	1439	1372
3407	3008	2668	2402	2187	2000	1883	1777	1682	1596	1522

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT)									
	10		14		18		22		28	
	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)
200	4.8	0:49	4.4	0:47	4.0	0:45	3.7	0:44	3.4	0:41
400	9.9	1:36	9.2	1:31	8.5	1:27	8.1	1:23	7.7	1:17
600	14.9	2:23	13.9	2:15	13.0	2:09	12.4	2:03	11.8	1:53
800	19.8	3:11	18.5	3:01	17.3	2:52	16.6	2:43	15.8	2:30
1000	24.6	4:00	23.0	3:47	21.5	3:36	20.7	3:24	19.7	3:07
1200	29.3	4:50	27.4	4:34	25.7	4:20	24.7	4:06	23.6	3:45
1400	33.9	5:41	31.7	5:21	29.7	5:04	28.6	4:48	27.3	4:24
1600	38.4	6:33	36.0	6:10	33.7	5:50	32.5	5:31	30.9	5:03
1800	42.8	7:26	40.1	6:59	37.6	6:36	36.2	6:15	34.4	5:42
2000	47.1	8:19	44.1	7:50	41.4	7:23	39.8	6:59	37.9	6:23

Fuel Required Adjustment (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG)				
	100	120	140	160	180
5	-0.8	-0.4	0.0	0.7	1.3
10	-1.6	-0.8	0.0	1.3	2.7
15	-2.4	-1.2	0.0	2.0	4.1
20	-3.2	-1.6	0.0	2.6	5.5
25	-4.0	-2.0	0.0	3.2	6.8
30	-4.8	-2.4	0.0	3.8	8.0
35	-5.6	-2.8	0.0	4.4	9.2
40	-6.4	-3.2	0.0	5.0	10.4
45	-7.2	-3.6	0.0	5.6	11.5
50	-8.1	-4.0	0.0	6.1	12.6

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	39	43	47	51	55	59	63	67	71	75
TIME (MINUTES)	7	9	12	12	13	14	15	16	16	17	18	19	20

GEAR DOWN

Holding

Flaps Up

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)						
		1500	5000	10000	15000	20000	25000	30000
190	EPR	1.15	1.18	1.25	1.35			
	KIAS	249	249	249	249			
	FF/ENG	4850	4820	4810	4900			
180	EPR	1.14	1.17	1.23	1.31	1.46		
	KIAS	241	241	241	241	241		
	FF/ENG	4570	4540	4480	4560	4810		
170	EPR	1.13	1.16	1.21	1.28	1.41		
	KIAS	234	234	234	234	234		
	FF/ENG	4300	4270	4170	4220	4440		
160	EPR	1.12	1.15	1.19	1.26	1.37		
	KIAS	226	226	226	226	226		
	FF/ENG	4030	4000	3880	3890	4080		
150	EPR	1.11	1.13	1.17	1.23	1.33	1.49	
	KIAS	218	218	218	218	218	218	
	FF/ENG	3760	3730	3610	3580	3740	3960	
140	EPR	1.10	1.12	1.16	1.21	1.29	1.43	
	KIAS	212	212	212	212	212	212	
	FF/ENG	3530	3490	3380	3320	3450	3640	
130	EPR	1.09	1.11	1.14	1.19	1.26	1.38	1.60
	KIAS	207	207	207	207	207	207	207
	FF/ENG	3300	3270	3150	3080	3180	3320	3530
120	EPR	1.09	1.10	1.13	1.17	1.23	1.33	1.51
	KIAS	201	201	201	201	201	201	201
	FF/ENG	3080	3050	2930	2860	2920	3030	3190
110	EPR	1.08	1.09	1.12	1.15	1.20	1.29	1.43
	KIAS	195	195	195	195	195	195	195
	FF/ENG	2850	2830	2720	2650	2680	2750	2870
100	EPR	1.07	1.08	1.10	1.14	1.18	1.25	1.37
	KIAS	189	189	189	189	189	189	189
	FF/ENG	2640	2610	2510	2440	2460	2510	2590

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

Intentionally
Blank



Performance Inflight - QRH

Gear Down, Engine Inop

Chapter PI-QRH

Section 64

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	1.75
	MAX TAT	-10	-12	-6
	EPR CORR	0.09	0.09	0.09
25000	EPR	1.75	1.78	1.75
	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	0.09	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	0.09	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 KG)		OPTIMUM DRIFTDOWN SPEED (KIAS)	LEVEL OFF ALTITUDE (FT)		
START DRIFT DOWN	LEVEL OFF		ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
170	161	230	3000		
160	152	223	5800	4000	2100
150	143	216	8400	6800	5000
140	133	210	10900	9400	7700
130	124	205	13400	12000	10500
120	114	199	16100	14700	13300
110	105	193	18700	17500	16100
100	96	187	20900	20200	19000
90	86	181	23000	22700	21700

Includes APU fuel burn.

Long Range Cruise Altitude Capability

100 ft/min residual rate of climb

WEIGHT (1000 KG)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
155	3000		
150	4700		
145	6400	3800	
140	8100	5700	3000
135	9800	7500	5000
130	11400	9400	7000
125	12900	11200	8900
120	14400	12900	10800
115	16000	14600	12800
110	17500	16000	14600
105	18800	17500	16100
100	20100	19000	17600



GEAR DOWN

ENGINE INOP

MAX CONTINUOUS THRUST

Long Range Cruise Control

WEIGHT (1000 KG)		PRESSURE ALTITUDE (1000 FT)							
		6	8	10	12	14	16	18	20
150	EPR	1.46							
	MACH	.383							
	KIAS	228							
	FF/ENG	7333							
140	EPR	1.41	1.46	1.53					
	MACH	.375	.384	.394					
	KIAS	223	220	217					
	FF/ENG	6844	6751	6721					
130	EPR	1.37	1.42	1.47	1.54				
	MACH	.365	.375	.384	.395				
	KIAS	217	215	212	210				
	FF/ENG	6344	6255	6192	6222				
120	EPR	1.33	1.37	1.42	1.47	1.54	1.64		
	MACH	.354	.365	.375	.384	.395	.409		
	KIAS	211	209	207	204	202	201		
	FF/ENG	5832	5748	5685	5689	5705	5834		
110	EPR	1.29	1.33	1.37	1.41	1.46	1.54	1.65	
	MACH	.342	.353	.363	.373	.383	.397	.413	
	KIAS	203	202	200	198	196	195	195	
	FF/ENG	5320	5243	5176	5178	5151	5218	5433	
100	EPR	1.26	1.29	1.32	1.36	1.40	1.46	1.54	1.65
	MACH	.328	.339	.350	.361	.371	.385	.400	.417
	KIAS	195	194	193	192	190	189	189	189
	FF/ENG	4815	4745	4686	4683	4637	4636	4816	5068
90	EPR	1.22	1.25	1.28	1.31	1.35	1.40	1.46	1.54
	MACH	.313	.324	.335	.347	.358	.372	.387	.403
	KIAS	186	185	185	184	183	183	183	183
	FF/ENG	4318	4257	4200	4195	4159	4131	4254	4450

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	94	89	84	79	75
336	297	264	239	218	200	187	175	165	156	149
508	449	399	359	328	300	281	263	247	234	222
681	601	533	480	437	400	374	350	329	311	295
855	754	667	600	547	500	467	438	411	388	368
1030	908	803	722	657	600	560	524	493	465	441
1206	1061	938	843	766	700	653	611	574	541	513
1383	1216	1074	964	876	800	746	698	655	618	586
1562	1372	1211	1086	986	900	839	785	737	694	658
1741	1528	1348	1208	1097	1000	932	872	818	771	731

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT)							
	6		10		14		18	
	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)
100	2.5	0:28	2.2	0:27	2.0	0:26	1.9	0:26
200	5.3	0:53	4.9	0:51	4.6	0:49	4.6	0:47
300	8.1	1:18	7.5	1:15	7.2	1:12	7.3	1:09
400	10.8	1:43	10.1	1:40	9.7	1:35	9.8	1:31
500	13.5	2:09	12.6	2:04	12.2	1:59	12.4	1:54
600	16.2	2:34	15.1	2:29	14.6	2:23	14.9	2:16
700	18.8	3:00	17.6	2:54	17.0	2:46	17.3	2:39
800	21.4	3:26	20.0	3:19	19.4	3:10	19.7	3:01
900	23.9	3:53	22.4	3:44	21.7	3:35	22.0	3:24
1000	26.4	4:19	24.8	4:10	24.0	3:59	24.3	3:47

Fuel Required Adjustment (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG)				
	100	120	140	160	180
2	-0.3	-0.2	0.0	0.3	0.6
4	-0.7	-0.4	0.0	0.6	1.4
6	-1.1	-0.6	0.0	1.0	2.1
8	-1.5	-0.8	0.0	1.3	2.8
10	-1.9	-1.0	0.0	1.6	3.5
12	-2.3	-1.1	0.0	1.9	4.1
14	-2.6	-1.3	0.0	2.2	4.8
16	-3.0	-1.5	0.0	2.5	5.4
18	-3.4	-1.7	0.0	2.8	6.1
20	-3.8	-1.9	0.0	3.1	6.7
22	-4.2	-2.1	0.0	3.4	7.3
24	-4.5	-2.3	0.0	3.7	7.9
26	-4.9	-2.5	0.0	4.0	8.5
28	-5.3	-2.7	0.0	4.3	9.1

Includes APU fuel burn.



GEAR DOWN
ENGINE INOP
MAX CONTINUOUS THRUST

**Holding
Flaps Up**

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)				
		1500	5000	10000	15000	20000
170	EPR	1.41				
	KIAS	234				
	FF/ENG	8430				
160	EPR	1.37	1.46			
	KIAS	226	226			
	FF/ENG	7820	7970			
150	EPR	1.33	1.41			
	KIAS	218	218			
	FF/ENG	7210	7330			
140	EPR	1.30	1.37	1.51		
	KIAS	212	212	212		
	FF/ENG	6720	6810	6870		
130	EPR	1.27	1.33	1.45		
	KIAS	207	207	207		
	FF/ENG	6240	6290	6320		
120	EPR	1.24	1.29	1.40	1.58	
	KIAS	201	201	201	201	
	FF/ENG	5770	5790	5760	6020	
110	EPR	1.22	1.26	1.35	1.50	
	KIAS	195	195	195	195	
	FF/ENG	5320	5320	5250	5410	
100	EPR	1.20	1.23	1.31	1.43	1.65
	KIAS	189	189	189	189	189
	FF/ENG	4880	4880	4780	4820	5320

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

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**Performance Inflight - QRH****Chapter PI-QRH****Text****Section 65**

Introduction

This chapter contains information to supplement performance data from the Flight Management Computer (FMC). In addition, sufficient inflight data is provided to complete a flight with the FMC inoperative. In the event of conflict between data presented in this chapter and that contained in the approved Airplane Flight Manual, the Flight Manual shall always take precedence.

General**Flight with Unreliable Airspeed / Turbulent Air Penetration**

Pitch attitude and average 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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Performance Inflight - QRH

Chapter PI-QRH

General

Section 70

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 KG)				
		100	120	140	160	180
40000	PITCH ATT	4.5	4.0	4.0		
	V/S (FT/MIN)	1800	1200	600		
30000	PITCH ATT	4.5	4.0	4.0	4.0	4.0
	V/S (FT/MIN)	2800	2200	1700	1400	1100
20000	PITCH ATT	7.0	6.5	6.0	6.0	6.0
	V/S (FT/MIN)	4200	3400	2800	2300	1900
10000	PITCH ATT	10.5	9.0	8.5	8.0	7.5
	V/S (FT/MIN)	5600	4500	3800	3200	2700
SEA LEVEL	PITCH ATT	13.5	11.5	10.5	9.5	9.5
	V/S (FT/MIN)	6300	5200	4300	3700	3200

Cruise (.78/290)**Flaps Up, Set Thrust for Level Flight**

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG)				
		100	120	140	160	180
40000	PITCH ATT	2.0	2.5	3.5		
	%N1	86.8	90.4	95.0		
35000	PITCH ATT	1.5	2.0	2.5	3.0	3.5
	%N1	84.3	86.3	88.8	91.9	95.2
30000	PITCH ATT	1.0	1.5	2.0	2.0	2.5
	%N1	83.7	85.2	86.7	88.4	90.3
25000	PITCH ATT	1.0	1.5	2.0	2.5	3.0
	%N1	80.6	82.0	83.3	84.9	86.9
20000	PITCH ATT	1.0	1.5	2.0	2.5	3.0
	%N1	76.7	78.0	79.4	81.0	82.9
15000	PITCH ATT	1.0	1.5	2.0	2.5	3.0
	%N1	72.6	74.0	75.5	77.2	78.9

Descent (.78/290)**Flaps Up, Set Idle Thrust**

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG)				
		100	120	140	160	180
40000	PITCH ATT	-1.0	-0.5	0.5	1.0	1.5
	V/S (FT/MIN)	-2500	-2400	-2500	-2500	-2800
30000	PITCH ATT	-2.5	-1.5	-1.0	-0.5	0.5
	V/S (FT/MIN)	-2600	-2300	-2100	-2000	-1900
20000	PITCH ATT	-2.5	-1.5	-1.0	0.0	0.5
	V/S (FT/MIN)	-2400	-2100	-1900	-1800	-1700
10000	PITCH ATT	-2.5	-1.5	-1.0	0.0	0.5
	V/S (FT/MIN)	-2100	-1900	-1700	-1600	-1500
SEA LEVEL	PITCH ATT	-3.0	-2.0	-1.0	-0.5	0.5
	V/S (FT/MIN)	-1900	-1700	-1600	-1500	-1400

Flight With Unreliable Airspeed / Turbulent Air Penetration

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

Holding (VREF30 + 80)

Flaps Up, Set Thrust for Level Flight

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG)				
		100	120	140	160	180
10000	PITCH ATT	4.0	4.5	5.0	5.0	5.0
	%N1	57.4	61.7	65.6	68.9	72.2
	KIAS	199	211	222	236	251
5000	PITCH ATT	4.0	4.5	5.0	5.0	5.0
	%N1	53.6	57.5	61.2	65.1	68.1
	KIAS	199	211	222	236	251

Terminal Area (5000 FT)

Set Thrust for Level Flight

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG)				
		100	120	140	160	180
FLAPS UP (VREF 30 + 80) (GEAR UP)	PITCH ATT	4.0	4.5	5.0	5.0	5.0
	%N1	54.6	58.8	62.9	66.7	69.6
	KIAS	199	211	222	236	251
FLAPS 1 (VREF 30 + 60) (GEAR UP)	PITCH ATT	6.0	6.5	6.5	6.5	6.5
	%N1	56.6	61.6	65.8	69.4	72.9
	KIAS	179	191	202	216	231
FLAPS 5 (VREF 30 + 40) (GEAR UP)	PITCH ATT	4.5	4.5	5.0	4.5	4.5
	%N1	57	62.3	66.2	70.0	73.7
	KIAS	159	171	182	196	211
FLAPS 15 (VREF 30 + 20) (GEAR UP)	PITCH ATT	5.5	5.5	6.0	6.0	5.5
	%N1	58.4	63.5	67.8	71.8	75.1
	KIAS	139	151	162	176	191
FLAPS 20 (VREF 30 + 20) (GEAR DOWN)	PITCH ATT	4.0	4.5	4.5	4.0	3.5
	%N1	65.7	71.2	75.4	79.8	83.5
	KIAS	139	151	162	176	191

Final Approach (1500 FT)

Gear Down, Set Thrust for a 3° Glideslope

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG)				
		100	120	140	160	180
FLAPS 20 (VREF20 + 10)	PITCH ATT	1.5	1.5	1.5	1.5	1.5
	%N1	46.4	49.9	53.3	56.3	59.3
	KIAS	138	150	162	172	184

Go-Around (VREF 30 + 20)

Flaps 20, Gear Up, Set Go-Around Thrust

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG)				
		100	120	140	160	180
10000	PITCH ATT	18.5	15.5	13.0	11.0	9.0
	V/S (FT/MIN)	4100	3400	2900	2500	2100
	KIAS	139	151	162	176	191
5000	PITCH ATT	22.5	18.5	16.0	13.5	11.0
	V/S (FT/MIN)	4800	4100	3500	3000	2700
	KIAS	139	151	162	176	191
SEA LEVEL	PITCH ATT	26.5	21.5	18.0	15.5	13.0
	V/S (FT/MIN)	5300	4500	3900	3500	3100
	KIAS	139	151	162	176	191

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 KG)	FLAPS		
	30	25	20
190	179	170	179
180	171	166	173
170	164	161	168
160	156	156	162
150	148	151	157
140	142	146	151
130	137	141	146
120	131	135	141
110	125	129	135
100	119	123	128



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Advisory Information

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Section 71

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	150000 KG LANDING WEIGHT	PER 5000 KG ABV/ BLW 150000 KG	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	3200	110/-60	80	-130	440	50	-40	80	-70	250	80	170
MAX AUTO	5370	130/-130	150	-250	840	0	0	160	-160	600	0	0
AUTOBRAKE 4	5540	140/-140	160	-260	880	0	0	160	-160	630	0	0
AUTOBRAKE 3	6370	160/-160	190	-300	1040	0	-20	190	-190	710	0	0
AUTOBRAKE 2	7090	190/-190	220	-350	1190	50	-120	220	-210	630	110	110
AUTOBRAKE 1	7740	220/-220	250	-390	1360	170	-220	250	-230	580	480	620

Good Reported Braking Action

MAX MANUAL	5060	120/-120	140	-240	830	140	-120	140	-130	400	300	660
MAX AUTO	6180	150/-150	180	-290	980	20	0	180	-180	700	20	90
AUTOBRAKE 4	6370	160/-160	180	-300	1010	10	0	190	-190	720	10	60
AUTOBRAKE 3	7320	190/-190	220	-350	1190	0	-20	220	-220	820	0	0

Medium Reported Braking Action

MAX MANUAL	6940	190/-190	220	-370	1360	340	-270	210	-190	510	790	1910
MAX AUTO	6970	190/-180	220	-380	1370	300	-180	210	-200	660	700	1820
AUTOBRAKE 4	7050	190/-190	220	-380	1380	280	-160	220	-200	710	610	1730
AUTOBRAKE 3	7670	210/-200	230	-400	1450	180	-120	230	-230	820	410	1270

Poor Reported Braking Action

MAX MANUAL	8960	270/-260	300	-550	2100	760	-500	290	-260	590	1670	4460
MAX AUTO	8960	270/-260	300	-550	2100	760	-500	290	-260	590	1670	4470
AUTOBRAKE 4	8960	270/-260	300	-550	2100	770	-500	290	-260	600	1670	4470
AUTOBRAKE 3	9050	270/-260	300	-550	2110	700	-410	290	-270	760	1530	4320

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 460 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).

Distances for GOOD, MEDIUM, and POOR are increased by 15%.

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	150000 KG LANDING WEIGHT	PER 5000 KG ABV/ BLW 150000 KG	PER 1000 FT ABV SEA LEVEL	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 10 KTS ABV VREF 30	ONE REV	NO REV
MAX MANUAL	3150	140/-70	80	-130	440	50	-40	80	-70	250	80	160
MAX AUTO	5220	210/-140	150	-240	830	0	0	150	-150	600	0	0
AUTOBRAKE 4	5380	220/-140	150	-250	870	0	0	160	-160	620	0	0
AUTOBRAKE 3	6180	260/-170	180	-300	1020	0	-10	190	-190	720	0	0
AUTOBRAKE 2	6930	280/-200	210	-340	1180	40	-110	210	-210	640	80	80
AUTOBRAKE 1	7590	300/-220	240	-390	1350	160	-210	240	-230	580	410	540

Good Reported Braking Action

MAX MANUAL	5000	180/-130	140	-240	830	140	-120	140	-130	400	280	620
MAX AUTO	6010	250/-160	170	-280	970	20	0	170	-170	690	20	90
AUTOBRAKE 4	6190	260/-170	180	-290	1000	10	0	180	-180	710	10	60
AUTOBRAKE 3	7110	300/-200	210	-340	1180	0	-10	210	-210	830	0	0

Medium Reported Braking Action

MAX MANUAL	6860	260/-190	210	-370	1370	350	-270	210	-190	510	740	1770
MAX AUTO	6860	280/-190	210	-380	1370	320	-190	210	-200	650	690	1720
AUTOBRAKE 4	6920	290/-200	220	-380	1380	300	-170	210	-200	690	620	1650
AUTOBRAKE 3	7480	320/-210	230	-400	1440	190	-110	230	-220	830	410	1220

Poor Reported Braking Action

MAX MANUAL	8870	360/-270	300	-550	2110	780	-510	290	-260	600	1580	4140
MAX AUTO	8870	360/-270	300	-550	2100	780	-510	290	-260	590	1580	4150
AUTOBRAKE 4	8870	360/-270	300	-550	2100	780	-510	290	-260	590	1580	4150
AUTOBRAKE 3	8920	380/-270	300	-550	2110	730	-420	290	-270	770	1480	4050

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 460 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).

Distances for GOOD, MEDIUM, and POOR are increased by 15%.

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	150000 KG LDG WT	PER 5000 KG ABV/BLW 150000KG	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	4210	90/-90	100	-170/570	90/-80	110/-110	420	0	0
AIR/GRD SYS (FLAPS 30)	VREF30	4130	160/-100	100	-170/570	90/-80	110/-110	440	0	0
ALL FLAPS AND SLATS UP LANDING	VREF30+50	4530	260/-110	130	-170/570	80/-70	130/-120	320	200	440
ANTI-SKID OFF (FLAPS 25)	VREF25	5920	160/-150	160	-290/1010	190/-160	160/-150	440	410	960
ANTI-SKID OFF (FLAPS 30)	VREF30	5770	230/-160	160	-290/1010	190/-160	160/-150	450	380	880
ENGINE FAILURE (FLAPS 20)	VREF20	3460	150/-80	90	-140/470	60/-50	90/-90	280	0	110
HYD SYS PRESS (C ONLY) (FLAPS 20)	VREF20	4140	110/-100	100	-160/530	70/-60	100/-100	380	140	300
HYD SYS PRESS (L ONLY) (FLAPS 25)	VREF25	3350	90/-80	80	-130/460	50/-50	80/-80	290	100	200
HYD SYS PRESS (L ONLY) (FLAPS 30)	VREF30	3300	130/-80	80	-130/460	60/-50	80/-80	300	90	190
HYD SYS PRESS (R ONLY) (FLAPS 25)	VREF25	3680	90/-90	90	-150/530	70/-60	90/-90	310	140	300
HYD SYS PRESS (R ONLY) (FLAPS 30)	VREF30	3620	140/-90	90	-150/530	70/-70	90/-90	330	130	280
HYD SYS PRESS (L AND C) (FLAPS 20)	VREF30+20	4890	190/-110	130	-180/600	100/-90	130/-130	510	230	510
HYD SYS PRESS (L AND R) (FLAPS 20)	VREF30+20	4570	180/-110	130	-180/610	110/-90	130/-120	420	260	570
HYD SYS PRESS (R AND C) (FLAPS 20)	VREF30+20	5800	240/-150	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	150000 KG LDG WT	PER 5000 KG ABV/BLW 150000KG	PER 1000FT 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	3670	180/-80	90	-140/480	60/-50	90/-90	270	120	260
LE SLAT ASYM (FLAPS = 20)	VREF30+30	4140	170/-90	110	-150/520	70/-60	110/-110	310	160	340
LE SLAT ASYM (5 < FLAPS < 20)	VREF30+40	4440	170/-100	120	-160/540	80/-70	120/-120	320	180	390
LE SLAT DISAGREE (FLAPS > 20)	VREF20	3390	140/-80	80	-130/450	50/-50	80/-80	260	100	220
LE SLAT DISAGREE - ALTN FLAP EXT ACCOMPLISHED (FLAPS = 20)	VREF20	3390	140/-80	80	-130/450	50/-50	80/-80	260	100	220
LE SLAT DISAGREE - ALTN FLAP EXT FAILED (FLAPS = 20)	VREF30+30	3940	180/-90	100	-150/500	60/-60	100/-100	280	140	290
REVERSER UNLOCKED (FLAPS 20)	VREF30+30	4260	180/-100	110	-160/540	80/-70	120/-110	330	0	180
TE FLAP ASYM (FLAPS ≥ 20)	VREF20	3390	140/-80	80	-130/450	50/-50	80/-80	260	100	220
TE FLAP ASYM (5 < FLAPS < 20)	VREF30+20	3670	180/-80	90	-140/480	60/-50	90/-90	270	120	260
TE FLAP ASYM (FLAPS ≤ 5)	VREF30+30	3890	210/-90	100	-150/490	60/-50	100/-100	270	130	290
TE FLAP DISAGREE (FLAPS ≥ 20)	VREF20	3390	140/-80	80	-130/450	50/-50	80/-80	260	100	220
TE FLAP DISAGREE (5 < FLAPS < 20)	VREF30+20	3670	180/-80	90	-140/480	60/-50	90/-90	270	120	260
TE FLAP DISAGREE (FLAPS ≤ 5)	VREF30+30	3890	210/-90	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	150000 KG LDG WT	PER 5000 KG ABV/BLW 150000KG	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	6240	150/-150	180	-300/1010	270/-220	180/-180	620	0	0
AIR/GRD SYS (FLAPS 30)	VREF30	6090	250/-150	180	-300/1010	280/-230	180/-180	640	0	0
ALL FLAPS AND SLATS UP LANDING	VREF30+50	6220	220/-160	190	-250/860	160/-150	190/-180	380	530	1220
ANTI-SKID OFF (FLAPS 25)	VREF25	6660	190/-180	190	-350/1240	290/-230	190/-180	490	630	1530
ANTI-SKID OFF (FLAPS 30)	VREF30	6500	260/-180	190	-350/1240	290/-230	190/-180	490	590	1410
ENGINE FAILURE (FLAPS 20)	VREF20	4980	150/-130	140	-230/800	160/-140	140/-140	410	0	410
HYD SYS PRESS (C ONLY) (FLAPS 20)	VREF20	5600	170/-150	160	-250/840	170/-150	160/-150	510	430	1010
HYD SYS PRESS (L ONLY) (FLAPS 25)	VREF25	4620	130/-120	130	-220/750	140/-120	130/-120	390	300	680
HYD SYS PRESS (L ONLY) (FLAPS 30)	VREF30	4550	190/-120	130	-220/750	140/-120	130/-120	400	280	640
HYD SYS PRESS (R ONLY) (FLAPS 25)	VREF25	4620	130/-120	130	-220/750	140/-120	130/-120	390	300	680
HYD SYS PRESS (R ONLY) (FLAPS 30)	VREF30	4550	190/-120	130	-220/750	140/-120	130/-120	400	280	640
HYD SYS PRESS (L AND C) (FLAPS 20)	VREF30+20	6580	280/-180	200	-280/940	230/-190	200/-190	640	650	1560
HYD SYS PRESS (L AND R) (FLAPS 20)	VREF30+20	5760	240/-160	180	-250/860	190/-170	180/-170	510	530	1250
HYD SYS PRESS (R AND C) (FLAPS 20)	VREF30+20	6580	280/-180	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 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	
		150000 KG LDG WT	PER 5000 KG ABV/BLW 150000KG	PER 1000FT 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	5130	200/-130	150	-230/790	150/-130	150/-140	380	380	860
LE SLAT ASYM (FLAPS = 20)	VREF30+30	5770	220/-150	170	-250/840	170/-150	170/-170	420	470	1080
LE SLAT ASYM (5 < FLAPS < 20)	VREF30+40	6180	230/-160	190	-260/870	180/-160	190/-180	430	520	1190
LE SLAT DISAGREE (FLAPS > 20)	VREF20	4730	140/-130	130	-220/750	130/-120	130/-130	370	330	750
LE SLAT DISAGREE - ALTN FLAP EXT ACCOMPLISHED (FLAPS = 20)	VREF20	4730	140/-130	130	-220/750	130/-120	130/-130	370	330	750
LE SLAT DISAGREE - ALTN FLAP EXT FAILED (FLAPS = 20)	VREF30+30	5500	200/-140	160	-240/810	150/-140	160/-160	380	420	950
REVERSER UNLOCKED (FLAPS 20)	VREF30+30	6160	230/-160	180	-270/900	210/-180	190/-180	470	0	590
TE FLAP ASYM (FLAPS ≥ 20)	VREF20	4730	140/-130	130	-220/750	130/-120	130/-130	370	330	750
TE FLAP ASYM (5 < FLAPS < 20)	VREF30+20	5140	200/-140	150	-230/790	140/-130	150/-140	380	380	880
TE FLAP ASYM (FLAPS ≤ 5)	VREF30+30	5470	200/-140	160	-230/810	150/-130	160/-150	370	430	980
TE FLAP DISAGREE (FLAPS ≥ 20)	VREF20	4730	140/-130	130	-220/750	130/-120	130/-130	370	330	750
TE FLAP DISAGREE (5 < FLAPS < 20)	VREF30+20	5140	200/-140	150	-230/790	140/-130	150/-140	380	380	880
TE FLAP DISAGREE (FLAPS ≤ 5)	VREF30+30	5470	200/-140	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	150000 KG LDG WT	PER 5000 KG ABV/BLW 150000KG	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	9940	240/-230	310	-560/1950	1000/-670	320/-320	870	0	0
AIR/GRD SYS (FLAPS 30)	VREF30	9650	370/-230	310	-550/1940	1000/-670	320/-320	870	0	0
ALL FLAPS AND SLATS UP LANDING	VREF30+50	8820	340/-250	300	-400/1400	410/-330	300/-270	520	1430	3670
ANTI-SKID OFF (FLAPS 25)	VREF25	8370	260/-250	260	-500/1870	640/-440	250/-230	560	1370	3680
ANTI-SKID OFF (FLAPS 30)	VREF30	8180	350/-250	260	-500/1870	650/-440	250/-230	560	1290	3390
ENGINE FAILURE (FLAPS 20)	VREF20	7250	240/-220	230	-390/1360	440/-340	230/-220	560	0	1250
HYD SYS PRESS (C ONLY) (FLAPS 20)	VREF20	7520	260/-230	240	-380/1340	400/-310	240/-220	630	1120	2890
HYD SYS PRESS (L ONLY) (FLAPS 25)	VREF25	6320	190/-190	200	-340/1220	330/-260	200/-180	490	780	1900
HYD SYS PRESS (L ONLY) (FLAPS 30)	VREF30	6220	280/-190	200	-340/1220	340/-260	200/-180	500	740	1780
HYD SYS PRESS (R ONLY) (FLAPS 25)	VREF25	6320	190/-190	200	-340/1220	330/-260	200/-180	490	780	1900
HYD SYS PRESS (R ONLY) (FLAPS 30)	VREF30	6220	280/-190	200	-340/1220	340/-260	200/-180	500	740	1780
HYD SYS PRESS (L AND C) (FLAPS 20)	VREF30+20	8720	390/-260	290	-420/1460	500/-390	290/-260	740	1530	4090
HYD SYS PRESS (L AND R) (FLAPS 20)	VREF30+20	7850	350/-240	270	-390/1370	430/-340	260/-240	620	1300	3370
HYD SYS PRESS (R AND C) (FLAPS 20)	VREF30+20	8720	390/-260	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 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	
		150000 KG LDG WT	PER 5000 KG ABV/BLW 150000 KG	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	7070	290/-210	230	-360/1280	350/-280	230/-210	490	980	2430
LE SLAT ASYM (FLAPS = 20)	VREF30+30	7900	320/-230	260	-380/1350	390/-320	260/-240	530	1170	2930
LE SLAT ASYM (5 < FLAPS < 20)	VREF30+40	8430	340/-250	290	-400/1380	410/-330	280/-260	540	1340	3430
LE SLAT DISAGREE (FLAPS > 20)	VREF20	6540	220/-200	210	-340/1230	330/-260	200/-190	490	880	2200
LE SLAT DISAGREE - ALTN FLAP EXT ACCOMPLISHED (FLAPS = 20)	VREF20	6540	220/-200	210	-340/1230	330/-260	200/-190	490	880	2200
LE SLAT DISAGREE - ALTN FLAP EXT FAILED (FLAPS = 20)	VREF30+30	7550	300/-220	250	-370/1310	360/-290	250/-230	490	1050	2620
REVERSER UNLOCKED (FLAPS 20)	VREF30+30	8860	360/-260	290	-430/1510	530/-420	290/-280	610	0	1680
TE FLAP ASYM (FLAPS ≥ 20)	VREF20	6540	220/-200	210	-340/1230	330/-260	200/-190	490	880	2200
TE FLAP ASYM (5 < FLAPS < 20)	VREF30+20	7120	300/-210	230	-360/1280	350/-280	230/-210	490	1010	2540
TE FLAP ASYM (FLAPS ≤ 5)	VREF30+30	7590	310/-220	250	-370/1310	360/-290	250/-230	490	1110	2810
TE FLAP DISAGREE (FLAPS ≥ 20)	VREF20	6540	220/-200	210	-340/1230	330/-260	200/-190	490	880	2200
TE FLAP DISAGREE (5 < FLAPS < 20)	VREF30+20	7120	300/-210	230	-360/1280	350/-280	230/-210	490	1010	2540
TE FLAP DISAGREE (FLAPS ≤ 5)	VREF30+30	7590	310/-220	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	
		150000 KG LDG WT	PER 5000 KG ABV/BLW 150000 KG	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	16490	320/-200	570	-1120/4230	6080/-2020	600/-590	1090	0	0
AIR/GRD SYS (FLAPS 30)	VREF30	15920	480/-200	550	-1100/4180	5960/-1970	580/-570	1080	0	0
ALL FLAPS AND SLATS UP LANDING	VREF30+50	11600	480/-370	430	-590/2140	900/-630	410/-370	640	3020	8970
ANTI-SKID OFF (FLAPS 25)	VREF25	10950	380/-360	370	-800/3310	3040/-940	350/-310	630	3540	14250
ANTI-SKID OFF (FLAPS 30)	VREF30	10760	480/-360	360	-800/3310	3040/-950	350/-310	630	3380	13380
ENGINE FAILURE (FLAPS 20)	VREF20	9970	360/-320	340	-600/2200	1100/-700	330/-310	690	0	3070
HYD SYS PRESS (C ONLY) (FLAPS 20)	VREF20	9560	360/-310	330	-550/2030	840/-570	320/-290	710	2280	6740
HYD SYS PRESS (L ONLY) (FLAPS 25)	VREF25	8130	280/-260	280	-500/1870	710/-480	270/-240	560	1610	4380
HYD SYS PRESS (L ONLY) (FLAPS 30)	VREF30	8030	370/-270	280	-500/1870	730/-490	270/-240	570	1530	4080
HYD SYS PRESS (R ONLY) (FLAPS 25)	VREF25	8130	280/-260	280	-500/1870	710/-480	270/-240	560	1610	4380
HYD SYS PRESS (R ONLY) (FLAPS 30)	VREF30	8030	370/-270	280	-500/1870	730/-490	270/-240	570	1530	4080
HYD SYS PRESS (L AND C) (FLAPS 20)	VREF30+20	10910	510/-360	400	-600/2160	990/-670	380/-340	800	2910	8920
HYD SYS PRESS (L AND R) (FLAPS 20)	VREF30+20	10000	460/-330	360	-560/2060	890/-610	350/-310	690	2540	7490
HYD SYS PRESS (R AND C) (FLAPS 20)	VREF30+20	10910	510/-360	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 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	
		150000 KG LDG WT	PER 5000 KG ABV/BLW 150000 KG	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	9120	400/-290	320	-530/1950	760/-520	310/-280	570	2010	5610
LE SLAT ASYM (FLAPS = 20)	VREF30+30	10100	430/-320	360	-560/2040	820/-570	350/-320	600	2310	6530
LE SLAT ASYM (5 < FLAPS < 20)	VREF30+40	10880	460/-350	400	-570/2100	870/-610	380/-340	630	2700	7890
LE SLAT DISAGREE (FLAPS > 20)	VREF20	8500	320/-280	290	-510/1900	730/-500	280/-260	580	1860	5230
LE SLAT DISAGREE - ALTN FLAP EXT ACCOMPLISHED (FLAPS = 20)	VREF20	8500	320/-280	290	-510/1900	730/-500	280/-260	580	1860	5230
LE SLAT DISAGREE - ALTN FLAP EXT FAILED (FLAPS = 20)	VREF30+30	9680	410/-310	340	-540/1990	780/-540	330/-300	560	2120	5910
REVERSER UNLOCKED (FLAPS 20)	VREF30+30	11960	500/-380	420	-660/2380	1260/-830	410/-390	730	0	3880
TE FLAP ASYM (FLAPS ≥ 20)	VREF20	8500	320/-280	290	-510/1900	730/-500	280/-260	580	1860	5230
TE FLAP ASYM (5 < FLAPS < 20)	VREF30+20	9250	410/-300	330	-530/1960	760/-520	320/-280	590	2160	6210
TE FLAP ASYM (FLAPS ≤ 5)	VREF30+30	9820	420/-310	350	-540/2000	780/-540	340/-300	580	2290	6540
TE FLAP DISAGREE (FLAPS ≥ 20)	VREF20	8500	320/-280	290	-510/1900	730/-500	280/-260	580	1860	5230
TE FLAP DISAGREE (5 < FLAPS < 20)	VREF30+20	9250	410/-300	330	-530/1960	760/-520	320/-280	590	2160	6210
TE FLAP DISAGREE (FLAPS ≤ 5)	VREF30+30	9820	420/-310	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 KG)	OAT (°C)	PRESSURE ALTITUDE (1000 FT)																	
		0	2	4	0	2	4	0	2	4	0	2	4	0	2	4	0	2	4
180	0	15.1	16.1	17.0	22.8	24.3	25.8	31.8	33.9	35.9	41.8	44.6	47.4	52.7	56.3	59.9			
	10	15.7	16.6	17.6	23.6	25.1	26.6	32.9	35.0	37.2	43.2	46.1	49.1	54.5	58.3	62.0			
	20	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	60.3	64.2			
	30	16.7	17.7	18.7	25.2	26.8	28.4	35.0	37.4	39.7	46.1	49.2	52.3	58.2	62.2	66.2			
	40	16.9	18.0	19.0	25.6	27.3	29.0	35.8	38.2	40.5	47.2	50.4	53.6	59.6	63.7	67.9			
160	0	13.7	14.5	15.3	20.6	21.9	23.2	28.5	30.4	32.3	37.5	40.0	42.5	47.2	50.4	53.6	57.6	61.6	65.6
	10	14.1	15.0	15.9	21.3	22.6	24.0	29.5	31.5	33.4	38.8	41.4	44.0	48.9	52.2	55.5	59.6	63.8	67.9
	20	14.6	15.5	16.4	22.0	23.4	24.8	30.5	32.5	34.5	40.1	42.8	45.4	50.5	54.0	57.4	61.7	65.9	70.2
	30	15.0	16.0	16.9	22.7	24.1	25.5	31.5	33.5	35.6	41.3	44.1	46.9	52.1	55.7	59.3	63.7	68.1	72.5
	40	15.3	16.2	17.2	23.1	24.5	26.0	32.1	34.2	36.3	42.3	45.1	48.0	53.4	57.0	60.7	65.2	69.8	74.3
140	0	12.2	13.0	13.7	18.3	19.4	20.6	25.3	26.9	28.6	33.1	35.3	37.4	41.5	44.3	47.1	50.6	54.0	57.5
	10	12.7	13.4	14.2	18.9	20.1	21.3	26.2	27.9	29.5	34.2	36.5	38.8	43.0	45.9	48.8	52.4	56.0	59.6
	20	13.1	13.9	14.6	19.6	20.8	22.0	27.0	28.8	30.5	35.4	37.7	40.1	44.4	47.4	50.5	54.1	57.8	61.6
	30	13.5	14.3	15.1	20.2	21.4	22.7	27.9	29.7	31.5	36.5	38.9	41.3	45.9	49.0	52.1	55.9	59.7	63.6
	40	13.7	14.5	15.3	20.5	21.8	23.1	28.4	30.3	32.1	37.3	39.8	42.2	46.9	50.1	53.3	57.2	61.2	65.1
120	0	10.8	11.5	12.1	16.0	17.0	18.0	22.0	23.4	24.8	28.6	30.5	32.3	35.7	38.1	40.5	43.3	46.2	49.1
	10	11.2	11.9	12.5	16.6	17.6	18.6	22.8	24.2	25.7	29.6	31.5	33.4	37.0	39.4	41.9	44.8	47.8	50.9
	20	11.6	12.2	12.9	17.1	18.2	19.3	23.5	25.0	26.5	30.6	32.6	34.6	38.2	40.7	43.3	46.3	49.4	52.6
	30	11.9	12.6	13.3	17.7	18.8	19.9	24.2	25.8	27.3	31.5	33.6	35.7	39.4	42.0	44.7	47.8	51.0	54.3
	40	12.1	12.8	13.5	18.0	19.1	20.2	24.7	26.3	27.9	32.2	34.3	36.4	40.3	43.0	45.7	48.9	52.2	55.6
100	0	9.4	10.0	10.5	13.8	14.6	15.5	18.7	19.8	21.0	24.0	25.5	27.1	29.7	31.6	33.6	35.7	38.0	40.4
	10	9.8	10.3	10.9	14.3	15.1	16.0	19.3	20.5	21.7	24.8	26.4	28.0	30.7	32.7	34.7	36.9	39.4	41.8
	20	10.1	10.7	11.2	14.7	15.6	16.5	20.0	21.2	22.5	25.7	27.3	29.0	31.7	33.8	35.9	38.2	40.7	43.2
	30	10.4	11.0	11.6	15.2	16.1	17.0	20.6	21.9	23.2	26.5	28.2	29.9	32.7	34.9	37.0	39.4	42.0	44.6
	40	10.5	11.1	11.7	15.4	16.4	17.3	20.9	22.3	23.6	27.0	28.7	30.5	33.4	35.6	37.8	40.2	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
LANDING	RTO MAX MAN	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0	45.0	50.0
	MAX MAN	1.0	6.1	11.2	16.1	21.0	25.8	30.5	35.2	39.8	44.5
	MAX AUTO	1.7	6.1	10.4	14.7	18.9	23.1	27.3	31.5	35.8	40.0
	AUTOBRAKE 4	1.9	6.0	10.1	14.1	18.1	22.0	26.0	29.9	33.8	37.8
	AUTOBRAKE 3	1.8	5.7	9.5	13.2	17.0	20.7	24.3	28.0	31.6	35.3
	AUTOBRAKE 2	1.7	5.4	9.0	12.5	15.9	19.3	22.7	26.1	29.4	32.8
	AUTOBRAKE 1	1.7	5.0	8.2	11.3	14.4	17.4	20.3	23.3	26.2	29.1

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	NO SPECIAL	PROCEDURE REQUIRED	1	1	2	2	3	4	6	CAUTION	FUSE PLUG MELT ZONE
GEAR DOWN			11	15	19	24	34	44	59		
GROUND											

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 72

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 THRUST

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)	
KLAS	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)	
KLAS	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)	
KLAS	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)	
KLAS	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)	
KLAS	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)	
KLAS	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 THRUST

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)														
CIAS	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)														
CIAS	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)														
CIAS	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)														
CIAS	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)														
CIAS	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)														
CIAS	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 THRUST

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)														
CIAS	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)														
CIAS	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)														
CIAS	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)														
CIAS	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 KG)		OPTIMUM DRIFTDOWN SPEED (KIAS)	LEVEL OFF ALTITUDE (FT)		
START DRIFT DOWN	LEVEL OFF		ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
190	184	278	19900	18900	17400
180	175	270	21100	20400	19400
170	165	263	22400	21600	20800
160	155	255	23700	22900	22000
150	145	247	25100	24300	23300
140	135	239	26700	26100	24700
130	126	231	28400	28100	27100
120	116	222	30200	30200	29600
110	107	213	32000	32000	31600
100	97	203	34000	33900	33700

Includes APU fuel burn.

ENGINE INOP

MAX CONTINUOUS THRUST

Driftdown/LRC Cruise Range Capability

Ground to Air Miles Conversion

AIR DISTANCE (NM)					GROUND DISTANCE (NM)	AIR DISTANCE (NM)				
HEADWIND COMPONENT (KTS)						TAILWIND COMPONENT (KTS)				
100	80	60	40	20		20	40	60	80	100
272	254	237	223	211	200	189	180	172	164	158
545	508	476	447	422	400	379	361	344	329	315
818	762	714	671	633	600	569	542	517	494	473
1091	1017	952	895	845	800	759	722	689	659	631
1364	1272	1191	1119	1056	1000	949	903	861	823	789
1639	1527	1429	1344	1267	1200	1138	1083	1033	988	946
1913	1782	1668	1568	1479	1400	1328	1264	1205	1152	1103
2188	2038	1907	1792	1690	1600	1518	1444	1377	1316	1260
2464	2294	2147	2017	1902	1800	1707	1624	1549	1480	1417

Driftdown/Cruise Fuel and Time

AIR DIST (NM)	FUEL REQUIRED (1000 KG)										TIME (HR-MIN)
	WEIGHT AT START OF DRIFTDOWN (1000 KG)										
	100	110	120	130	140	150	160	170	180	190	
200	1.5	1.6	1.7	1.9	2.0	2.1	2.3	2.3	2.5	2.6	0:32
400	3.2	3.5	3.8	4.1	4.4	4.7	5.0	5.2	5.5	5.8	1:04
600	4.9	5.3	5.8	6.3	6.7	7.1	7.6	7.9	8.4	8.9	1:36
800	6.5	7.1	7.7	8.3	8.9	9.5	10.1	10.6	11.2	11.8	2:08
1000	8.1	8.9	9.6	10.4	11.1	11.8	12.6	13.2	14.0	14.7	2:40
1200	9.7	10.6	11.5	12.4	13.3	14.1	15.0	15.8	16.7	17.6	3:13
1400	11.3	12.3	13.3	14.4	15.4	16.4	17.4	18.4	19.4	20.5	3:45
1600	12.8	14.0	15.2	16.4	17.5	18.7	19.8	20.9	22.1	23.3	4:18
1800	14.3	15.6	17.0	18.3	19.6	20.9	22.2	23.4	24.7	26.0	4:51

Includes APU fuel burn.

Driftdown at optimum driftdown speed and cruise at Long Range Cruise speed.

ENGINE INOP

MAX CONTINUOUS THRUST

Long Range Cruise Altitude Capability

100 ft/min residual rate of climb

WEIGHT (1000 KG)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
190	17800	16200	13700
185	18700	17200	14800
180	19500	18200	15900
175	20300	19200	17100
170	20900	20100	18300
165	21600	20700	19600
160	22200	21400	20400
155	22900	22000	21000
150	23600	22700	21700
145	24300	23400	22300
140	25000	24100	23000
135	25900	24900	23700
130	26900	26000	24400
125	27900	27200	25300
120	28900	28400	26900
115	29900	29700	28400
110	30800	30700	30000
105	31800	31700	31100
100	32800	32700	32200

With engine anti-ice on, decrease altitude capability by 1400 ft.

With engine and wing anti-ice on, decrease altitude capability by 2900 ft.

ENGINE INOP

MAX CONTINUOUS THRUST

Long Range Cruise Control

WEIGHT (1000 KG)		PRESSURE ALTITUDE (1000 FT)								
		10	14	18	21	23	25	27	29	31
190	%N1	96.4	99.8	104.2						
	MACH	.554	.587	.625						
	KIAS	308	303	299						
	FF/ENG	5791	5827	5977						
180	%N1	94.8	98.2	102.2						
	MACH	.543	.576	.612						
	KIAS	301	297	292						
	FF/ENG	5465	5488	5597						
170	%N1	93.3	96.6	100.2	103.8					
	MACH	.531	.564	.599	.628					
	KIAS	294	291	286	283					
	FF/ENG	5142	5170	5231	5349					
160	%N1	91.5	94.8	98.3	101.5	104.2				
	MACH	.517	.551	.585	.614	.634				
	KIAS	286	284	279	276	274				
	FF/ENG	4813	4842	4873	4961	5060				
150	%N1	89.8	93.0	96.4	99.3	101.5				
	MACH	.503	.538	.572	.599	.618				
	KIAS	279	276	272	269	267				
	FF/ENG	4500	4522	4540	4594	4659				
140	%N1	87.9	91.1	94.4	97.1	99.2	101.6			
	MACH	.489	.522	.558	.583	.603	.623			
	KIAS	271	268	265	262	260	258			
	FF/ENG	4189	4195	4221	4241	4286	4356			
130	%N1	85.8	89.0	92.3	94.9	96.8	98.9	101.5		
	MACH	.474	.506	.542	.568	.586	.606	.626		
	KIAS	262	260	258	255	253	251	249		
	FF/ENG	3883	3878	3898	3915	3932	3975	4049		
120	%N1	83.7	86.9	90.2	92.7	94.4	96.3	98.5	101.2	
	MACH	.459	.490	.524	.551	.569	.587	.607	.628	
	KIAS	254	251	249	247	245	243	241	239	
	FF/ENG	3586	3569	3578	3593	3606	3621	3664	3736	
110	%N1	81.5	84.5	87.8	90.3	92.0	93.8	95.7	97.9	100.8
	MACH	.442	.473	.505	.533	.551	.569	.588	.608	.629
	KIAS	244	242	240	238	237	235	233	231	229
	FF/ENG	3290	3266	3262	3276	3285	3296	3309	3350	3417
100	%N1	78.6	82.1	85.3	87.7	89.4	91.1	92.9	94.9	97.1
	MACH	.423	.454	.486	.511	.530	.549	.568	.586	.607
	KIAS	234	233	230	229	228	226	225	222	221
	FF/ENG	2985	2971	2955	2955	2967	2976	2986	2997	3035

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
293	268	247	229	214	200	190	180	172	164	158
589	539	496	459	428	400	380	362	345	330	316
886	811	745	689	642	600	570	542	517	494	474
1184	1083	994	920	856	800	760	723	690	659	632
1483	1356	1244	1151	1071	1000	950	904	861	823	789
1784	1630	1495	1382	1286	1200	1140	1084	1033	987	946
2085	1905	1746	1614	1501	1400	1329	1264	1205	1151	1103
2389	2181	1998	1846	1716	1600	1519	1445	1377	1315	1260
2693	2457	2250	2077	1931	1800	1708	1624	1548	1479	1417

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT)									
	10		14		18		22		26	
	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)
200	2.5	0:43	2.2	0:41	2.0	0:40	1.8	0:38	1.6	0:37
400	5.2	1:21	4.7	1:18	4.4	1:15	4.1	1:12	3.9	1:09
600	7.8	2:01	7.3	1:55	6.8	1:50	6.5	1:45	6.2	1:41
800	10.5	2:40	9.8	2:33	9.2	2:25	8.8	2:19	8.5	2:13
1000	13.1	3:20	12.3	3:10	11.6	3:01	11.0	2:53	10.7	2:46
1200	15.6	4:00	14.7	3:48	13.9	3:37	13.3	3:28	12.9	3:18
1400	18.2	4:40	17.1	4:27	16.2	4:14	15.5	4:02	15.0	3:51
1600	20.7	5:21	19.5	5:06	18.5	4:50	17.7	4:37	17.2	4:24
1800	23.2	6:02	21.9	5:45	20.8	5:27	19.9	5:12	19.3	4:58

Fuel Required Adjustment (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG)									
	100	110	120	130	140	150	160	170	180	
2	-0.3	-0.2	-0.1	-0.1	0.0	0.1	0.2	0.3	0.4	
4	-0.6	-0.5	-0.3	-0.2	0.0	0.2	0.4	0.7	0.9	
6	-0.9	-0.7	-0.5	-0.2	0.0	0.3	0.7	1.1	1.5	
8	-1.3	-1.0	-0.6	-0.3	0.0	0.5	1.0	1.5	2.0	
10	-1.6	-1.2	-0.8	-0.4	0.0	0.6	1.2	1.9	2.6	
12	-2.0	-1.5	-1.0	-0.5	0.0	0.7	1.5	2.3	3.1	
14	-2.3	-1.7	-1.1	-0.6	0.0	0.8	1.7	2.7	3.6	
16	-2.6	-2.0	-1.3	-0.7	0.0	1.0	2.0	3.1	4.1	
18	-3.0	-2.2	-1.5	-0.7	0.0	1.1	2.2	3.4	4.7	
20	-3.3	-2.5	-1.6	-0.8	0.0	1.2	2.5	3.8	5.2	
22	-3.7	-2.7	-1.8	-0.9	0.0	1.3	2.7	4.2	5.7	
24	-4.0	-3.0	-2.0	-1.0	0.0	1.4	3.0	4.5	6.2	

Includes APU fuel burn.

ENGINE INOP

MAX CONTINUOUS THRUST

Holding

Flaps Up

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)						
		1500	5000	10000	15000	20000	25000	30000
190	%N1	85.2	88.3	92.7	97.7	104.2		
	KIAS	259	259	259	259	259		
	FF/ENG	5090	5110	5190	5350	5680		
180	%N1	83.6	86.6	91.0	95.9	101.7		
	KIAS	251	251	251	251	251		
	FF/ENG	4790	4810	4870	5000	5250		
170	%N1	81.8	84.8	89.2	93.9	99.4		
	KIAS	244	244	244	244	244		
	FF/ENG	4510	4520	4560	4670	4870		
160	%N1	79.7	83.0	87.4	91.9	97.2		
	KIAS	236	236	236	236	236		
	FF/ENG	4230	4230	4260	4330	4490		
150	%N1	77.7	81.0	85.4	89.9	95.0	101.4	
	KIAS	228	228	228	228	228	228	
	FF/ENG	3950	3950	3960	4010	4130	4380	
140	%N1	75.7	78.8	83.4	87.9	92.7	98.5	
	KIAS	222	222	222	222	222	222	
	FF/ENG	3690	3680	3680	3720	3810	3990	
130	%N1	73.7	76.7	81.4	85.9	90.5	95.9	
	KIAS	217	217	217	217	217	217	
	FF/ENG	3440	3420	3420	3440	3510	3650	
120	%N1	71.2	74.5	79.1	83.7	88.2	93.3	100.0
	KIAS	211	211	211	211	211	211	211
	FF/ENG	3190	3170	3170	3180	3220	3320	3530
110	%N1	68.8	72.2	76.7	81.4	85.9	90.8	96.5
	KIAS	205	205	205	205	205	205	205
	FF/ENG	2950	2930	2920	2920	2950	3020	3160
100	%N1	66.4	69.5	74.2	79.0	83.5	88.1	93.4
	KIAS	199	199	199	199	199	199	199
	FF/ENG	2710	2690	2680	2670	2690	2730	2830

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



Performance Inflight - QRH

Chapter PI-QRH

Gear Down

Section 73

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

GEAR DOWN

Long Range Cruise Altitude Capability

WEIGHT (1000 KG)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
190	21200	19700	17900
185	22200	20700	19100
180	23200	21600	20200
175	24300	22500	21100
170	25400	23500	22000
165	26400	24400	23000
160	27300	25600	23900
155	28000	26900	24900
150	28800	28200	26300
145	29700	29500	27800
140	30400	30400	29300
135	31200	31200	30500
130	32000	32000	31400
125	32800	32800	32300
120	33700	33600	33300
115	34500	34500	34200
110	35400	35400	35200
105	36300	36300	36100
100	37200	37100	37000



GEAR DOWN

Long Range Cruise Control

WEIGHT (1000 KG)		PRESSURE ALTITUDE (1000 FT)										
		10	14	18	21	23	25	27	29	31	33	35
190	%N1	90.5	93.9	97.7	101.1							
	MACH	.472	.508	.546	.577							
	KIAS	261	261	260	259							
	FF/ENG	4585	4622	4709	4821							
180	%N1	89.0	92.3	96.0	99.1	101.6						
	MACH	.461	.495	.534	.563	.584						
	KIAS	255	254	254	253	252						
	FF/ENG	4323	4348	4419	4492	4574						
170	%N1	87.4	90.7	94.2	97.1	99.4	102.0					
	MACH	.449	.483	.520	.550	.571	.591					
	KIAS	248	248	247	246	246	244					
	FF/ENG	4071	4081	4124	4190	4256	4322					
160	%N1	85.7	88.8	92.3	95.2	97.2	99.6	102.4				
	MACH	.437	.469	.506	.536	.555	.577	.596				
	KIAS	241	240	240	240	239	238	236				
	FF/ENG	3822	3813	3844	3901	3938	4011	4071				
150	%N1	83.8	87.1	90.5	93.2	95.1	97.2	99.8	102.9			
	MACH	.424	.456	.491	.520	.540	.561	.583	.602			
	KIAS	234	233	233	232	232	231	231	229			
	FF/ENG	3574	3558	3576	3608	3650	3688	3761	3822			
140	%N1	81.9	85.2	88.4	91.1	93.0	95.0	97.2	99.8	103.2		
	MACH	.411	.442	.476	.504	.524	.544	.565	.587	.607		
	KIAS	227	226	225	225	225	224	224	223	221		
	FF/ENG	3326	3311	3312	3331	3361	3398	3442	3506	3572		
130	%N1	80.0	83.1	86.3	89.0	90.7	92.7	94.7	97.0	99.7		
	MACH	.398	.427	.460	.487	.506	.527	.548	.570	.591		
	KIAS	220	219	218	217	217	217	216	216	214		
	FF/ENG	3100	3066	3053	3068	3081	3112	3144	3194	3248		
120	%N1	77.7	80.9	84.2	86.6	88.4	90.2	92.2	94.2	96.6	99.4	
	MACH	.385	.411	.443	.469	.488	.508	.529	.550	.572	.593	
	KIAS	212	210	210	209	209	209	209	208	207	206	
	FF/ENG	2880	2820	2808	2805	2818	2830	2860	2890	2943	2987	
110	%N1	75.2	78.6	81.8	84.3	85.9	87.8	89.6	91.6	93.6	96.1	99.0
	MACH	.369	.396	.426	.451	.469	.488	.508	.529	.551	.574	.595
	KIAS	203	203	201	201	200	200	200	200	199	199	197
	FF/ENG	2642	2598	2567	2558	2557	2568	2579	2607	2638	2688	2729
100	%N1	72.7	75.9	79.2	81.7	83.4	85.0	86.9	88.7	90.7	92.8	95.3
	MACH	.353	.380	.408	.432	.449	.467	.487	.507	.528	.550	.574
	KIAS	195	194	192	192	192	191	191	191	191	190	190
	FF/ENG	2414	2378	2327	2317	2311	2310	2318	2329	2355	2386	2434

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
650	580	520	473	434	400	378	357	339	323	308
981	875	784	711	652	600	567	536	509	484	462
1316	1172	1048	950	870	800	755	714	677	644	615
1655	1472	1315	1190	1089	1000	944	893	846	805	768
1998	1774	1583	1431	1308	1200	1132	1071	1015	965	921
2346	2080	1852	1673	1527	1400	1320	1248	1182	1124	1072
2699	2389	2124	1915	1747	1600	1509	1426	1350	1283	1224
3056	2700	2397	2159	1967	1800	1697	1603	1518	1442	1375
3419	3016	2672	2404	2188	2000	1884	1779	1684	1599	1525

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT)									
	10		14		18		22		28	
	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)
200	4.6	0:49	4.2	0:47	3.8	0:45	3.5	0:44	3.1	0:41
400	9.6	1:36	8.9	1:32	8.2	1:27	7.7	1:23	7.1	1:17
600	14.4	2:24	13.4	2:16	12.5	2:09	11.8	2:03	10.9	1:53
800	19.2	3:12	17.9	3:02	16.7	2:52	15.8	2:43	14.7	2:30
1000	23.9	4:01	22.2	3:49	20.9	3:36	19.7	3:24	18.4	3:07
1200	28.4	4:51	26.5	4:36	24.9	4:20	23.5	4:05	22.0	3:44
1400	32.9	5:43	30.7	5:24	28.9	5:05	27.3	4:47	25.5	4:22
1600	37.3	6:35	34.9	6:12	32.8	5:51	30.9	5:30	28.9	5:01
1800	41.6	7:28	38.9	7:02	36.6	6:37	34.5	6:13	32.3	5:40
2000	45.8	8:22	42.9	7:52	40.3	7:24	38.1	6:57	35.6	6:20

Fuel Required Adjustment (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG)				
	100	120	140	160	180
5	-0.7	-0.3	0.0	0.6	1.2
10	-1.5	-0.7	0.0	1.2	2.5
15	-2.3	-1.1	0.0	1.8	3.7
20	-3.1	-1.5	0.0	2.3	4.9
25	-3.9	-1.9	0.0	2.9	6.1
30	-4.7	-2.3	0.0	3.5	7.2
35	-5.5	-2.7	0.0	4.0	8.3
40	-6.3	-3.1	0.0	4.5	9.4
45	-7.0	-3.5	0.0	5.0	10.4
50	-7.8	-3.9	0.0	5.5	11.4

Descent at VREF30 + 70

PRESSURE ALTITUDE (1000 FT)	5	10	15	17	19	21	23	25	27	29	31	33	35
DISTANCE (NM)	17	27	37	41	45	49	54	58	62	66	71	75	79
TIME (MINUTES)	7	9	12	12	13	14	15	16	16	17	18	19	19

GEAR DOWN

Holding Flaps Up

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)						
		1500	5000	10000	15000	20000	25000	30000
190	%N1	81.7	84.5	88.7	93.1	98.1		
	KIAS	249	249	249	249	249		
	FF/ENG	4500	4480	4490	4540	4690		
180	%N1	79.8	82.9	87.0	91.3	96.1		
	KIAS	241	241	241	241	241		
	FF/ENG	4240	4210	4200	4240	4350		
170	%N1	78.0	81.1	85.3	89.5	94.2	100.0	
	KIAS	234	234	234	234	234	234	
	FF/ENG	4000	3970	3950	3970	4050	4240	
160	%N1	76.1	79.0	83.3	87.6	92.1	97.5	
	KIAS	226	226	226	226	226	226	
	FF/ENG	3740	3710	3680	3690	3740	3880	
150	%N1	74.1	76.9	81.3	85.6	90.0	95.0	102.5
	KIAS	218	218	218	218	218	218	218
	FF/ENG	3480	3450	3420	3410	3450	3540	3790
140	%N1	72.1	75.1	79.5	83.7	88.1	92.9	99.2
	KIAS	212	212	212	212	212	212	212
	FF/ENG	3270	3240	3200	3190	3210	3270	3450
130	%N1	70.2	73.4	77.6	81.9	86.3	90.9	96.5
	KIAS	207	207	207	207	207	207	207
	FF/ENG	3080	3050	3010	2980	2990	3040	3170
120	%N1	68.2	71.3	75.6	80.1	84.4	88.8	94.0
	KIAS	201	201	201	201	201	201	201
	FF/ENG	2880	2850	2810	2780	2780	2810	2900
110	%N1	66.3	69.2	73.6	78.1	82.4	86.8	91.7
	KIAS	195	195	195	195	195	195	195
	FF/ENG	2700	2660	2620	2590	2580	2590	2660
100	%N1	64.2	67.0	71.5	75.7	80.2	84.6	89.3
	KIAS	189	189	189	189	189	189	189
	FF/ENG	2510	2480	2440	2400	2380	2380	2420

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

Intentionally
Blank



Performance Inflight - QRH

Chapter PI-QRH

Gear Down, Engine Inop

Section 74

GEAR DOWN

ENGINE INOP

MAX CONTINUOUS THRUST

Initial Max Continuous %N1

29000 FT to 10000 FT Pressure Altitudes

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

29000 FT PRESS ALT								TAT (°C)					
MACH	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	
0.6	102.6	103.6	104.7	105.8	106.8	107.9	108.6	107.7	106.8	106.1	105.5	104.9	
0.5	102.6	103.6	104.7	105.8	106.8	107.9	108.4	107.4	106.8	106.1	105.5	102.8	
0.4	102.6	103.6	104.7	105.8	106.8	107.9	108.2	107.5	106.8	106.2	103.6	100.5	
27000 FT PRESS ALT								TAT (°C)					
MACH	-40	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	
0.6	102.6	103.6	104.7	105.8	106.8	107.9	108.6	107.6	106.7	105.7	105.0	104.3	
0.5	102.6	103.6	104.7	105.8	106.8	107.9	108.2	107.2	106.3	105.6	104.8	104.0	
0.4	102.6	103.6	104.7	105.8	106.8	107.9	108.0	107.0	106.3	105.6	104.7	101.8	
25000 FT PRESS ALT								TAT (°C)					
MACH	-35	-30	-25	-20	-15	-10	-5	0	5	10	15	20	
0.6	102.3	103.2	104.2	105.2	106.1	106.9	107.3	106.4	105.4	104.4	103.6	102.9	
0.5	103.6	104.7	105.8	106.8	107.6	107.8	106.9	105.9	104.9	104.1	103.4	102.1	
0.4	103.6	104.7	105.8	106.8	107.9	107.7	106.7	105.7	104.9	104.1	102.8	100.0	
23000 FT PRESS ALT								TAT (°C)					
MACH	-30	-25	-20	-15	-10	-5	0	5	10	15	20	25	
0.6	103.2	104.2	105.2	106.1	107.0	107.9	108.0	107.2	106.2	105.3	104.5	103.7	
0.5	104.7	105.8	106.8	107.8	108.7	108.6	107.7	106.7	105.8	105.0	104.2	102.7	
0.4	104.7	105.8	106.8	107.9	108.9	108.6	107.6	106.6	105.8	105.0	103.4	100.8	
21000 FT PRESS ALT								TAT (°C)					
MACH	-30	-25	-20	-15	-10	-5	0	5	10	15	20	25	
0.6	103.9	104.8	105.8	106.8	107.7	108.6	109.5	109.4	108.5	107.5	106.6	105.7	
0.5	104.7	105.8	106.8	107.9	108.9	109.9	109.9	109.0	108.0	107.0	106.1	105.3	
0.4	104.7	105.8	106.8	107.9	108.9	109.9	109.8	108.8	107.8	106.9	106.1	104.2	
19000 FT PRESS ALT								TAT (°C)					
MACH	-25	-20	-15	-10	-5	0	5	10	15	20	25	30	
0.6	104.3	105.3	106.2	107.2	108.1	109.0	110.0	109.6	108.7	107.7	106.8	105.9	
0.5	105.8	106.8	107.9	108.9	109.8	110.7	110.1	109.2	108.2	107.3	106.4	105.5	
0.4	105.8	106.8	107.9	108.9	109.9	110.9	110.1	109.1	108.2	107.2	106.4	104.3	
15000 FT PRESS ALT								TAT (°C)					
MACH	-20	-15	-10	-5	0	5	10	15	20	25	30	35	
0.6	102.8	103.8	104.7	105.6	106.6	107.5	108.4	109.2	108.2	107.3	106.4	105.7	
0.5	104.3	105.2	106.2	107.1	108.1	109.0	109.4	108.4	107.5	106.7	105.9	105.1	
0.4	105.2	106.2	107.2	108.2	109.2	110.2	109.5	108.6	107.7	106.9	106.1	105.1	
10000 FT PRESS ALT								TAT (°C)					
MACH	-15	-10	-5	0	5	10	15	20	25	30	35	40	
0.6	100.3	101.2	102.1	103.0	103.9	104.8	105.6	106.5	107.4	106.7	106.0	105.2	
0.5	101.4	102.4	103.3	104.2	105.1	106.0	106.9	107.5	106.8	106.0	105.2	104.5	
0.4	102.6	103.5	104.4	105.4	106.3	107.2	107.8	107.0	106.2	105.4	104.7	104.1	

GEAR DOWN

ENGINE INOP

MAX CONTINUOUS THRUST

Driftdown Speed/Level Off Altitude

100 ft/min residual rate of climb

WEIGHT (1000 KG)		OPTIMUM DRIFTDOWN SPEED (KIAS)	LEVEL OFF ALTITUDE (FT)		
START DRIFT DOWN	LEVEL OFF		ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
180	172	239	4900	3000	800
170	163	232	7500	5700	3700
160	153	224	10000	8600	6800
150	144	217	12300	11200	9600
140	134	211	14400	13600	12100
130	125	206	16100	15800	14700
120	115	201	17900	17800	17000
110	106	195	20000	19900	19300
100	96	189	21800	21700	21200

Includes APU fuel burn.

GEAR DOWN**ENGINE INOP****MAX CONTINUOUS THRUST****Long Range Cruise Altitude Capability****100 ft/min residual rate of climb**

WEIGHT (1000 KG)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
170	3300	300	
165	4800	2100	
160	6400	3800	900
155	8000	5400	2700
150	9400	7100	4400
145	10800	8700	6100
140	12200	10200	8000
135	13600	12100	9600
130	15000	13900	11500
125	16000	15500	13500
120	16900	16800	15400
115	18000	17900	17100
110	19100	19000	18300
105	20200	20100	19600
100	21200	21100	20600
95	22100	22000	21400
90	23100	22900	22300

With engine anti-ice on, decrease altitude capability by 1500 ft.**With engine and wing anti-ice on, decrease altitude capability by 3300 ft.**

GEAR DOWN

ENGINE INOP

MAX CONTINUOUS THRUST

Long Range Cruise Control

WEIGHT (1000 KG)		PRESSURE ALTITUDE (1000 FT)							
		6	8	10	12	14	16	18	20
160	%N1	101.7	103.7						
	MACH	.398	.409						
	KIAS	237	234						
	FF/ENG	7366	7381						
150	%N1	99.5	101.4	103.5					
	MACH	.389	.400	.410					
	KIAS	231	229	227					
	FF/ENG	6877	6875	6891					
140	%N1	97.4	99.1	101.0	103.2	105.9			
	MACH	.379	.390	.401	.412	.422			
	KIAS	225	223	221	219	216			
	FF/ENG	6405	6388	6386	6399	6425			
130	%N1	95.1	96.8	98.5	100.5	102.7	105.5		
	MACH	.367	.379	.391	.402	.412	.422		
	KIAS	218	217	215	213	211	208		
	FF/ENG	5932	5916	5902	5897	5907	5942		
120	%N1	92.7	94.3	96.0	97.8	99.8	102.0	105.3	
	MACH	.355	.367	.379	.390	.402	.412	.425	
	KIAS	211	210	209	207	205	203	201	
	FF/ENG	5467	5446	5432	5419	5410	5423	5515	
110	%N1	90.2	91.7	93.4	95.1	96.9	98.9	101.3	105.3
	MACH	.342	.353	.365	.377	.389	.401	.413	.430
	KIAS	203	202	201	200	199	197	195	195
	FF/ENG	5011	4985	4964	4952	4940	4929	4975	5146
100	%N1	87.4	89.0	90.6	92.2	94.0	95.8	97.9	100.9
	MACH	.328	.339	.351	.363	.375	.387	.400	.417
	KIAS	195	194	193	192	191	190	189	189
	FF/ENG	4543	4530	4508	4487	4476	4465	4483	4593

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
164	146	131	118	109	100	94	89	84	79	75
334	296	263	238	218	200	187	175	165	156	148
505	447	398	359	327	300	281	263	247	234	222
677	598	531	479	437	400	374	350	329	311	295
850	751	666	600	546	500	467	438	411	388	368
1024	903	801	720	656	600	560	524	493	465	441
1199	1057	936	841	766	700	653	611	574	541	513
1375	1211	1072	963	876	800	746	698	655	618	586
1553	1366	1208	1084	986	900	839	785	737	695	659
1731	1522	1344	1206	1096	1000	932	872	818	771	731

Reference Fuel and Time Required at Check Point

AIR DIST (NM)	PRESSURE ALTITUDE (1000 FT)							
	6		10		14		18	
	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)	FUEL (1000 KG)	TIME (HR:MIN)
100	2.4	0:27	2.1	0:27	1.9	0:26	1.7	0:26
200	5.0	0:52	4.6	0:50	4.3	0:49	4.1	0:47
300	7.5	1:17	7.0	1:14	6.6	1:12	6.5	1:09
400	10.1	1:42	9.5	1:38	9.0	1:35	8.8	1:31
500	12.6	2:08	11.9	2:02	11.3	1:58	11.1	1:54
600	15.1	2:33	14.2	2:27	13.6	2:21	13.4	2:16
700	17.6	2:59	16.6	2:51	15.8	2:45	15.6	2:38
800	20.0	3:25	18.9	3:16	18.0	3:08	17.8	3:01
900	22.4	3:51	21.2	3:40	20.2	3:32	19.9	3:24
1000	24.8	4:17	23.4	4:06	22.4	3:56	22.0	3:47

Fuel Required Adjustment (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG)									
	100	110	120	130	140	150	160	170	180	
2	-0.3	-0.2	-0.2	-0.1	0.0	0.1	0.3	0.4	0.5	
4	-0.7	-0.5	-0.3	-0.2	0.0	0.3	0.5	0.8	1.1	
6	-1.0	-0.7	-0.5	-0.3	0.0	0.4	0.8	1.3	1.7	
8	-1.4	-1.0	-0.7	-0.3	0.0	0.5	1.1	1.7	2.3	
10	-1.7	-1.3	-0.8	-0.4	0.0	0.7	1.4	2.2	2.9	
12	-2.1	-1.5	-1.0	-0.5	0.0	0.8	1.7	2.6	3.5	
14	-2.4	-1.8	-1.2	-0.6	0.0	0.9	1.9	3.0	4.1	
16	-2.8	-2.1	-1.4	-0.7	0.0	1.1	2.2	3.4	4.6	
18	-3.2	-2.3	-1.5	-0.8	0.0	1.2	2.5	3.8	5.2	
20	-3.5	-2.6	-1.7	-0.9	0.0	1.4	2.8	4.3	5.8	
22	-3.9	-2.9	-1.9	-0.9	0.0	1.5	3.0	4.7	6.3	
24	-4.2	-3.1	-2.1	-1.0	0.0	1.6	3.3	5.1	6.9	
26	-4.6	-3.4	-2.2	-1.1	0.0	1.8	3.6	5.5	7.4	

Includes APU fuel burn.

GEAR DOWN
ENGINE INOP

MAX CONTINUOUS THRUST

**Holding
Flaps Up**

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)				
		1500	5000	10000	15000	20000
180	%N1	99.6				
	KIAS	241				
	FF/ENG	8240				
170	%N1	97.5	101.1			
	KIAS	234	234			
	FF/ENG	7710	7820			
160	%N1	95.3	98.6			
	KIAS	226	226			
	FF/ENG	7150	7220			
150	%N1	93.0	96.2	101.6		
	KIAS	218	218	218		
	FF/ENG	6610	6650	6820		
140	%N1	91.0	94.0	99.1		
	KIAS	212	212	212		
	FF/ENG	6160	6190	6300		
130	%N1	89.0	92.1	96.8	103.3	
	KIAS	207	207	207	207	
	FF/ENG	5760	5780	5850	6090	
120	%N1	87.0	89.9	94.4	100.1	
	KIAS	201	201	201	201	
	FF/ENG	5350	5360	5400	5550	
110	%N1	84.8	87.7	92.1	97.2	105.3
	KIAS	195	195	195	195	195
	FF/ENG	4960	4960	4990	5080	5400
100	%N1	82.4	85.5	89.7	94.5	100.9
	KIAS	189	189	189	189	189
	FF/ENG	4580	4570	4580	4630	4820

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

**Performance Inflight - QRH****Chapter PI-QRH****Text****Section 75**

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. Landing distances for slippery runways are 115% of the actual landing distances.

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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Maneuvers

Introduction

Chapter Man

Section 05

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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**Maneuvers****Chapter Man****Non-Normal Maneuvers****Section 1****Approach to Stall or Stall Recovery**

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

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

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

Pilot Flying	Pilot Monitoring
• Initiate the recovery: • Hold the control column firmly. • Disconnect autopilot and autothrottle. • Smoothly apply nose down elevator to reduce the angle of attack until buffet or stick shaker stops. Nose down stabilizer trim may be needed.*	• Monitor altitude and airspeed. • Verify all required actions have been done and call out any omissions. • Call out any trend toward terrain contact.
• Continue the recovery: • Roll in the shortest direction to wings level if needed.** • Advance thrust levers as needed. • Retract the speedbrakes. • Do not change gear or flap configuration, except • During liftoff, if flaps are up, call for flaps 1.	• Monitor altitude and airspeed. • Verify all required actions have been done and call out any omissions. • Call out any trend toward terrain contact. • Set the FLAP lever as directed.
• Complete the recovery: • Check airspeed and adjust thrust as needed. • Establish pitch attitude. • Return to the desired flight path. • Re-engage the autopilot and autothrottle if desired.	• Monitor altitude and airspeed. • Verify all required actions have been done and call out any omissions. • Call out any trend toward terrain contact.

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

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

Rejected Takeoff

The captain has the sole responsibility for the decision to reject the takeoff. The decision must be made in time to start the rejected takeoff maneuver by V1. If the decision is to reject the takeoff, the captain must clearly announce “REJECT,” immediately start the rejected takeoff maneuver, and assume control of the airplane. If the first officer is making the takeoff, the first officer must maintain control of the airplane until the captain makes a positive input to the controls.

Prior to 80 knots the takeoff should be rejected for any of the following:

- activation of the master caution
- system 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.

- I** **VP-BDI, VP-BMC, VP-BWW, VP-BWX, VQ-BMU, VQ-BOG**
- 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.

- I** **VP-BDI, VP-BMC, VP-BWW, VP-BWX, VQ-BMU, VQ-BOG**
- predictive windshear warning

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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 AUTO BRAKES light illuminates or deceleration is not adequate. Raise SPEEDBRAKE lever. Apply reverse thrust up to the maximum amount consistent with conditions. Continue maximum braking until certain the airplane will stop on the runway.	Verify actions as follows: Thrust levers closed. Autothrottle disengaged. Maximum brakes applied. Verify speedbrake lever UP and call "SPEEDBRAKES UP." If speedbrake lever not UP call "SPEEDBRAKES NOT UP." Reverse thrust applied. When both REV indications are green, call "REVERSERS NORMAL." If there is no REV indication(s) or the indication(s) stays amber, call "NO REVERSER LEFT ENGINE", or "NO REVERSER RIGHT ENGINE", or "NO REVERSERS". 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.
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	

Accomplish the following maneuver for any of these aural alerts*:

- **VP-BDI, VP-BWW, VP-BWX, VQ-BOG**
- **CAUTION OBSTACLE**
- **VP-BOQ**
- **CAUTION OBSTACLE**
- **VP-BDI, VP-BMC, VP-BWW through VQ-BMQ, VQ-BOG, VQ-BPT**
- **CAUTION TERRAIN**
- **VP-BOQ**
- **CAUTION TERRAIN**
- **VQ-BMU**
- **TERRAIN AHEAD**
- **TERRAIN**
- **DON'T SINK**
- **GLIDESLOPE**
- **SINK RATE**
- **TOO LOW FLAPS**
- **TOO LOW GEAR**
- **TOO LOW TERRAIN**
- **VP-BDI through VQ-BPT**
- **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.

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VP-BDI, VP-BWW, VP-BWX, VQ-BOG

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.

VP-BOQ

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.

VP-BMC, VQ-BMQ, VQ-BMU, VQ-BPT

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

Note: *As installed, some repeat.

Ground Proximity GPWS Warning

Accomplish the following maneuver for any of these conditions:

- activation of the “PULL UP” warning

VP-BDI, VP-BWW, VP-BWX, VQ-BOG

- activation of the “OBSTACLE OBSTACLE PULL UP” warning

VP-BOQ

- activation of the “OBSTACLE OBSTACLE PULL UP” warning

VP-BDI, VP-BMC, VP-BWW through VQ-BMQ, VQ-BOG, VQ-BPT

- activation of the “TERRAIN TERRAIN PULL UP” warning

VP-BOQ

- activation of the “TERRAIN TERRAIN PULL UP” warning

VQ-BMU

- activation of the “TERRAIN AHEAD PULL UP” warning
- other situations resulting in unacceptable flight toward terrain.

Pilot Flying	Pilot Monitoring
• Disconnect autopilot. • Disconnect autothrottle. • Aggressively apply maximum* thrust. • Simultaneously roll wings level and rotate to an initial pitch attitude of 20°. • Retract speedbrakes. • If terrain remains a threat, continue rotation up to the pitch limit indicator 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.

| VP-BDI, VP-BWW, VP-BWX, VQ-BOG

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.

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VP-BOQ

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.

VP-BMC, VQ-BMQ, VQ-BMU, VQ-BPT

Note: If positive visual verification is made that no terrain hazard exists when flying under daylight VMC conditions prior to a 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.

VP-BDI, VP-BOQ through VQ-BRA

Note: Do not use flight director pitch commands until clear of conflict.

VP-BMC

Note: Do not use flight director 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)

VP-BDI, VP-BMC, VP-BWW, VP-BWX, VQ-BMU, VQ-BOG |

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)**	• Verify maximum* thrust. • Verify all required actions have been completed and call out any omissions.
AUTOMATIC FLIGHT • Press either go-around switch***. • Verify TO/GA mode annunciation. • Verify GA thrust. • Retract speedbrakes. • Monitor system performance****.	• Verify GA* thrust. • Verify all required actions have been completed and call out any omissions.
MANUAL OR AUTOMATIC FLIGHT • Do not change flap or gear configuration until windshear is no longer a factor. • Monitor vertical speed and altitude. • Do not attempt to regain lost airspeed until windshear is no longer a factor.	• Monitor vertical speed and altitude. • Call out any trend toward terrain contact, descending flight path, or significant airspeed changes.

Note: Aft control column force increases as the airspeed decreases. In all cases, the pitch attitude that results in intermittent stick shaker or initial buffet is the upper pitch attitude limit. Flight at intermittent stick shaker may be required to obtain 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: ** Do not exceed the Pitch Limit Indication.

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.

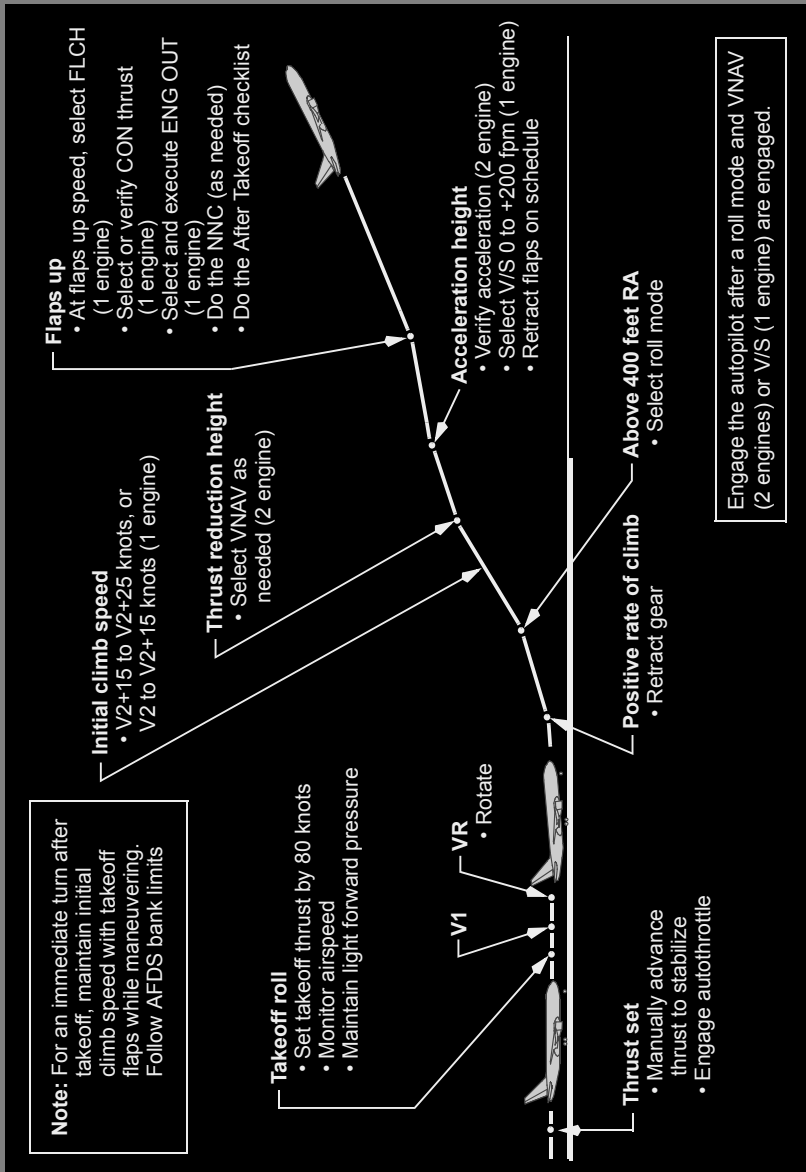
Maneuvers

Flight Patterns

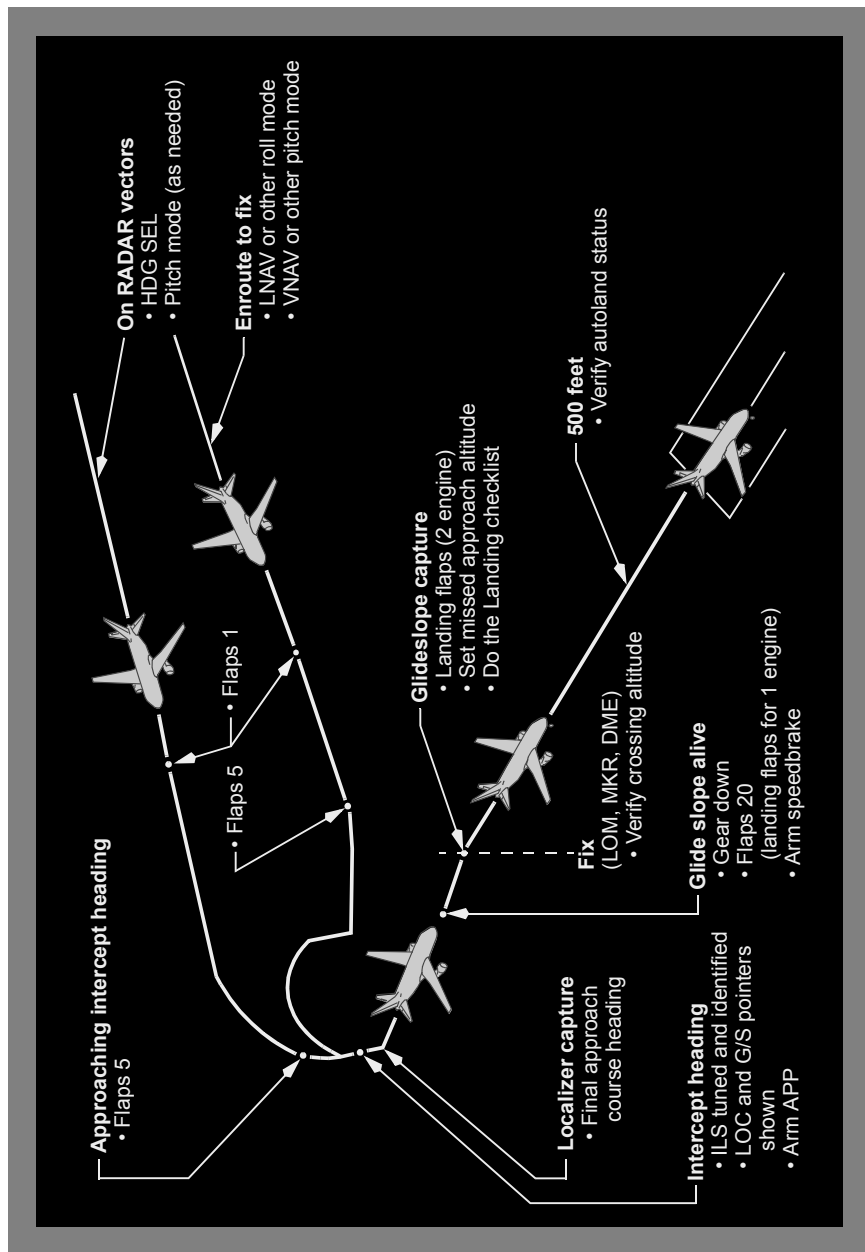
Chapter Man

Section 2

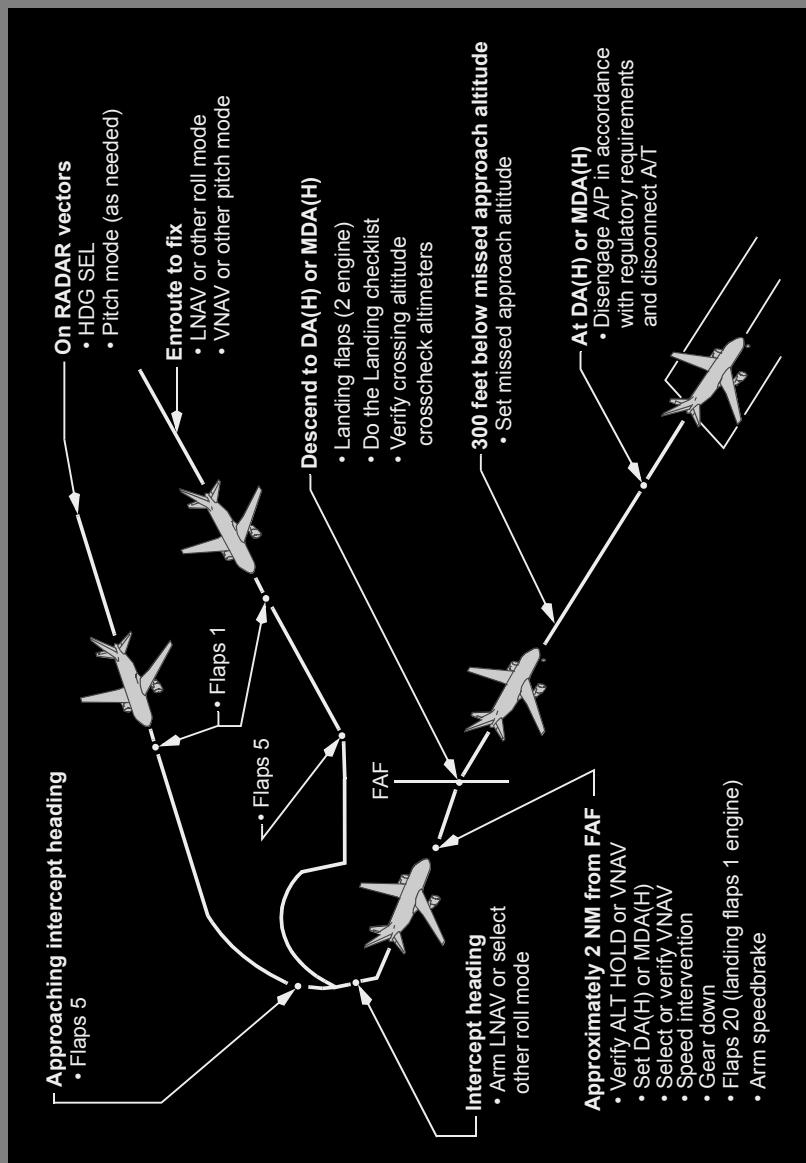
Takeoff



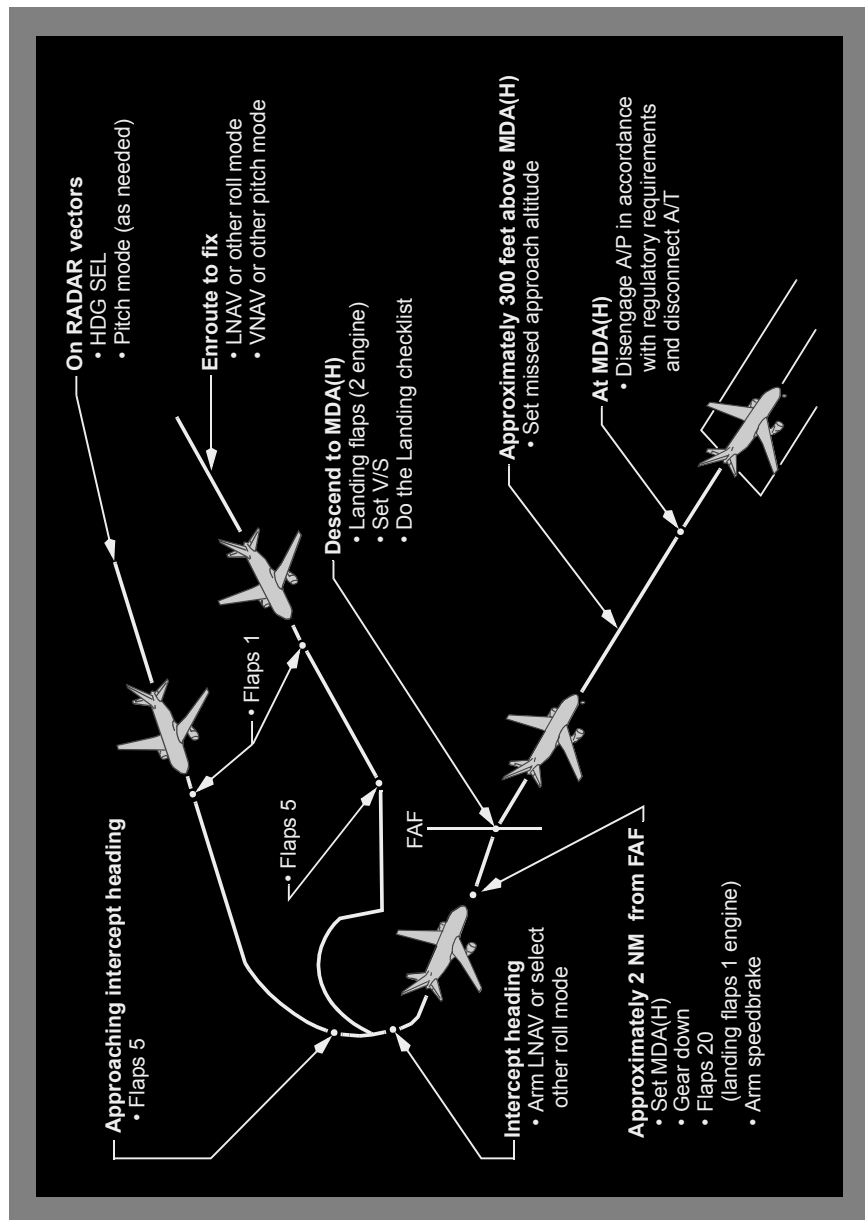
ILS Approach



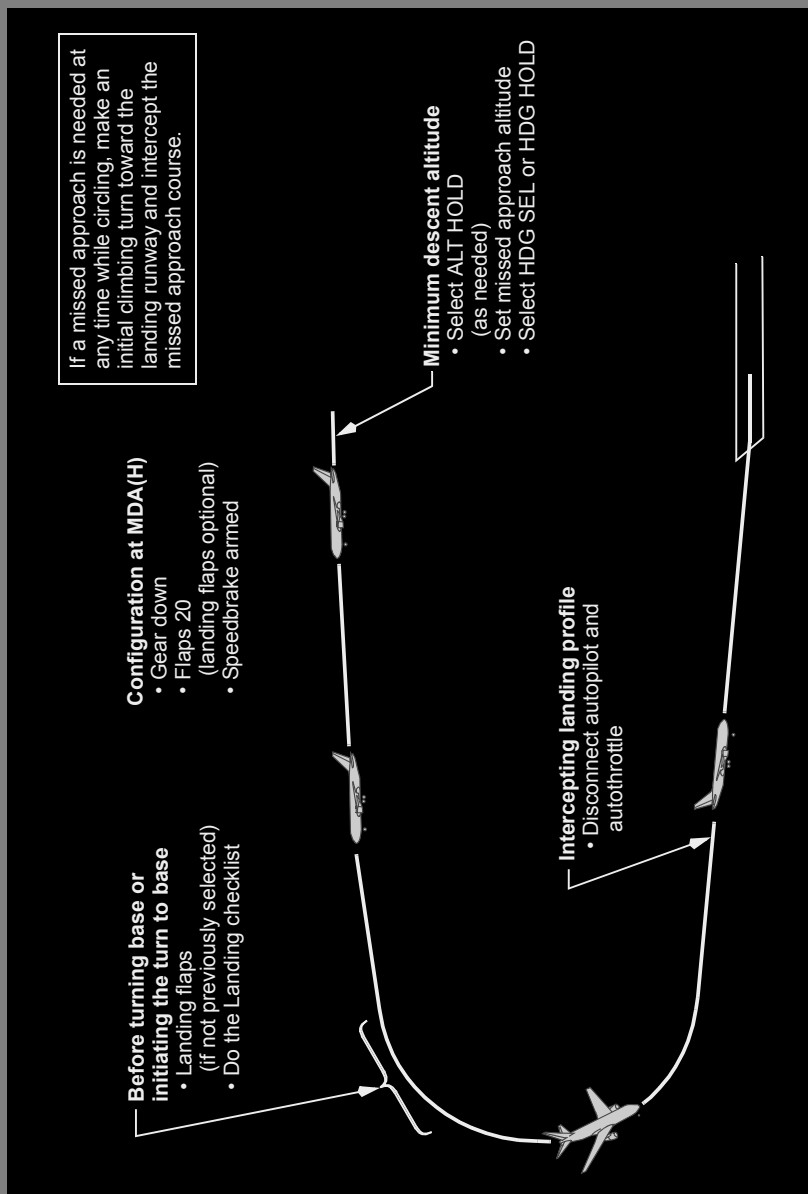
Instrument Approach Using VNAV



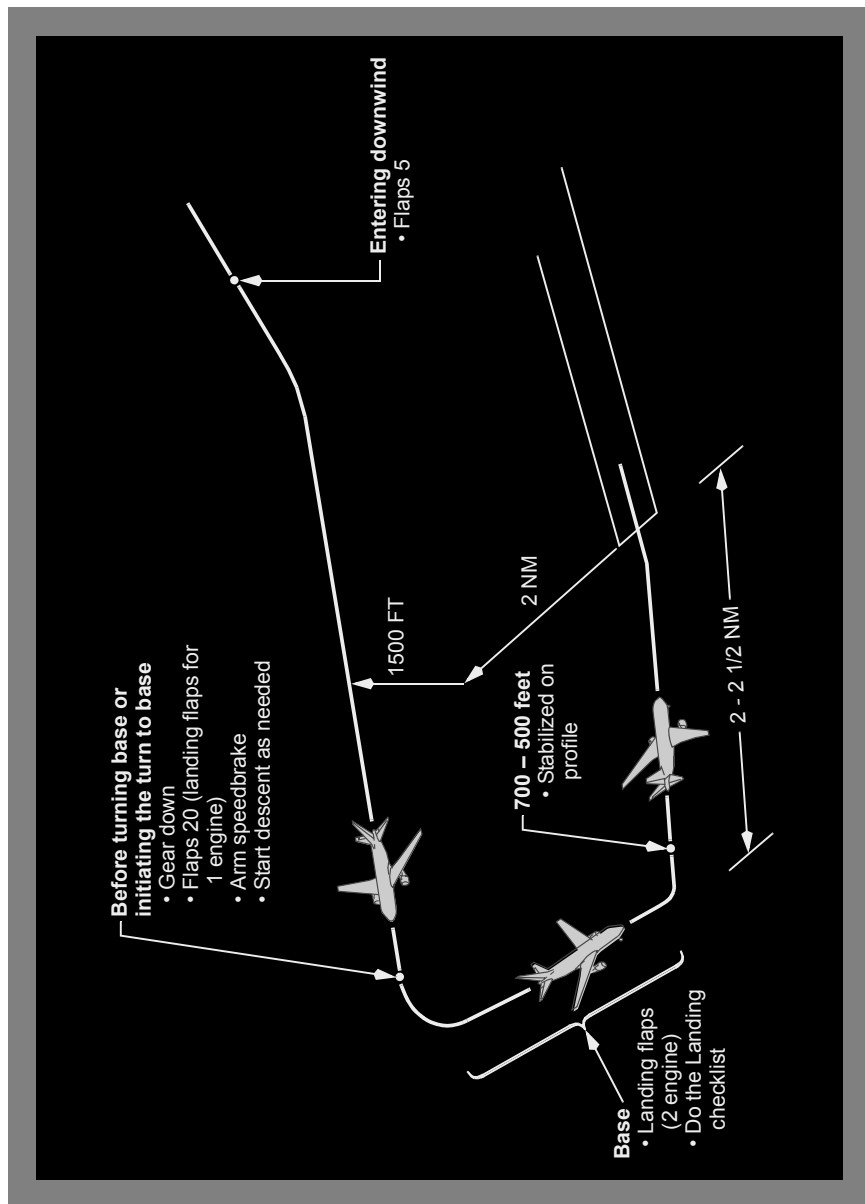
Instrument Approach Using V/S



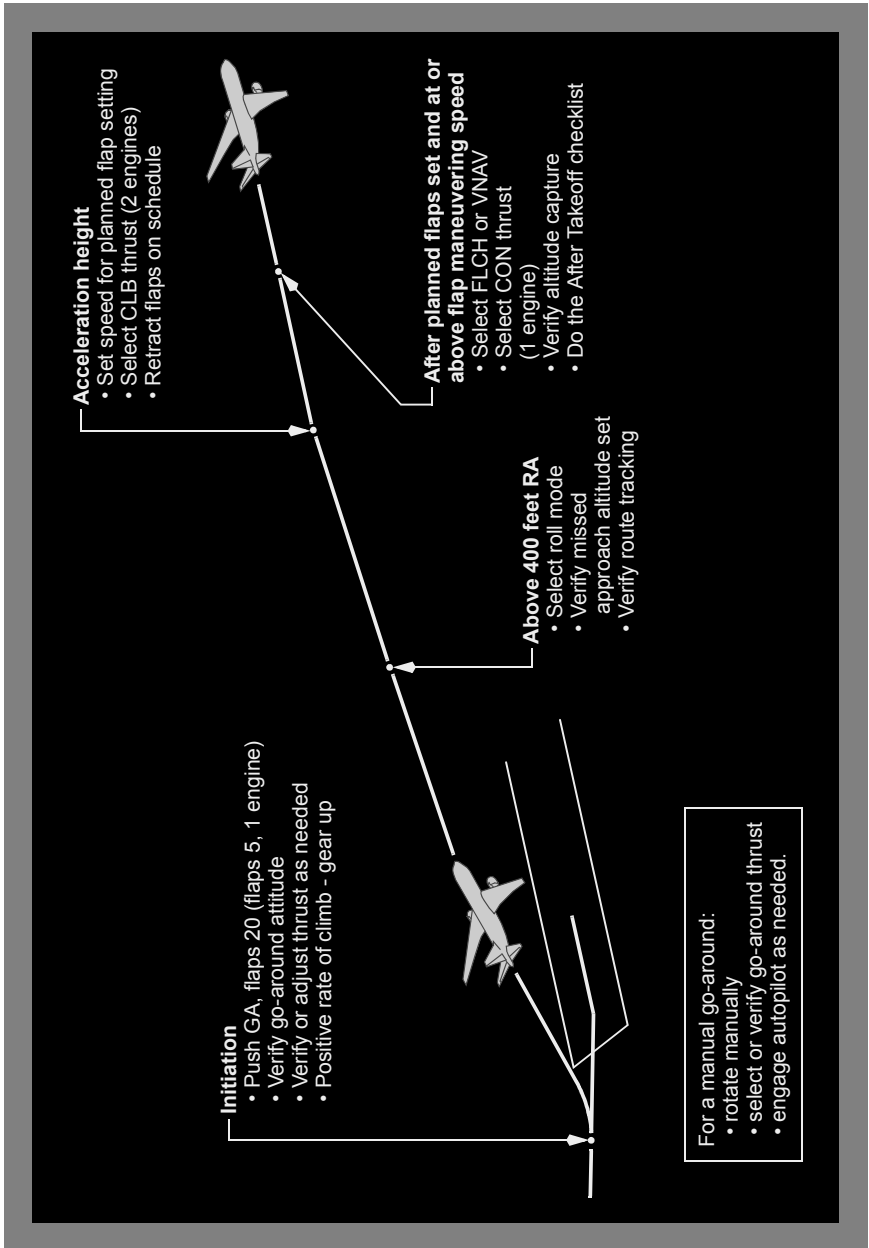
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Visual Traffic Pattern



Go-Around and Missed Approach



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Checklist Instructions

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**Checklist Instructions**
Model Identification**Chapter CI**
Section ModID**General**

The airplanes listed in the table below are covered in the Quick Reference Handbook. The numbers are used to distinguish data peculiar to one or more, but not all of the airplanes. Where data applies to all airplanes listed, no reference is made to individual airplane numbers.

The table permits flight crew correlation of configuration differences by Registry Number in alpha/numeric order within an operator's fleet for airplanes covered in this manual. Configuration data reflects the airplane as delivered configuration and is updated for service bulletin incorporations in conformance with the policy stated in the introduction section of this chapter.

Registry number is supplied by the national regulatory agency. Serial and tabulation numbers are supplied by Boeing.

Revision changes to the table below, and the manual throughout, reflect the new registry number(s). The same changes are applicable to the Model ID table in Volume 1.

Registry Number	Serial Number	Tabulation Number
VP-BDI	29618	VS217
VP-BMC	30301	VS208
VP-BOQ	28042	VL914
VP-BOY	29435	VS061
VP-BOZ	28111	VN174
VP-BRL	26328	VL941
VP-BWW	27959	VL896
VP-BWX	27960	VL897
VQ-BMQ	28098	VL895
VQ-BMU	27427	VN637
VQ-BOG	30342	VS392
VQ-BPT	27957	VL891
VQ-BRA	27310	VN421



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**Checklist Instructions**
Revision Record**Chapter CI**
Section RR**Revision Transmittal Letter**

To: All holders of Nordwind Airlines 767 Flight Crew Operations Manual (FCOM), Boeing Document Number D632T001-36NRW.

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 and does not have revisions bars, 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	August 16, 2010	
2	March 2, 2011	
4	September 15, 2011	
6	August 14, 2012	
8	March 29, 2013	
10	February 20, 2014	
12	October 15, 2014	

No.	Revision Date	Date Filed
1	February 18, 2011	
3	August 15, 2011	
5	February 17, 2012	
7	February 15, 2013	
9	August 16, 2013	
11	August 14, 2014	

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 2 - Air Systems

ENGINE HPSOV

- 2.20 - Changed response to all upper case.
- 2.20 - Added procedural step for aircraft with auto anti-ice.
- 2.20 - Deleted procedural step for aircraft with auto anti-ice.

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2.20 - Revised response for wing anti-ice selector from "Auto" to "ON" for manual operation and greater crew awareness.

Section 6 - Electrical**STANDBY BUS OFF**

- 6.15 - Deleted revised Standby Bus Off checklist.
- 6.16 - Added Standby Bus Off checklist for airplanes with battery charger enabled while STBY POWER selector is in BAT position.
- 6.16-17 - Added information for airplanes with dual fuel crossfeed switches and updated EICAS computer.
- 6.18,21 - Added inoperative item for airplanes with FADEC engines.
- 6.18 - Added inoperative item for airplanes with alternate electric trim switch.
- 6.18 - Added inoperative item for airplanes with dual crossfeed valves.
- 6.18 - Added inoperative item for airplanes with dual ADF installations.
- 6.18 - Added inoperative item for airplanes with RDMIs installed.
- 6.18 - Added inoperative item for passenger airplanes.
- 6.21 - Added inoperative item for airplanes with dual ADF installations.
- 6.21 - Added inoperative item for airplanes with RDMIs installed.

Section 12 - Fuel**FUEL CONFIGURATION**

- 12.1 - Corrected typographical error, revised "of" to "or"

Chapter PI-QRH - Performance Inflight - QRH**Section 40 - Table of Contents**

PI-QRH.TOC.40.1 - 767-300 CF6-80C2B7F KG FAA CATC CATD
EU-OPS TO1-10% TO2-20% was added as Section 40.

Section 40 - General**General**

PI-QRH.40.1 - 767-300 CF6-80C2B7F KG FAA CATC CATD EU-OPS
TO1-10% TO2-20% was added as Section 40.

Chapter CI - Checklist Instructions**Section ModID - Model Identification**

- CI.ModID.1 - Revised to add/change an airplane entry.



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**Preface****QRH List of Effective Pages****Chapter CI****Section LEP****Quick Reference Handbook****Quick Action Index**

* QA.Index.1-2	October 15, 2014

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* EICAS.Index.1-14	October 15, 2014

Unannounced Checklists (tab)

* Unann.Index.1-2	October 15, 2014

Alphabetical (tab)

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* PI-QRH.TOC.40.1-2	October 15, 2014	PI-QRH.TOC.50.1-2	August 14, 2014
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Checklist Instructions

Normal Checklists

Chapter CI

Section 1

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.



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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.

Because normal checklists are done routinely, some checklist items are simplified to be more conversational such as "Autobrake ...RTO" instead of AUTO BRAKE select switch RTO".



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Checklist Instructions

Non-Normal Checklists

Chapter CI

Section 2

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 a light, alert, or EICAS alert message. In some cases, the master WARNING or master CAUTION, and miscellaneous lights also illuminate to indicate the non-normal condition. These lights, alerts, and EICAS alert message indicate a non-normal condition and are the cue to select and do the associated checklist.

Checklists without a light, alert, or EICAS alert message (such as Ditching Preparation) are called unannunciated checklists. Most unannunciated checklists are in the associated system section. For example, Fuel Leak Engine is in section 12, Fuel. Unannunciated checklists with no associated system are in section 0, Miscellaneous.

All checklists have condition statements. The condition statement briefly describes the situation that caused the light, alert, or 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 a light, alert, or EICAS alert message. 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 engine out 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.

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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 a light, alert, or 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.
- If the master WARNING or master CAUTION, and miscellaneous lights illuminate, all related amber and red lights are reviewed to assist in recognizing the cause(s) of the alert.
- 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 circuit breaker 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.
- When a non-normal checklist directs the flight crew to attempt only one reset of a switch per flight, a second reset of the switch should not be done until maintenance has cleared the malfunction.

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.

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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 checklists to be done by memory if no hazard is created by such action, or if the situation does not allow reference to the checklist.

Checklists include an Inoperative Items table only when the condition of the items is needed for planning the rest of the flight and the condition is not indicated by a light, alert, or EICAS alert message. 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



The redirection symbol is used in two ways:

- In the Table of Contents of a system section, to direct the flight crew to a different system section.
- In a non-normal checklist, with the word "Go to", to direct the flight crew to a different checklist or to a different step in the current checklist.

Separator Symbol



The separator symbol is used in two ways:

- In the Table of Contents of a system section, to separate the Quick Action Index checklists from the checklists that are not in the Quick Action Index.
- In a non-normal checklist, to separate the memory items from the reference items.

Task Divider Symbol



The task divider symbol is used to indicate the end of one task and the beginning of another task.

Decision Symbol

Choose one:



The decision symbol is used to identify possible choices.

Precaution Symbol



The precaution symbol is used to identify information the flight crew must consider before taking the action.



Intentionally
Blank



**Evacuation Checklist is on the
reverse side of this page.**



Evacuation

Condition: Evacuation is needed.

- 1 Parking brake Set C
- 2 Cabin altitude MODE SELECT MAN F/O
- 3 CABIN ALTITUDE
MANUAL control . Hold in CLIMB until the
outflow valve indication
shows fully open to
depressurize the aircraft F/O
- 4 FUEL CONTROL
switches (both) CUT OFF C
- 5 Advise the cabin to evacuate. C
- 6 Advise the tower. F/O
- 7 Engine and APU
fire switches (all) Override and pull F/O
- 8 If an engine or APU fire warning occurs:
Related fire
switch Rotate to the stop and
hold for 1 second F/O

