Thomson Airways

757
Quick Reference Handbook

Quick Action Index

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PREFLIGHT (PM)

Oxygen.	Tested, 100%	BOTH
Pressurization Mode Selector	AUTO	PF
Flight instruments	Heading___, Altimeter___	BOTH
Parking brake	Set	PF
Fuel control switches.	CUTOFF	PF
Gear pins	Removed	PF

BEFORE START (F/O)

Fuel	___kgs	C
Passenger signs	Set	C
Windows	Locked	BOTH
MCP	V2___, HDG___, ALT___	C
Takeoff thrust	Full/Derate___,Assumed___°C	C
Takeoff speeds	V1___, VR___, V2___	BOTH
CDU preflight.	Completed	C
Rudder and aileron trim	0, 0	C
Taxi and takeoff briefing	Completed	C

– –

Flight deck door	Closed and locked	C
Red anti collision light	ON	C

BEFORE TAXI (F/O)

Anti-ice.	___	C
Isolation switch.	Off	C
Recall	Checked	C
Autobrake	RTO	C
Ground equipment	*Clear	BOTH

BEFORE TAKEOFF (F/O)

Takeoff briefing	Reviewed	C
Packs	AUTO/OFF	C
Flaps	___	C
Stabilizer Trim	___ Units	C
Flight controls	Checked	C
Cabin	*Secure	C

AFTER TAKEOFF (PM)

Packs	AUTO	PM
Landing gear	UP and OFF	PM
Flaps	UP	PM
Altimeters	Set	BOTH

DESCENT (PM)

Pressurization	LDG ALT___	PM
Recall	Checked	PM
Autobrake	___	PM
Landing data	VREF___, Minimums___	BOTH
Approach briefing	Completed	PM

APPROACH (PM)

Altimeters	___	BOTH
Nav aids	Set	PM

LANDING (PM)

Cabin	Secure	PF
Speedbrake	ARMED	PF
Landing gear	Down	PF
Flaps	*___	PF

SHUTDOWN (F/O)

Hydraulic panel	Set	C
Fuel pumps	Off	C
Flaps	UP	C
Parking brake	Set	C
Fuel control switches	CUTOFF	C
Weather radar	Off	BOTH

SECURE (F/O)

IRSs	OFF	C
Emergency lights	OFF	C
Window heat	Off	C
Packs	OFF	C
If no qualified person available:		
External power	Set	C
APU	OFF	C
Standby power selector	OFF	C
Battery	OFF	C
Ground service bus	Set	C

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Non-Normal Checklists — Chapter NNC

Miscellaneous — Section 0

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Bomb Threat

Condition: A category RED/AMBER bomb threat has been received.

Note: If a small electronic device is found onboard and the owner cannot be identified refer to Ops Manual Part B SEP 08.03.00

1 Choose one:

◆Aircraft is **on the ground**

▶▶**Go to step 2**

◆Aircraft is **in flight**

▶▶**Go to step 5**

2 Crew Briefing . . . . PERFORM

Prepare passengers for evacuation.

Suspicious objects should not be touched.

3 PASSENGERS . . . . DISEMBARK

Disembark passengers and crew with all hand baggage using steps or jetties.

Use escape slides only in extreme emergencies.

Assemble passengers at least 200m up wind of the Aircraft.

4 Refer to Ops Manual Part B SEP Section 8. BOMB THREAT OR WARNING.

■ ■ ■ ■

▼ Continued on next page ▼

▼ Bomb Threat continued ▼

5 Flight Deck Door. . . . . .VERIFY LOCKED

Warning! DO NOT RAISE CABIN ALTITUDE

6 Cabin Crew . . . . .NOTIFY

7 Cabin Signs . . . . AS REQD

8 Galley Power / IFE Power / Video Power (as installed) . . . . OFF

9 Fly at M0.78 / 290 kts and avoid turbulence.

10 LANDING ALTITUDE SELECTOR . . . . SET CURRENT CABIN ALTITUDE

11 **When** conditions allow, descend to altitude set in LANDING ALTITUDE SELECTOR at turbulent air penetration speed.

[Descending to the existing cabin altitude will result in a cabin differential pressure of zero, reducing the structural load of the fuselage as far as possible.]

12 ATC. . . . . .INFORM "FLIGHT DECK SECURE"

13 Declare an emergency and plan to land at the nearest suitable airport. Use the phrase "Flight Deck is secure".

14 Transponder. . . . . SET

[Consider Transponder code 7700]

15 Brief crew and passengers for a Precautionary or Emergency Landing (example P.A. follows).

16 Organize search of flight deck and cabin. Refer to Ops Manual Part B SEP (08.16.00) SEARCH PROCEDURE.

17 Intercept Procedures are contained in the Flight Deck Brief (Monitor 121.5 Mhz). Declare an emergency and plan to land at the nearest suitable airport.

18 Establish landing configuration early.

19 Advise ATC of requirements for remote parking, passenger coaches and steps.

▼ Continued on next page ▼

▼ Bomb Threat continued ▼

20 After landing, disembark passengers and crew with minimum delay, with hand baggage when circumstances permit.

21 **If** an immediate landing cannot be made:

Make a PA to the passengers (example follows). Request any passenger with I.E.D. experience to come forward.

[To assist with bomb search and covering etc.]

22 **If** a suspicious device is discovered:

It is preferable not to move it.

Cover with polythene and pack with wet pillows, blankets etc.

Move passengers away if possible.

Move portable oxygen, first aid kits etc. away.

Fire extinguishers should be available.

Disconnect non-essential electrical power near the device.

23 **If** device is to be moved (after cabin differential pressure is ZERO), move to rear right service door:

[Least risk bomb location.]

Disarm door escape slide.

Place and secure device on top of escape bustle. Do not remove bustle from door.

Use maximum amount of blast attenuating materials, with only soft material being piled above the seat-back level.

Note: Further information is contained in Ops Manual Part A General/Basic Section 10 and Part B SEP Section 8. A record of the completed Bomb Search should be noted on the OFP and Journey Log.

▼ Continued on next page ▼

▼ Bomb Threat continued ▼

24 Example of a bomb warning PA:

Commander to announce:

"May I please have your complete attention.

We have received a warning that a device has been placed on board this aircraft. We consider this warning to be hoax, as calls of this nature have been received by airlines many times in the past.

However, as your safety is of paramount importance we must take such warnings seriously.

I am therefore making arrangements to land as soon as possible, so that a thorough search of the aircraft can be carried out."

(If applicable):

"In the meantime the cabin crew will be carrying out a preliminary search and I would be grateful for your co-operation.

I would like to repeat that this warning is almost certainly a hoax and that there is no cause for alarm.

I will let you know as soon as I have any further information."

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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 the autobrake.

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 (PM)

Pressurization . . . . LDG ALT___		PM
Recall . . . . Checked		PM
Autobrake . . . . **OFF**		PM
Landing data . . . . **VREF30,** Minimums__		BOTH
Approach briefing . . . . Completed		PM

Approach Checklist (PM)

Altimeters . . . . QNH___		BOTH
Nav aids. . . . . Set		PM

▼ Continued on next page ▼

▼ Ditching Preparation continued ▼

When below 5,000 feet

G-BYAD through G-BYAX, G-CPEP, G-OOBI through SE-RFP
GND PROX/CONFIG GEAR OVRD switch . . . . . OVRD

G-BYAY, G-CPEU through G-OOBH
GND PROX GEAR OVRD switch . . . . OVRD

GND PROX TERR OVRD switch . . . . OVRD

PACK control selectors (both) . . . . OFF

Cabin altitude MODE SELECT . . . . MAN

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

PASS SIGNS selectors . . . . ON

Do **not** accomplish the following checklists:

PACK OFF

CABIN AUTOMATIC INOPERATIVE

Landing Checklist (PM)

Cabin	Secure	PF
Speedbrake	**DOWN**	PF
Landing gear	**UP**	PF
Flaps.	***30**	PF

When on final approach

Make PA "CREW STATIONS"

When touchdown is imminent, make PA "BRACE, BRACE"

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

■ ■ ■ ■

Emergency Landing Preparation

Condition: An emergency landing not on a runway is required

1 Transmit a distress signal.

2 Advise the cabin to prepare for emergency landing.

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 (PM)

Pressurization	LDG ALT___	PM
Recall	Checked	PM
Autobrake	**OFF**	PM
Landing data	**VREF 30,** Minimums___	BOTH
Approach briefing	Completed	PM

Approach Checklist (PM)

Altimeters	QNH___	BOTH
Nav aids	Set	PM

When below 5,000 feet

G-BYAD through G-BYAX, G-CPEP, G-OOBI through SE-RFP
GND PROX/CONFIG GEAR OVRD switch . . . . . OVRD

G-BYAY, G-CPEU through G-OOBH
GND PROX GEAR OVRD switch . . . . OVRD

GND PROX TERR OVRD switch . . . . OVRD

PACK control selectors (both) . . . . OFF

PASS SIGNS selectors . . . . ON

Do **not** accomplish the following checklist:

PACK OFF

▼ Continued on next page ▼

▼ **Emergency Landing Preparation continued** ▼

Landing Checklist (PM)

Cabin . . . . Secure PF

Fuel Pump switches. . . . . OFF PF

Speedbrake . . . . **DOWN** PF

Landing gear . . . . Down PF

All available landing gear should be down.

Flaps. . . . . ***30** PF

When on final approach

Make PA "CREW STATIONS"

When touchdown is imminent, make PA "BRACE, BRACE"

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

Do **not** accomplish the following checklist:

FUEL SYSTEM PRESSURE

On touchdown:

SPEEDBRAKE LEVER . . . . UP

When aircraft has come to rest:

Accomplish the EVACUATION checklist if required.

■ ■ ■ ■

Hijack

1 Choose one:

◆Aircraft is **on the ground**

▶▶**Go to step 2**

◆Aircraft is **in flight**

▶▶**Go to step 6**

2 Flight Deck Door. . . . . .VERIFY LOCKED

3 ATC. . . . . .INFORM "FLIGHT DECK IS SECURE"

4 Do not take-off.

5 Co-operate fully with the authorities.

■ ■ ■ ■

6 Flight Deck Door. . . . . .VERIFY LOCKED

7 ATC. . . . . .INFORM "FLIGHT DECK IS SECURE"

8 Declare an emergency and plan to land at the nearest suitable airport. Use the phrase "Flight Deck is secure".

9 Flight Deck door must remain locked.

10 Pass all relevant information to the authorities when possible.

11 Transponder Code 7500.

12 Intercept Procedures are contained in the Flight Deck Brief. Monitor 121.5 Mhz when airborne.

13 On the ground 134.975 Mhz may be available for aircraft / ATC / Police use (UK only).

Note: Further information is contained in Ops Manual Part B SEP 08.13.00 and 08.14.00.

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Landing On A Flat Tyre

Condition: Pilot is aware of a flat tyre prior to landing

1 Use normal landing techniques, avoid landing overweight and use the centre of the runway

2 Use differential braking as necessary for directional control

3 With a single tyre failure, towing is not necessary unless unusual vibration is noticed or other failures have occurred

4 **If** a nose gear tyre is known to be flat:

   Autobrakes may be used at lower settings if desired

   Slowly and gently lower the nose wheels to the runway while braking lightly

   Runway length permitting, use idle reverse thrust

   After nose gear touchdown, increasing or decreasing control column back pressure may change vibration levels

   Maintain nose gear contact with the runway

5 **If** one or more main gear tyres are known to be flat:

   Do not use autobrakes

   Expect a general loss of braking effectiveness, a yawing moment towards the flat tyre with light or no braking and a yawing moment away from the flat tyre if the brakes are applied harder

   After touchdown, ensure speedbrake lever is UP then use maximum reverse thrust

6 **If** uncertain whether a nose tyre or a main tyre has failed:

   Slowly and gently lower the nose wheels to the runway

   Do not use autobrakes

   Differential braking may be required to steer the airplane

▼ Continued on next page ▼

▼ Landing On A Flat Tyre continued ▼

Use idle or higher reverse thrust as needed to stop the airplane

7 Loss of two aft main gear tyres may cause the air/ground system to remain in the air mode causing loss of thrust reversers and a need to manually deploy the speedbrakes

Note: Extended taxi distances or fast taxi speeds can cause significant increases in temperatures on the remaining tyres

■ ■ ■ ■

Pilot Incapacitation

Condition: A pilot is considered to be incapacitated if he is unable to perform his proper duties. Both pilots must be constantly alert to the possibility of flight crew incapacitation. The onset of pilot incapacitation can be subtle and difficult to detect. Indications may include:
- Lack of alertness
- Failure to respond to standard calls
- Abnormal behaviour

1 **If** not operating as PF call "I have control"

2 AUTOPILOT . . . . .SET/CHECK

F/O should engage right autopilot and use FLCH/ALT HOLD modes rather than VNAV

CPT should engage left or centre autopilots

[Ensures AFDS is referenced to appropriate altimeter]

3 Ensure correct and safe flight path

4 Check the position of essential controls and switches

5 Summon assistance from the cabin crew

Announce on the PA "Attention Cabin Crew on Station"

6 Have them take care of the incapacitated crew member

7 Ascertain whether there are medically qualified pax and type qualified flight crew available

8 Declare an emergency ("MAYDAY, MAYDAY, MAYDAY") and plan to land at the nearest suitable airport. Consider the following factors:

Increased workload

Weather conditions

Familiarity with alternate airports

9 Re-organize the work on the flight deck

▼ Continued on next page ▼

▼ Pilot Incapacitation continued ▼

10 Do not allow an incapacitated pilot to perform any further duties for the remainder of the flight

11 Follow standard procedures. Aim for being established earlier than normal

12 Complete Normal Checklists. Aim for completing checklists earlier than normal.

13 If workload permits, inform ATC about gender, age, etc. of incapacitated crew member

Deferred Items

AFTER LANDING

Obtain medical assistance and ground support (stairs, towing equipment, GPU)

Start the APU, if needed

■ ■ ■ ■

Tail Strike

Condition: The tail hits the runway.

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

1 Cabin altitude MODE SELECT . . . . .MAN

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

3 Level off at the lowest safe altitude.

4 Plan to land at the nearest suitable airport.

5 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**

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

CABIN AUTOMATIC INOPERATIVE

■ ■ ■ ■

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AUTO UNLK

AUTOMATIC UNLOCK

G-BYAD through G-BYAY, G-CPEU, G-CPEV, G-OOBC through G-OOBH, G-OOOZ through SE-RFP

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

■ ■ ■ ■

ACCESS DOORS

ACCESS DOOR(S)

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

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

1 Choose one:

◆Pressurization is **normal**:

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

■ ■ ■ ■

◆Pressurization is **not normal**:

►►**Go to step 2**

2 PASS SIGNS selectors . . . . ON

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

4 Choose one:

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

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

■ ■ ■ ■

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

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

■ ■ ■ ■

CARGO DOORS

CARGO DOOR(S)

Messages: CARGO DOORS
FWD CARGO DOOR | AFT CARGO DOOR
AFT CARGO DOOR 1 | AFT CARGO DOOR 2

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

1 Choose one:

◆Pressurization is **normal**:

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

■ ■ ■ ■

◆Pressurization is **not normal**:

▶▶**Go to step 2**

2 PASS SIGNS selectors .ON

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

4 Choose one:

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

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

■ ■ ■ ■

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

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

■ ■ ■ ■

EMER DOORS

EMERGENCY DOOR(S)

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 as long as cabin pressurization is normal.

■ ■ ■ ■

◆Pressurization is **not normal**:

►►**Go to step 2**

2 PASS SIGNS selectors . . . . ON

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

4 Choose one:

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

Do not exceed 10,000 feet.

■ ■ ■ ■

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

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

■ ■ ■ ■

UNARMED

EMERGENCY LIGHTS

Message: EMER LIGHTS

Condition: The emergency lights switch is not ARMED.

■ ■ ■ ■

ENTRY DOORS

ENTRY DOOR(S)

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

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

1 Choose one:

◆Pressurization is **normal**:

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

■ ■ ■ ■

◆Pressurization is **not normal**:

►►**Go to step 2**

2 PASS SIGNS selectors .ON

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

4 Choose one:

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

Do not exceed 10,000 feet.

■ ■ ■ ■

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

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

■ ■ ■ ■

LOCK FAIL

LOCK FAIL

Condition: One or more of these occur:
- The flight deck access system switch is off
- The lock is failed

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

1 **If** conditions allow:

FLIGHT DECK ACCESS SYSTEM switch . . . . OFF

Note: The door can be locked with the deadbolt.

■ ■ ■ ■

ON

PASSENGER OXYGEN ON

Message: PASS OXYGEN ON

Condition: The passenger oxygen system is on.

■ ■ ■ ■

Window Damage

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

1 Choose one:

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

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

Do **not** accomplish the following checklist:

WINDOW (HEAT)

▶▶**Go to step 2**

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

▶▶**Go to step 2**

2 Choose one:

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

▶▶**Go to step 3**

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

■ ■ ■ ■

3 Plan to land at the nearest suitable airport.

4 Choose one:

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

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

▶▶**Go to step 5**

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

▶▶**Go to step 5**

▼ **Continued on next page** ▼

▼ Window Damage continued ▼

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

■ ■ ■ ■

Window Open

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

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

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

3 Close and lock the window.

4 Choose one:

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

Continue normal operation.

■ ■ ■ ■

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

Level off at the lowest safe altitude.

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

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CABIN ALT

CABIN ALTITUDE or Rapid Depressurization

CABIN ALTITUDE

Message: 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

Caution! For aircraft equipped with winglets, speedbrakes may automatically retract to the "50%" position when airspeed exceeds 330 KIAS. If this occurs, do not extend speedbrake lever beyond the "50%" position until airspeed is less than 325 KIAS.

■ ■ ■ ■

VALVE

APU BLEED VALVE

Message:	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 Determine the affected side:

If either duct pressure is abnormally low and/or corresponding pack has tripped, the low pressure indication determines the affected side.

If duct pressure and pack operation are normal on both sides, use the duct leak message to determine the affected side.

2 ENG BLEED AIR switch (affected side). . . . . . . .Off

3 ISOLATION switch . . . . .Off

4 **If** the left side is the affected side:

APU BLEED AIR switch . . . . .Off

5 WING ANTI–ICE switch . . . . .Off

This prevents possible asymmetrical ice buildup on the wings.

6 Avoid icing conditions.

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

ENGINE BLEED OFF

■ ■ ■ ■

VALVE

BLEED ISOLATION VALVE

Message: BLEED ISLN VAL

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

■ ■ ■ ■

AUTO INOP

CABIN AUTOMATIC INOPERATIVE

Messages: CABIN AUTO INOP

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

1 Cabin altitude MODE SELECT . . . . .MAN

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

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

Recommended cabin altitude in cruise is:

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

3 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist (PM)

Pressurization.	LDG ALT ___	PM
Recall	Checked	PM
Autobrake	___	PM
Landing data . . VREF___,	Minimums______	BOTH
Approach briefing	Completed	PM

Approach Checklist (PM)

Altimeters	QNH___	BOTH
Nav aids.	Set	PM

Continued on next page

▼ CABIN AUTOMATIC INOPERATIVE continued ▼

When at pattern altitude

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

Landing Checklist (PM)

Cabin	Secure	PF
Speedbrake	ARMED	PF
Landing gear	Down	PF
Flaps	*___	PF

■ ■ ■ ■

INOP

CABIN TEMPERATURE

Messages: AFT CABIN TEMP   FWD 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 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

■ ■ ■ ■

OFF

ENGINE BLEED OFF

Messages: L ENG BLEED OFF R ENG BLEED OFF

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

1 ENG BLEED AIR switch (affected side). . . . . . . .Off

2 **If** wing anti–ice needed:

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

ISOLATION switch . . . . On

When wing anti–ice no longer needed:

ISOLATION switch . . . . .Off

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

PACK OFF

■ ■ ■ ■

BLEED

ENGINE BLEED VALVE

Messages: L ENG BLEED VAL R ENG BLEED VAL

Condition: An engine bleed air overheat occurs.

1 ENG BLEED AIR switch (affected side) . . . . Off, then On

2 **If** ENG BLEED VAL message reappears:

ENG BLEED AIR switch . . . . .Off

3 **If** wing anti–ice needed:

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

ISOLATION switch . . . . On

When wing anti–ice no longer needed:

ISOLATION switch . . . . .Off

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

ENGINE BLEED OFF

PACK OFF

■ ■ ■ ■

HI STAGE

ENGINE HIGH STAGE

Messages:	L ENG HI STAGE	R ENG HI STAGE
Condition:	Excessive engine bleed air pressure occurs.	

1 ENG BLEED AIR switch (affected side) . . . . Off

2 **If** wing anti–ice needed:

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

ISOLATION switch . . . . On

When wing anti–ice no longer needed:

ISOLATION switch . . . . Off

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

ENGINE BLEED OFF

PACK OFF

■ ■ ■ ■

OVHT

EQUIPMENT OVERHEAT

Message: EQPT OVHT

Condition: The forward equipment cooling system is inoperative.

Note: If accompanied by a FWD EQPT SMOKE message, delay action until the smoke message disappears.

1 EQUIP COOLING switch . . . . ALTN

G-BYAD through G-OOBF, G-OOBI through SE-RFP

2 Choose one:

◆OVHT light **extinguishes**:

■ ■ ■ ■

◆OVHT light **stays illuminated**:

Non–essential avionics and electrical equipment are subject to imminent failure

Cooling is being provided as required to essential avionics and electrical equipment

G-OOBG, G-OOBH

3 Choose one:

◆OVHT light **extinguishes**:

■ ■ ■ ■

◆OVHT light **stays illuminated**:

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

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.

■ ■ ■ ■

INOP

FLIGHT DECK TEMPERATURE

Message: 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 . . . . 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

■ ■ ■ ■

PACK OFF

PACK OFF

Messages: L PACK OFF R PACK OFF

Condition: A pack valve is closed.

1 Choose one:

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

Continue normal operation.

■ ■ ■ ■

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

►►**Go to step 2**

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

3 To descend:

Move the thrust levers to idle.

Extend the speedbrakes.

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

Descend at VMO/MMO.

Caution! For aircraft equipped with winglets, speedbrakes may automatically retract to the "50%" position when airspeed exceeds 330 KIAS. If this occurs, do not extend speedbrake lever beyond the "50%" position until airspeed is less than 325 KIAS.

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

5 **Wait** until level off.

▼ **Continued on next page** ▼

▼ PACK OFF continued ▼

6 Choose one:

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

■ ■ ■ ■

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

▶▶**Go to step 7**

7 Maintain airspeed at or greater than 290 knots to ensure fresh air circulation .

8 Choose one:

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

▶▶**Go to step 9**

◆Airplane altitude is above 10,000 feet:

Don the oxygen masks.

Establish crew communications.

▶▶**Go to step 9**

9 Cabin altitude MODE SELECT . . . . MAN

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

11 UTILITY BUS switches (Both) . . . . Off

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

13 Minimize flight deck lighting intensity.

14 Open the flight deck door.

15 Install flight deck sunvisors during daylight operations.

16 Instruct flight attendants to:

Reduce cabin lighting to minimum needed.

Close cabin window shades during daylight operations.

17 Plan to land at nearest suitable airport.

▼ Continued on next page ▼

▼ PACK OFF continued ▼

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

CABIN AUTOMATIC INOPERATIVE

RECIRCULATION FAN

UTILITY BUS OFF

■ ■ ■ ■

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.

■ ■ ■ ■

OFF — TRIM AIR

Message: TRIM AIR

Condition: The trim air switch is OFF.

■ ■ ■ ■

Intentionally
Blank

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Intentionally
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C ADIRU PITOT

ADIRU PITOT

G-OOBC through G-OOBF

Message: C ADIRU PITOT

Condition: The center ADIRU pitot probe heat is failed.

1 Continue normal operations

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

■ ■ ■ ■

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

Message: CAPT PITOT

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

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

■ ■ ■ ■

VALVE

ENGINE ANTI-ICE

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

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

1 Choose one:

◆ENGINE ANTI-ICE switch is **ON**:

Avoid icing conditions.

Leave the ENGINE ANTI-ICE switch ON.

■ ■ ■ ■

◆ENGINE ANTI-ICE switch is **off**:

▶▶**Go to step 2**

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

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

Avoid high thrust settings.

■ ■ ■ ■

F O PITOT

FIRST/OFFICER PITOT

Message: F/O PITOT

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

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

■ ■ ■ ■

PROBE HEAT

Message: PROBE HEAT

Condition: Two or more probe heats are failed.

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

■ ■ ■ ■

STBY INST PITOT

STANDBY INSTRUMENT PITOT

G-OOBC through G-OOBF

Messages: STBY INST PITOT

Condition: The standby instrument pitot probe heat is failed.

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

■ ■ ■ ■

TAT

TAT PROBE

Message: 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

■ ■ ■ ■

VALVE

WING ANTI–ICE

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

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

1 Choose one:

◆WING ANTI-ICE switch is **ON**:

WING ANTI–ICE switch. . . . . .Off

Avoid icing conditions.

Do not use wing anti–ice

■ ■ ■ ■

◆WING ANTI-ICE switch is **Off**:

▶▶**Go to step 2**

2 WING ANTI-ICE switch . . . . .ON

3 **If** left valve failed open:

APU BLEED AIR switch . . . . .Off

4 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist (PM)

Pressurization	LDG ALT ___	PM
Recall	Checked	PM
Autobrake	___	PM
Landing data	VREF___, Minimums___	BOTH
Approach briefing	Completed	PM

Approach Checklist (PM)

Altimeters	QNH___	BOTH
Nav aids	Set	PM

▼ Continued on next page ▼

▼ WING ANTI–ICE continued ▼

Landing Checklist (PM)

Cabin . . . . Secure PF

Speedbrake .ARMED PF

Landing gear . . . . Down PF

Flaps . . . . *___ PF

After landing

ENG BLEED AIR switch (affected side) . . . . Off

ISOLATION switch . . . . Off

This prevents possible structural damage due to overheat.

■ ■ ■ ■

Intentionally
Blank

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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.

■ ■ ■ ■

Intentionally
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Non-Normal Checklists — Chapter NNC

Communications — Section 5

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DATALINK LOST

G-OOBC through G-OOBF

Message: DATALINK LOST

Condition: The datalink is temporarily lost.

■ ■ ■ ■

DATALINK SYSTEM

G-OOBC through G-OOBF

Message: DATALINK SYS

Condition: The datalink system is failed.

■ ■ ■ ■

ON

ELT ON

G-BYAD through G-BYAY, G-OOBC through G-OOBF, SE-RFO, SE-RFP

Message: ELT ON

Condition: The emergency locator transmitter is on.

■ ■ ■ ■

Radio Transmit Continuous (Stuck Microphone Switch)

Condition: A radio transmits continuously without crew input.

Objective: To identify and isolate the stuck microphone.

G-OOBC through G-OOBF

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

This deselects radios and stops radio transmissions.

G-CPEP through G-CPEV, G-OOBG, G-OOBH

2 CABIN microphone selector switches (all) . . . . On

This deselects radios and stops radio transmissions.

G-BYAD through G-BYAY, G-OOBA, G-OOBB, G-OOBI through SE-RFP

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

This deselects radios and stops radio transmissions.

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

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

■ ■ ■ ■

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Blank

AC BUS OFF

G-BYAD through G-OOBF, G-OOBI through SE-RFP

BUS OFF   BUS OFF

Messages: L AC BUS OFF   R AC BUS OFF

Condition: The AC bus is not powered.

Objective: To attempt to restore electrical power.

Attempt only one reset

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

2 Choose one:

◆ APU is **available**:

▶▶ **Go to step 3**

◆ APU is **not** available:

▶▶ **Go to step 5**

3 APU selector . . . . START, then ON

4 **When** the APU is running:

Attempt only one reset

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

Attempt only one reset

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

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.

▼ **Continued on next page** ▼

▼ AC BUS OFF continued ▼

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**

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

G-BYAD through G-CPEP, G-OOBA through G-OOBF, G-OOBI through SE-RFP

All autopilots inop

G-CPEU, G-CPEV

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

▼ Continued on next page ▼

▼ AC BUS OFF continued ▼

■ ■ ■ ■

9 Plan to land at the nearest suitable airport.

10 RAM AIR TURB switch . . . . .Push

Observe PRESS light illuminated

11 EQUIP COOLING switch. . . . . ALTN

12 TRIM AIR switch. . . . . OFF

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

13 Do not use the autobrake.

14 Do not arm the speedbrake for landing.

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

RAM AIR TURBINE UNLOCKED

TRIM AIR

16 **Checklist Complete Except Deferred Items**

▼ Continued on next page ▼

▼ AC BUS OFF continued ▼

Deferred Items

Descent Checklist (PM)

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

Approach Checklist (PM)

Altimeters . . . . .QNH___ BOTH
Nav aids. . . . . Set PM

Landing Checklist (PM)

Cabin. . . . . .Secure PF
Speedbrake . . . . **DOWN** PF
Landing gear . . . . .Down PF
Flaps . . . . *___ PF

■ ■ ■ ■

Intentionally
Blank

AC BUS OFF

G-OOBG, G-OOBH

BUS OFF	BUS OFF

Messages: L AC BUS OFF   R AC BUS OFF

Condition: The AC bus is not powered.

Objective: To attempt to restore electrical power.

Attempt only one reset

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

2 Choose one:

◆ APU is **available**:

▶▶**Go to step 3**

◆ APU is **not** available:

▶▶**Go to step 5**

3 APU selector . . . . START, then ON

4 **When** the APU is running:

Attempt only one reset

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

Attempt only one reset

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

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.

▼ **Continued on next page** ▼

▼ **AC BUS OFF continued** ▼

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**

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

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

Caution! Flight beyond 90 minutes will result in complete loss of electrical power.

10 APU selector . . . . OFF

11 RAM AIR TURB switch . . . . Push

Observe PRESS light illuminated

12 Avoid icing conditions.

13 CABIN ALTITUDE MODE SELECT . . . . .MAN

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

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

Recommended cabin altitude in cruise is:

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

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

Flap indicator inop

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

Anti-skid for outboard wheels inop

Master caution system inop

Wing anti-ice inop

Continued on next page

▼ AC BUS OFF continued ▼

15 Do not use the autobrake.

16 Do not arm the speedbrake for landing.

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

RAM AIR TURBINE UNLOCKED

18 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist (PM)

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

Approach Checklist (PM)

Altimeters	QNH___	BOTH
Nav aids	Set	PM

When at pattern altitude

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

Landing Checklist (PM)

Cabin	Secure	PF
Speedbrake	**DOWN**	PF
Landing gear	Down	PF
Flaps	*___	PF

■ ■ ■ ■

APU BAT DISCH

APU BATTERY DISCHARGE

G-BYAD through G-OOBH, G-OOOX through SE-RFP

Message: APU BAT DISCH

Condition: An APU battery discharge occurs.

■ ■ ■ ■

OFF

APU GENERATOR OFF

Message: APU GEN OFF

Condition: The generator control breaker is open.

Attempt only one reset

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

■ ■ ■ ■

OFF

BATTERY OFF

Message: BATTERY OFF

Condition: The battery switch is OFF.

■ ■ ■ ■

ISLN

BUS ISOLATED

Messages: L BUS ISOLATED R BUS ISOLATED

Condition: The bus tie breaker is open.

■ ■ ■ ■

DRIVE

GENERATOR DRIVE

Messages: L GEN DRIVE R GEN DRIVE

Condition: A generator drive malfunction occurs.

Action is **not** reversible.

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

2 Choose one:

◆APU is **available**:

APU selector . . . . START, then ON

►►**Go to step 3**

◆APU is **not available:**

Plan to land at the nearest suitable airport.

►►**Go to step 3**

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

GENERATOR OFF

■ ■ ■ ■

OFF

GENERATOR OFF

Messages: L GEN OFF R GEN OFF

Condition: The generator control breaker is open.

Attempt only one reset

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

2 Choose one:

◆GEN CONT OFF light **extinguishes**:

Continue normal operation.

■ ■ ■ ■

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

►►**Go to step 3**

3 Choose one:

◆APU is **available**:

APU selector . . . . .START, then ON

■ ■ ■ ■

◆APU is **not available**:

Plan to land at the nearest suitable airport.

■ ■ ■ ■

DISCH

MAIN BATTERY DISCHARGE

G-OOBI, G-OOBJ

Message: MAIN BAT DISCH

Condition: A main battery discharge occurs.

■ ■ ■ ■

MAIN BAT DISCH

MAIN BATTERY DISCHARGE

G-BYAD through G-OOBH, G-OOOX through SE-RFP

Message: MAIN BAT DISCH

Condition: A main battery discharge occurs.

■ ■ ■ ■

OFF

STANDBY BUS OFF

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 9**

3 Autopilot disengage switch . . . . Push

4 Choose one:

◆Electric stabilizer trim is **not operative**:

▶▶**Go to step 5**

◆Electric stabilizer trim is **operative:**

Use electric stabilizer trim.

▶▶**Go to step 15**

5 Choose one:

◆Alternate stabilizer trim is **not operative**:

▶▶**Go to step 6**

◆Alternate stabilizer trim is **operative:**

Use alternate stabilizer trim.

▶▶**Go to step 15**

▼ **Continued on next page** ▼

▼ STANDBY BUS OFF continued ▼

6 Engage left or right autopilot and allow autopilot to remain engaged until landing configuration is established.

Automatic stabilizer trim is available with autopilot engaged.

7 Avoid icing conditions.

Inoperative Items

Passenger address, flight, and cabin interphone systems inop

Wing and engine anti-ice inop

G-CPEP, G-OOOZ

Fuel crossfeed valve inop

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

G-BYAD through G-BYAY, G-CPEU through G-OOOX, SE-RFO, SE-RFP

Forward and aft fuel crossfeed valves inop

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

Left VHF communication system inop

Rudder trim inop

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

■ ■ ■ ■

9 Autopilot disengage switch . . . . .Push

10 Choose one:

◆Electric stabilizer trim is **not operative**:

►►**Go to step 11**

◆Electric stabilizer trim is **operative:**

Use electric stabilizer trim.

►►**Go to step 22**

▼ Continued on next page ▼

▼ STANDBY BUS OFF continued ▼

11 Choose one:

◆Alternate stabilizer trim is **not operative**:

▶▶**Go to step 12**

◆Alternate stabilizer trim is **operative:**

Use alternate stabilizer trim.

▶▶**Go to step 22**

12 Plan to land with the standby buses powered normally.

13 Engage left or right autopilot and allow autopilot to remain engaged until landing configuration is established.

Automatic stabilizer trim is available with autopilot engaged.

14 Avoid icing conditions.

Inoperative Items

Passenger address, flight, and cabin interphone systems inop

Wing and engine anti-ice inop

G-CPEP, G-OOOZ

Fuel crossfeed valve inop

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

G-BYAD through G-BYAY, G-CPEU through G-OOOX, SE-RFO, SE-RFP

Forward and aft fuel crossfeed valves inop

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

Left VHF communication system inop

Rudder trim inop

G-OOBI, G-OOBJ

▶▶**Go to step 28**

G-BYAD through G-OOBH, G-OOOX through SE-RFP

▶▶**Go to step 29**

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

▼ Continued on next page ▼

▼ STANDBY BUS OFF continued ▼

16 Wing and engine anti-ice may be inoperative.

17 Cabin altitude and differential pressure indicators may be inoperative.

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

18 Left thrust reverser may be inoperative.

19 Left VHF communication system may be inoperative.

20 Rudder trim may be inoperative.

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

■ ■ ■ ■

22 Plan to land with the standby buses powered normally.

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

24 Wing and engine anti-ice may be inoperative.

25 Cabin altitude and differential pressure indicators may be inoperative.

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

26 Left VHF communication system may be inoperative.

27 Rudder trim may be inoperative.

G-OOBI, G-OOBJ

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

STBY POWER selector . . . . BAT

►►**Go to step 30**

G-BYAD through G-OOBH, G-OOOX through SE-RFP

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

STBY POWER selector . . . . BAT

►►**Go to step 30**

▼ Continued on next page ▼

▼ STANDBY BUS OFF continued ▼

30 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.

■ ■ ■ ■

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 **GND**:

Motor the engine for a minimum of 30 seconds and until EGT is 100° C or less.

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

■ ■ ■ ■

◆ENG START selector in **AUTO**:

▶▶**Go to step 3**

3 **When** N3 decreases below 20%:

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

Motor the engine for a minimum of 30 seconds and until EGT is 100° C or less.

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

Do not advance thrust levers during engine recovery until above 50% N3

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

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

Repeat above step as needed.

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

5 RAM AIR TURB switch . . . . Push

6 Maintain airspeed as indicated below.

Above 30,000 feet use 240 knots.

30,000 feet or below use 300 knots minimum.

Caution! For aircraft equipped with winglets, speedbrakes may automatically retract to the "50%" position when airspeed exceeds 330 KIAS. If this occurs, do not extend speedbrake lever beyond the "50%" position until airspeed is less than 325 KIAS.

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

Note: Cabin altitude warning may occur during descent.

▼ Continued on next page ▼

▼ **Dual Engine Failure continued** ▼

7 Choose one:

◆APU is **not available**:

▶▶**Go to step 9**

◆APU is **available**:

▶▶**Go to step 8**

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

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

9 Choose one:

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

▶▶**Go to step 13**

◆**Both** engines remain **failed**:

▶▶**Go to step 10**

10 Thrust levers (both) . . . . Idle

11 Engines may accelerate to idle very slowly, especially at high altitude. Slow acceleration may be incorrectly interpreted as a hung start or an engine malfunction. If N3 is steadily increasing, and EGT remains within limits, the start is progressing normally.

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

13 Activate the FMC route.

14 Enter the FMC performance data.

15 Choose one:

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

▶▶**Go to step 18**

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

▶▶**Go to step 16**

▼ **Continued on next page** ▼

▼ Dual Engine Failure continued ▼

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

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

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

Note: Cabin altitude warning may occur during descent.

18 Choose one:

◆**Both** engines are **started**:

■ ■ ■ ■

◆**An** engine **stays failed**:

►►**Go to the Engine Failure or Shutdown checklist on page 7.10**

■ ■ ■ ■

Intentionally
Blank

Engine Limit or Surge or Stall

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

1 A/T ARM switch . . . . OFF

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

3 Choose one:

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

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

►►**Go to the Engine Failure or Shutdown checklist on page 7.10**

■ ■ ■ ■

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

►►**Go to step 4**

4 Thrust lever (affected side) . . Advance slowly and check that RPM and EGT follow thrust lever movement

5 Choose one:

◆Engine acceleration is **normal**:

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

■ ■ ■ ■

◆Engine acceleration is **not normal**:

►►**Go to step 6**

▼ **Continued on next page** ▼

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

6 Choose one:

◆EGT is **normal**:

▶▶**Go to step 7**

◆EGT is **not normal**:

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

▶▶**Go to the Engine Failure or Shutdown checklist on page 7.10**

■ ■ ■ ■

7 ENG BLEED AIR switch (affected side) . . . . . . Off

8 Choose one:

◆Engine **responds**:

▶▶**Go to step 9**

◆Engine does **not respond**:

Continue engine operation at idle.

▶▶**Go to step 9**

9 ENG BLEED AIR switch (affected side) . . . . . . On

■ ■ ■ ■

FAULT

APU FAULT

Message: 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

Message: APU FUEL VAL

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

1 APU selector . . . . OFF

2 Do **not** start the APU.

■ ■ ■ ■

INOP

EEC OFF

Messages: L EEC OFF R EEC OFF

Condition: The EEC switch is off.

■ ■ ■ ■

INOP

ENGINE EEC

Messages: L ENG EEC R ENG EEC

Condition: The EEC is inoperative.

Objective: To operate both engines in the same control mode.

1 A/T ARM switch . . . . OFF

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

This prevents exceeding thrust limits.

▼ Continued on next page ▼

▼ **ENGINE EEC continued** ▼

3 Choose one:

◆Corresponding ENG LIMITER INOP light is **illuminated**:

ENG LIMITER
switch (affected side). . . . . Off

This deactivates the limiter, re–establishes electronic engine control, and allows thrust to be set normally.

Observe engine limits.

Do **not** accomplish the following checklist:

ENGINE LIMITER

▶▶**Go to step 4**

◆Corresponding ENG LIMITER INOP light is **not** illuminated:

▶▶**Go to step 4**

4 Choose one:

◆ELEC ENG CONT INOP **stays illuminated**:

L ELEC ENG CONT switch . . . . Off

R ELEC ENG CONT switch . . . . Off

Observe thrust limits.

■ ■ ■ ■

◆ELEC ENG CONT INOP **extinguishes**:

■ ■ ■ ■

Engine Failure or Shutdown

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

1 A/T ARM switch . . . . OFF

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

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

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

5 Choose one:

◆APU is **not available**:

▶▶**Go to step 7**

◆APU is **available**:

▶▶**Go to step 6**

6 APU selector . . . . START, then ON

7 GND PROX FLAP OVRD switch . . . . OVRD

8 Transponder mode selector . . . . TA

9 Plan to land at the nearest suitable airport.

10 **If** wing anti–ice required:

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

ISOLATION switch . . . . On

When wing anti–ice no longer required:

ISOLATION switch . . . . Off

11 Use flaps 20 and VREF 20 for landing.

12 Use flaps 5 for go-around.

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

▼ **Continued on next page** ▼

▼ Engine Failure or Shutdown continued ▼

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

ENGINE SHUTDOWN

PACK OFF

15 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist (PM)

Pressurization	LDG ALT___	PM
Recall	Checked	PM
Autobrake	___	PM
Landing data . . . **VREF 20,**	Minimums___	BOTH
Approach briefing	Completed	PM

Approach Checklist (PM)

Altimeters	QNH___	BOTH
Nav aids	Set	PM

Landing Checklist (PM)

Cabin	Secure	PF
Speedbrake	ARMED	PF
Landing gear	Down	PF
Flaps.	***20**	PF

■ ■ ■ ■

ENGINE FUEL FILTER

Messages: L ENG FUEL FILT   R ENG FUEL FILT

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

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

■ ■ ■ ■

ENG VALVE

ENGINE FUEL VALVE

Messages: L ENG FUEL VAL   R ENG FUEL VAL

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

1 Choose one:

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

■ ■ ■ ■

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

The engine may continue to run for approximately 1 minute.

►►**Go to step 2**

2 Choose one:

◆In **flight**:

■ ■ ■ ■

◆On the **ground**:

Do **not** attempt engine start.

■ ■ ■ ■

Engine Indication Fluctuations

Condition: Engine EPR, N1,EGT, N2 and Fuel Flow fluctuations not approaching or exceeding limits indicate an engine probe has failed

1 A/T ARM switch . . . . OFF

2 Thrust lever
(affected side) . . . . . . RETARD TO MID POSITION

Prevents exceeding thrust limits when deactivating the electronic engine control

3 ELEC ENG CONTROL
switch (affected side) . . . . Off

4 Thrust lever
(affected side) . . . . SET 75% N1 MINIMUM

Sets thrust to determine if fluctuations are associated with EEC

5 Choose one:

◆**N1, EGT, N2 and Fuel Flow** indications continue to fluctuate or approach a limit:

▶▶**Go to the Engine Limit or Surge or Stall checklist on page 7.6**

■ ■ ■ ■

◆All indications **except EPR** stabilize:

▶▶**Go to step 6**

6 Thrust lever
(other side) . . . . RETARD TO MID POSITION

Prevents exceeding thrust limits when deactivating the electronic engine control.

7 ELEC ENG CONTROL
switch (other side) . . . . OFF

8 Continue normal operations with both engines

9 Do not use autothrottle.

10 Observe thrust limits.

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

EEC OFF

■ ■ ■ ■

Engine In–flight Start

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

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

2 Engine may accelerate to idle very slowly, especially at high altitude. The time from fuel control switch to RUN to stabilized idle may be as long as 2 minutes. Slow acceleration may be incorrectly interpreted as a hung start or an engine malfunction. If N3 is steadily increasing, and EGT remains within limits, the start is progressing normally.

3 Choose one:

◆X-BLD is **shown**:

▶▶**Go to step 7**

◆X-BLD is **not shown**:

▶▶**Go to step 4**

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

5 Choose one:

◆EGT is **0 degrees C:**

FUEL CONTROL switch (affected side). . . . . RICH

▶▶**Go to step 12**

◆EGT is **above 0 degrees C**:

FUEL CONTROL switch (affected side). . . . . .RUN

▶▶**Go to step 6**

▼ **Continued on next page** ▼

▼ Engine In–flight Start continued ▼

6 Choose one:

◆ Light up is obtained, but EGT and N3 stay low, with no increase for approximately 10 seconds:

FUEL CONTROL switch
(affected side) . . . . .RICH

►►**Go to step 12**

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

►►**Go to step 14**

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

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

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

►►**Go to step 19**

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

8 ISOLATION switch . . . . On

9 Ignition selector . . . . BOTH

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

When N3 is at a minimum of 20%:

FUEL CONTROL switch . . . . RUN

▼ Continued on next page ▼

▼ Engine In–flight Start continued ▼

11 Choose one:

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

►►**Go to step 14**

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

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

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

►►**Go to step 19**

12 Choose one:

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

►►**Go to step 13**

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

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

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

►►**Go to step 19**

13 FUEL CONTROL switch (affected side) . . . . . . RUN

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

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

16 ISOLATION switch . . . . Off

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

18 GND PROX FLAP OVRD switch . . . . Off

■ ■ ■ ■

▼ Continued on next page ▼

▼ Engine In–flight Start continued ▼

19 Plan to land at the nearest suitable airport.

20 **If** wing anti–ice required:

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

ISOLATION switch . . . . On

When wing anti–ice no longer required:

ISOLATION switch . . . . Off

21 Use flaps 20 and VREF 20 for landing.

22 Use flaps 5 for go-around.

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

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

ENGINE SHUTDOWN

PACK OFF

25 **Checklist Complete Except Deferred Items**

▼ Continued on next page ▼

▼ Engine In–flight Start continued ▼

Deferred Items

Descent Checklist (PM)

Pressurization	LDG ALT___	PM
Recall	Checked	PM
Autobrake	___	PM
Landing data	**VREF 20,** Minimums___	BOTH
Approach briefing	Completed	PM

Approach Checklist (PM)

Altimeters	QNH___	BOTH
Nav aids	Set	PM

Landing Checklist (PM)

Cabin	Secure	PF
Speedbrake	ARMED	PF
Landing gear	Down	PF
Flaps	***20**	PF

■ ■ ■ ■

INOP

ENGINE LIMITER

Messages: L ENG LIMITER   R ENG LIMITER

Condition: The engine limiter has failed.

1 Autothrottle disconnect switch . . . . Push

2 Thrust lever (affected side) . . . . Retard to mid position

3 ENG LIMITER switch (affected side) . . . . .Off

Observe engine limits

4 Autothrottle . . . . .Engage

Select desired mode

■ ■ ■ ■

ENGINE OIL PRESSURE

L ENG OIL PRESS	R ENG OIL PRESS

Messages: L ENG OIL PRESS R ENG OIL PRESS

Condition: The oil pressure is low.

1 Choose one:

◆Oil pressure indication **normal**:

Operate engine normally.

■ ■ ■ ■

◆Oil pressure indication in **amber band**:

Autothrottle disconnect switch. . . . . .Push

Thrust lever
(affected side). . . . . Confirm . . . Move to mid position

▶▶**Go to step 2**

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

▶▶**Go to the Engine Failure or Shutdown checklist on page 7.10**

■ ■ ■ ■

2 Choose one:

◆Oil pressure **can** be maintained above amber band:

■ ■ ■ ■

◆Oil pressure **cannot** be maintained above amber band:

▶▶**Go to the Engine Failure or Shutdown checklist on page 7.10**

■ ■ ■ ■

Engine Oil Temperature

Condition: The oil temperature is high.

1 A/T ARM switch . . . . OFF

2 Thrust lever (affected side) . . . . Confirm . . . . Move to mid position

3 **If** temperature is above red line limit:

▶▶**Go to the Engine Failure or Shutdown checklist on page 7.10**

■ ■ ■ ■

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.

■ ■ ■ ■

Engine Vibration

Condition: Vibration indication is in the amber band

1 Choose one:

◆In icing conditions:

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

Note: Vibration levels in amber band on either or both engines not accompanied by other failure indications are considered normal.

■ ■ ■ ■

◆**Not** in icing conditions:

►►**Go to step 2**

2 A/T ARM switch . . . . OFF

3 Thrust lever
(affected side) . . . . Confirm . . . . RETARD

Operate at a thrust level which will maintain vibration below amber band

If vibration remains in amber band with the thrust lever at idle:

►►**Go to the Engine Failure or Shutdown checklist on page 7.10**

■ ■ ■ ■

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.

■ ■ ■ ■

OIL FILTER

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

■ ■ ■ ■

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

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

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

2 Choose one:

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

Operate engine normally.

■ ■ ■ ■

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

▶▶**Go to step 3**

3 A/T ARM switch . . . . OFF

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

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

6 Choose one:

◆APU is **not available**:

▶▶**Go to step 8**

◆APU is **available**:

▶▶**Go to step 7**

7 APU selector . . . . START, then ON

8 GND PROX FLAP OVRD switch . . . . OVRD

9 Transponder mode selector . . . . TA

10 Plan to land at the nearest suitable airport.

11 **If** wing anti–ice needed:

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

ISOLATION switch . . . . On

When wing anti–ice no longer needed:

ISOLATION switch . . . . Off

▼ **Continued on next page** ▼

▼ **REVERSER UNLOCKED continued** ▼

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

13 Use flaps 5 for go-around.

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

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

ENGINE SHUTDOWN

PACK OFF

16 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist (PM)

Pressurization	LDG ALT___	PM
Recall	Checked	PM
Autobrake	___	PM
Landing data	**VREF 30+30,** Minimums___	BOTH
Approach briefing	Completed	PM

Approach Checklist (PM)

Altimeters	QNH___	BOTH
Nav aids	Set	PM

Landing Checklist (PM)

Cabin	Secure	PF
Speedbrake	ARMED	PF
Landing gear	Down	PF
Flaps.	***20**	PF

■ ■ ■ ■

VALVE

STARTER CUTOUT

Messages: L STARTER CUTOUT   R STARTER CUTOUT

Condition: The start valve is not closed.

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

2 Choose one:

◆VALVE light **extinguishes**:

■ ■ ■ ■

◆VALVE light **stays illuminated**:

►►**Go to step 3**

3 ENG BLEED AIR switch (affected side). . . . . . . Off

4 ISOLATION switch . . . . Off

5 APU BLEED AIR Switch . . . . Off

6 Choose one:

◆Ground air source **not** in use:

►►**Go to step 8**

◆Ground air source **in use**:

►►**Go to step 7**

7 Disconnect the ground air source.

8 WING ANTI–ICE switch . . . . Off

This prevents possible asymmetrical ice buildup on the wings.

9 Avoid icing conditions.

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

ENGINE BLEED OFF

PACK OFF

■ ■ ■ ■

Intentionally
Blank

Volcanic Ash

Condition: Volcanic ash is suspected when one or more of these occur:
- A static discharge around the windshield
- A bright glow in the engine inlets
- Smoke or dust on the flight deck
- An acrid odor

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

1 Don oxygen masks, as needed.

G-BYAD through G-CPEV, G-OOBC through SE-RFP
2 Don smoke goggles, as needed.

3 Establish crew communications (if needed).

4 A/T ARM switch . . . . OFF

If conditions allow, run the engines at idle
5 ⚠ Thrust levers (both) . . . . Idle

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

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

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

9 WING ANTI–ICE switch . . . . ON

10 Choose one:

◆APU is **not available**:

▶▶**Go to step 12**

◆APU is **available**:

▶▶**Go to step 11**

11 APU selector . . . . START, then ON

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

▼ **Continued on next page** ▼

▼ **Volcanic Ash continued** ▼

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 Slow acceleration may be incorrectly interpreted as a hung start or an engine malfunction. If N3 is steadily increasing, and EGT remains within limits, the start is progressing normally.

14 Choose one:

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

▶▶**Go to step 15**

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

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

■ ■ ■ ■

15 Plan to land at the nearest suitable airport.

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

RECIRCULATION FAN

■ ■ ■ ■

Intentionally
Blank

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Intentionally
Blank

APU FIRE

Message:	APU FIRE
Condition:	Fire is detected in the APU.

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

2 Choose one:

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

Plan to land at the nearest suitable airport.

▶▶ **Go to step 3**

◆ APU fire warning light **extinguishes**:

▶▶ **Go to step 3**

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

APU BOTTLE

APU FAULT

■ ■ ■ ■

ENGINE FIRE or Engine Severe Damage or Separation

Messages: L ENGINE FIRE R ENGINE FIRE

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

1 A/T ARM switch . . . . OFF

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

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

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

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

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

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

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

---

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.

Continued on next page

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

7 Choose one:

◆APU is **not available**:

▶▶**Go to step 9**

◆APU is **available**:

▶▶**Go to step 8**

8 APU selector . . . . START, then ON

9 GND PROX FLAP OVRD switch . . . . OVRD

10 Transponder mode selector . . . . TA

11 Plan to land at the nearest suitable airport.

12 **If** wing anti–ice required:

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

ISOLATION switch . . . . On

When wing anti–ice no longer required:

ISOLATION switch . . . . Off

13 Use flaps 20 and VREF 20 for landing.

14 Use flaps 5 for go-around.

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

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

ENGINE BOTTLE

ENGINE SHUTDOWN

PACK OFF

17 **Checklist Complete Except Deferred Items**

▼ **Continued on next page** ▼

▼ ENGINE FIRE or Severe Damage or Separation continued ▼

Deferred Items

Descent Checklist (PM)

Pressurization	LDG ALT___	PM
Recall	Checked	PM
Autobrake	___	PM
Landing data	**VREF 20,** Minimums___	BOTH
Approach briefing	Completed	PM

Approach Checklist (PM)

Altimeters	QNH___	BOTH
Nav aids	Set	PM

Landing Checklist (PM)

Cabin	Secure	PF
Speedbrake	ARMED	PF
Landing gear	Down	PF
Flaps	***20**	PF

■ ■ ■ ■

Engine Tailpipe Fire

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

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

2 Advise the cabin.

3 Choose one:

◆Bleed air is **not** available:

Advise the tower.

■ ■ ■ ■

◆Bleed air is **available**:

►►**Go to step 4**

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

5 ISOLATION switch . . . . 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 N3 to decrease to 30%.

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

9 Advise the tower.

10 **When** the Tailpipe Fire is extinguished:

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

■ ■ ■ ■

Smoke, Fire or Fumes

Condition: Smoke, fire or fumes is identified.

1 Diversion may be needed.

2 Don oxygen masks, as needed.

G-BYAD through G-CPEV, G-OOBC through SE-RFP

3 Don smoke goggles, as needed.

4 Establish crew and cabin communications.

G-BYAD through G-BYAY, G-CPEU through G-OOBB, G-OOBG through SE-RFP

5 Advise the cabin crew to turn off main IFE power switches.

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

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

8 L RECIRC FAN . . . . Off

9 APU BLEED AIR switch . . . . Off

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

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

11 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 12**

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

▶▶**Go to step 13**

▼ Continued on next page ▼

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

12 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 8.14, if needed**

■ ■ ■ ■

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

► ►**Go to step 13**

13 EQUIP COOLING switch . . . . ALTN

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

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

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

17 ISOLATION switch . . . . Off

18 R PACK control selector . . . . OFF

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

20 Choose one:

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

► ►**Go to step 27**

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

► ►**Go to step 21**

21 R PACK control selector . . . . AUTO

22 L PACK control selector . . . . OFF

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

▼ **Continued on next page** ▼

▼ Smoke, Fire or Fumes continued ▼

24 Choose one:

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

  ►►**Go to step 27**

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

  ►►**Go to step 25**

25 L PACK control selector . . . . AUTO

26 Consider an immediate landing.

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

UTILITY BUS OFF

PACK OFF

RECIRCULATION FAN

►►**Go to the Smoke or Fumes Removal checklist on page 8.14, if needed**

■ ■ ■ ■

APU BTL DISCH

APU BOTTLE

Message:	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.	

■ ■ ■ ■

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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 1 DISCH switch . . . . . Push and hold for 1 second

Note: DISCH light may require approximately 30 seconds to illuminate.

3 PACK control selector (either) . . . . Off

4 Plan to land at the nearest suitable airport.

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

CARGO BOTTLE

RECIRCULATION FAN

G-OOOZ

6 **Wait** 50 minutes or during approach, whichever occurs first:

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

G-BYAD through G-OOOX, SE-RFO, SE-RFP

7 **Wait** 80 minutes or during approach, whichever occurs first:

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

8 **Checklist Complete Except Deferred Items**

▼ Continued on next page ▼

▼ CARGO FIRE continued ▼

Deferred Items

Descent Checklist (PM)

Pressurization	LDG ALT___	PM
Recall	Checked	PM
Autobrake	___	PM
Landing data	VREF__, Minimums___	BOTH
Approach briefing	Completed	PM

Approach Checklist (PM)

Altimeters	QNH___	BOTH
Nav aids	Set	PM

During approach

If second fire bottle has not been discharged:

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

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 (PM)

Cabin	Secure	PF
Speedbrake	ARMED	PF
Landing gear	Down	PF
Flaps	*___	PF

■ ■ ■ ■

ENGINE BOTTLE

ENG BTL 1 DISCH | ENG BTL 2 DISCH

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

■ ■ ■ ■

ENGINE OVERHEAT

L ENG OVHT | R ENG OVHT

Messages:	L ENG OVHT	R ENG OVHT
Condition:	An engine overheat is detected.	

1 ENG BLEED AIR switch (affected side). . . . . . . .Off

2 A/T ARM switch . . . . OFF

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

4 Choose one:

◆ENG OVHT light **extinguishes**:

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

▶▶**Go to step 5**

◆ENG OVHT light **stays illuminated**:

▶▶**Go to the Engine Failure or Shutdown checklist on page 7.10**

■ ■ ■ ■

5 **If** wing anti–ice needed:

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

ISOLATION switch . . . . .On

When wing anti–ice no longer needed:

ISOLATION switch . . . . .Off

▼ Continued on next page ▼

▼ ENGINE OVERHEAT continued ▼

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

ENGINE BLEED OFF

PACK OFF

■ ■ ■ ■

SMOKE

EQUIPMENT SMOKE

Messages: FWD EQPT SMOKE

Condition: Smoke is sensed in the equipment cooling system.

■ ■ ■ ■

FAIL P-RESET

FIRE/OVERHEAT SYSTEM

Message: 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

G-BYAD through G-BYAY, SE-RFO, SE-RFP

Message: 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 LDG ALT selector . . . . Set 9,500 feet

5 CABIN ALTITUDE AUTO RATE control. . . . . . . MAX

6 Choose one:

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

▶▶**Go to step 9**

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

▶▶**Go to step 7**

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

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

Cabin Altitude MODE SELECT . . . . .MAN

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

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

CABIN AUTOMATIC INOPERATIVE

▶▶**Go to the Smoke, Fire or Fumes checklist on page 8.6 and do the remaining steps**

■ ■ ■ ■

WHL WELL FIRE

WHEEL WELL FIRE

Message: WHEEL WELL FIRE

Condition: Fire is detected in a main wheel well.

Maximum 270K/.82M

1 Landing gear lever. . . . . .DN

This attempts to extinguish the fire.

2 Plan to land at the nearest suitable airport.

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

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

4 Choose one:

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

■ ■ ■ ■

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

►►**Go to step 5**

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

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

Landing gear lever . . . . UP, then OFF

■ ■ ■ ■

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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 or the TRAILING EDGE FLAP 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**

▼ Continued on next page ▼

▼ All Flaps and Slats Up Landing continued ▼

Deferred Items

Descent Checklist (PM)

Pressurization	LDG ALT___	PM
Recall	Checked	PM
Autobrake	___	PM
Landing data	**VREF30+50,** Minimums___	BOTH
Approach briefing	Completed	PM

Approach Checklist (PM)

Altimeters	QNH___	BOTH
Nav aids	Set	PM

Landing Checklist (PM)

Cabin	Secure	PF
Speedbrake	ARMED	PF
Landing gear	Down	PF
Flaps	***UP**	PF

■ ■ ■ ■

AUTO SPDBRK

AUTO SPEEDBRAKE

Message: AUTO SPEEDBRAKE

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

1 The following Note applies only to Aircraft with winglets:

Note: Limit airspeed to 330 KIAS. Speedbrakes may be used in flight.

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

3 Manually extend speedbrakes after landing.

Increased force may be required to deploy speedbrakes to full UP

4 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist (PM)

Pressurization.	LDG ALT___	PM
Recall	Checked	PM
Autobrake	**___**	PM
Landing data	VREF__, Minimums___	BOTH
Approach briefing	Completed	PM

Approach Checklist (PM)

Altimeters	QNH___	BOTH
Nav aids	Set	PM

Landing Checklist (PM)

Cabin	Secure	PF
Speedbrake **. . . . .**	**Down**	PF
Landing gear	Down	PF
Flaps	*___	PF

■ ■ ■ ■

TRAILING EDGE

FLAP LOAD RELIEF

Message: FLAP LD RELIEF

Condition: The flap load relief system is failed.

1 Check flap position and maintain the appropriate speed.

■ ■ ■ ■

OFF

FLIGHT CONTROL HYDRAULIC

Messages: C FLT CONT HYD L FLT CONT HYD
R FLT CONT HYD

Condition: A flight control valve is closed.

1 All switches must be ON for flight.

■ ■ ■ ■

OFF

FLIGHT CONTROL VALVES

OFF

Message: FLT CONT VALS

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

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

■ ■ ■ ■

Jammed or Restricted Flight Controls

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

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

2 **If** the failure could be due to freezing water and conditions allow, consider descent to a warmer temperature and attempt to overpower the jammed or restricted system again.

3 Choose one:

◆Faulty system can be **overpowered**:

Continue to overpower the jammed or restricted system as needed.

■ ■ ■ ■

◆Faulty system **cannot** be overpowered:

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

■ ■ ■ ■

LEADING EDGE

LEADING EDGE SLAT ASYMMETRY

Message: LE SLAT ASYM

Condition: The leading edge slats are not symmetrically extended.

Caution! Limit airspeed to 240 knots maximum

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 20 for landing.

▶▶**Go to step 10**

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

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

6 ⚠ TE ALTN FLAPS switch . . . . ALTN

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

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

8 Choose one:

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

▶▶**Go to step 10**

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

▶▶**Go to step 9**

▼ Continued on next page ▼

9 Choose one:

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

Do **not** accomplish the following checklist:

TRAILING EDGE FLAP ASYMMETRY

TRAILING EDGE FLAP DISAGREE

►►**Go to the All Flaps and Slats Up Landing checklist on page 9.1**

■ ■ ■ ■

◆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 10**

◆Indicated flap position is **20**:

Use current flaps and VREF 30 + 30 for landing.

►►**Go to step 10**

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

11 **Checklist Complete Except Deferred Items**

▼ Continued on next page ▼

▼ **LEADING EDGE SLAT ASYMMETRY continued** ▼

Deferred Items

Descent Checklist (PM)

Pressurization	LDG ALT___	PM
Recall	Checked	PM
Autobrake	___	PM
Landing data	**VREF 20, or VREF 30+30, or VREF 30+40,** Minimums__	BOTH
Approach briefing	Completed	PM

Approach Checklist (PM)

Altimeters	QNH___	BOTH
Nav aids.	Set	PM

Landing Checklist (PM)

Cabin.	Secure	PF
Speedbrake	ARMED	PF
Landing gear	Down	PF
Flaps.	***As directed**	PF

■ ■ ■ ■

LEADING EDGE

LEADING EDGE SLAT DISAGREE

Message: LE SLAT DISAGREE

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

Caution! Limit airspeed to 240 knots maximum.

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 10**

◆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 switch . . . . ALTN

7 TE ALTN FLAPS switch . . . . ALTN

▼ Continued on next page ▼

▼ LEADING EDGE SLAT DISAGREE continued ▼

8 Choose one:

◆LEADING EDGE light is **illuminated**:

LE ALTN FLAPS switch . . . . Off

▶▶**Go to the LEADING EDGE SLAT ASYMMETRY checklist on page 9.6**

■ ■ ■ ■

◆LEADING EDGE light **extinguishes**:

▶▶**Go to step 9**

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

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

11 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist (PM)

Pressurization	LDG ALT___	PM
Recall	Checked	PM
Autobrake **. . . . .**	___	PM
Landing data **. . . . .**	**VREF 20,** Minimums___	BOTH
Approach briefing	Completed	PM

Approach Checklist (PM)

Altimeters	QNH___	BOTH
Nav aids.	Set	PM

Landing Checklist (PM)

Cabin.	Secure	PF
Speedbrake	ARMED	PF
Landing gear	Down	PF

▼ Continued on next page ▼

▼ **LEADING EDGE SLAT DISAGREE continued** ▼

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

■ ■ ■ ■

MACH SPD TRIM

MACH/SPEED TRIM

Message: MACH/SPEED TRIM

Condition: The Mach/speed system is failed.

■ ■ ■ ■

RUDDER RATIO

RUDDER RATIO

Message: 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

Message: 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

G-OOBC through G-OOBF

- a thrust lever is not closed

■ ■ ■ ■

SPOILERS

SPOILERS [Advisory]

Message: 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

Message: 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

■ ■ ■ ■

TRAILING EDGE

TRAILING EDGE FLAP ASYMMETRY

Message: TE FLAP ASYM

Condition: The trailing edge flaps are not symmetrically extended.

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

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

1 GND PROX FLAP OVRD switch . . . . OVRD

2 Choose one:

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

Use current flaps and VREF 20 for landing.

▶▶**Go to step 7**

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

Use current flaps and VREF 30 + 30 for landing.

▶▶**Go to step 7**

◆ Indicated flap position at or between **1 and 5**:

▶▶**Go to step 5**

◆ Indicated flap position **less than 1**:

▶▶**Go to step 3**

3 ALTN FLAPS selector 1

4 LE ALTN FLAPS switch . . . . ALTN

Note: Flap indicator may remain less than 1.

5 Use VREF 30 + 40 for landing.

▼ **Continued on next page** ▼

▼ TRAILING EDGE FLAP ASYMMETRY continued ▼

6 Choose one:

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

► ►**Go to the All Flaps and Slats Up Landing checklist on page 9.1**

■ ■ ■ ■

◆LE SLAT ASYM and LE SLAT DISAGREE messages are **not** shown:

Note: Tail clearance is reduced on landing.

► ►**Go to step 7**

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

8 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist (PM)

Pressurization . . . . LDG ALT___		PM
Recall . . . . .Checked		PM
Autobrake . . . . ___		PM
Landing data . . **VREF 20, VREF 30 + 30, or VREF 30 + 40, as directed** Minimums___		BOTH
Approach briefing . . . . Completed		PM

Approach Checklist (PM)

Altimeters . . . . .QNH___	BOTH
Nav aids. . . . . Set	PM

Landing Checklist (PM)

Cabin. . . . . .Secure	PF
Speedbrake . . . . ARMED	PF
Landing gear .Down	PF

▼ Continued on next page ▼

▼ **TRAILING EDGE FLAP ASYMMETRY continued** ▼

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

■ ■ ■ ■

TRAILING EDGE

TRAILING EDGE FLAP DISAGREE

Message: 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 8**

◆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 LE ALTN FLAPS switch . . . . ALTN

5 TE ALTN FLAPS switch . . . . ALTN

6 Choose one:

◆ TRAILING EDGE light **is illuminated**:

TE ALTN FLAPS switch . . . . .Off

▶▶**Go to the TRAILING EDGE FLAP ASYMMETRY checklist on page 9.13**

■ ■ ■ ■

◆TRAILING EDGE light **extinguishes**:

▶▶**Go to step 7**

▼ Continued on next page ▼

▼ **TRAILING EDGE FLAP DISAGREE continued** ▼

7 ALTN FLAPS selector . . . . Extend or retract flaps as needed

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

9 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist (PM)

Pressurization.	LDG ALT___	PM
Recall	Checked	PM
Autobrake	___	PM
Landing data	**VREF 20,** Minimums__	BOTH
Approach briefing	Completed	PM

Approach Checklist (PM)

Altimeters	QNH___	BOTH
Nav aids	Set	PM

Landing Checklist (PM)

Cabin	Secure	PF
Speedbrake	ARMED	PF
Landing gear	Down	PF
Flaps.	***As Directed**	PF

■ ■ ■ ■

UNSCHED STAB TRIM

UNSCHEDULED STABILIZER TRIM

Message: UNSCHD STAB TRIM

Condition: Stabilizer movement occurs without a signal to trim.

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

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

2 Autopilot disengage switch . . . . Push

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

4 Choose one:

◆Unscheduled trim **does not occur**:

▶▶**Go to step 8**

◆Unscheduled trim **occurs**:

▶▶**Go to step 5**

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

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

7 Choose one:

◆Unscheduled trim **does not occur**:

▶▶**Go to step 8**

◆Unscheduled trim **occurs**:

R STAB TRIM CUT OUT switch . . CUT OUT

▶▶**Go to step 8**

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

STABILIZER TRIM

■ ■ ■ ■

INOP

YAW DAMPER

Messages: L YAW DAMPER R YAW DAMPER

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

1 YAW DAMPER switch . . . . Off

■ ■ ■ ■

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Airspeed Unreliable

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

Objective: Maintain control using manual pitch and thrust.

1 Check the pitch attitude and thrust.

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

Autopilot disengage switch . . . . .Push

Autothrottle disconnect switch . . . . .Push

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

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

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

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

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

▼ Continued on next page ▼

▼ Airspeed Unreliable continued ▼

G-BYAD through G-OOBB, G-OOBG through SE-RFP

5 Choose one:

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

AIR DATA switch (unreliable side) . . ALTN

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

■ ■ ■ ■

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

►►Go to step 7

G-OOBC through G-OOBF

6 Choose one:

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

AIR DATA source selector
(unreliable side) . . . . Select other source

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

■ ■ ■ ■

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

►►Go to step 7

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

8 Maintain visual conditions if possible.

9 **Checklist Complete Except Deferred Items**

▼ Continued on next page ▼

▼ Airspeed Unreliable continued ▼

Deferred Items

Descent Checklist (PM)

Pressurization	LDG ALT___	PM
Recall	Checked	PM
Autobrake	___	PM
Landing data	VREF___, Minimums___	BOTH
Approach briefing	Completed	PM

Approach Checklist (PM)

Altimeters	__	BOTH
Nav aids	Set and checked	PM

Establish landing configuration early.

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

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

Landing Checklist (PM)

Cabin	Secure	PF
Speedbrake	ARMED	PF
Landing gear	Down	PF
Flaps	*__	PF

■ ■ ■ ■

▼ Continued on next page ▼

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:

- ALT DISAGREE
- C ADIRU PITOT
- CAPT PITOT
- F/O PITOT
- IAS DISAGREE
- L AUX PITOT
- MACH/SPEED TRIM
- OVERSPEED
- PROBE HEAT
- R AUX PITOT
- RUDDER RATIO
- STBY INST PITOT

AIR DATA

G-OOBC through G-OOBF

Messages:	L AIR DATA	R AIR DATA
Condition:	An air data system malfunction occurs.	

1 Choose one:

◆**L** AIR DATA message is shown:

Captain's AIR DATA source selector . . . . R

■ ■ ■ ■

◆**R** AIR DATA message is shown:

First officer's AIR DATA
source selector L

■ ■ ■ ■

ALTITUDE DISAGREE

Message: ALT DISAGREE

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

1 Airplane does not meet RVSM airspace requirements.

2 Transponder altitude received by ATC may be unreliable.

3 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist (PM)

Pressurization . . . . LDG ALT___ PM
Recall . . . . .Checked PM
Autobrake . . . . ___ PM
Landing data . . . VREF___, Minimums___ BOTH
Approach briefing . . . . Completed PM

Approach Checklist (PM)

Altimeters . . . . __ BOTH
Nav aids. . . . . Set and checked PM

Maintain visual conditions if possible.

Establish landing configuration early.

Radio altitude reference available below 2500 feet.

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

Landing Checklist (PM)

Cabin. . . . . .Secure PF
Speedbrake . . . . ARMED PF
Landing gear .Down PF
Flaps . . . . *__ PF

■ ■ ■ ■

ATTITUDE DISAGREE

G-BYAD through G-OOBH, G-OOOX through SE-RFP

Message: ATT DISAGREE

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

■ ■ ■ ■

ATTITUDE FAIL

G-CPEP, G-OOOX, G-OOOZ

Message: ATT FAIL

Condition: The attitude comparison function is failed.

■ ■ ■ ■

HEADING DISAGREE

G-OOOZ

Message: HDG DISAGREE

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

■ ■ ■ ■

HEADING FAIL

G-OOOZ

Message: HDG FAIL

Condition: The heading comparison function is failed.

■ ■ ■ ■

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.

■ ■ ■ ■

SINGLE AIR DATA

G-OOBC through G-OOBF

Message:	SINGLE AIR DATA
Condition:	Both primary flight displays use the same air data source.

■ ■ ■ ■

TRACK DISAGREE

G-OOOZ

Message:	TRACK DISAGREE
Condition:	The captain's and the first officer's track indications disagree.

■ ■ ■ ■

TRACK FAIL

G-OOOZ

Message:	TRACK FAIL
Condition:	The track comparison function is failed.

■ ■ ■ ■

Intentionally
Blank

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Intentionally
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XPNDR FAIL

ATC FAULT

Messages: ATC FAULT

Condition: A transponder fault occurs.

■ ■ ■ ■

FMC FAIL

G-BYAX, G-BYAY, G-CPEU through G-OOBH

Messages:	L FMC FAIL	R FMC FAIL
Condition:	An FMC is failed.	

1 Choose one:

◆A **single** FMC is failed:

▶▶**Go to step 2**

◆**Both** FMCs are failed:

▶▶**Go to step 4**

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

Select the operative FMC

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

■ ■ ■ ■

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

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

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

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

8 Manually tune navigation radios.

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

■ ■ ■ ■

FMC FAIL

G-BYAD through G-BYAW, G-CPEP, G-OOBI through SE-RFP

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.

1 Choose one:

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

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

■ ■ ■ ■

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

Take action as needed per the message.

■ ■ ■ ■

GPS

G-BYAX, G-BYAY, G-CPEU through G-OOBH

Messages: L GPS R GPS
GPS

Condition: One or both GPS receivers are failed.

1 Choose one:

◆**L GPS or R GPS** message is shown:

The indicated GPS has failed.

■ ■ ■ ■

◆**GPS** message is shown:

Both GPSs have failed.

■ ■ ■ ■

DC FAIL

IRS DC FAIL

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

Condition: IRS backup DC power is failed.

■ ■ ■ ■

FAULT

IRS FAULT

Messages: L IRS FAULT   R IRS FAULT
C IRS FAULT

Condition: An IRS fault occurs.

1 Choose one:

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

Captain's IRS switch . . . . ALTN

■ ■ ■ ■

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

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

■ ■ ■ ■

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

■ ■ ■ ■

ON DC

IRS ON DC

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

Condition: IRS AC power is failed.

■ ■ ■ ■

UNABLE RNP

G-BYAX, G-BYAY, G-CPEU through G-OOBH

Messages: UNABLE RNP

Condition: The actual navigation performance is not sufficient.

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

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

■ ■ ■ ■

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

Verify position.

■ ■ ■ ■

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Engine Fuel Leak

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

G-CPEP, G-OOOZ

1 C LEFT and C RIGHT PUMP switches . . . . Off

G-BYAD through G-BYAY, G-CPEU through G-OOOX, SE-RFO, SE-RFP

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

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

FUEL CONFIGURATION

G-CPEP, G-OOOZ

4 FUEL CROSSFEED switch . . . . Off

G-BYAD through G-BYAY, G-CPEU through G-OOOX, SE-RFO, SE-RFP

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

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

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

8 **If** conditions allow:

Visually check for engine fuel leak.

9 Choose one:

◆Engine fuel leak **confirmed**:

►►**Go to step 21**

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

►►**Go to step 10**

10 Resume normal fuel management procedures.

▼ Continued on next page ▼

▼ Engine Fuel Leak continued ▼

11 Choose one:

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

▶▶**Go to step 14**

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

▶▶**Go to step 12**

12 PROGRESS PAGE 2 . . . . SELECT

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

■ ■ ■ ■

14 Choose one:

◆LOW FUEL message **not** shown:

■ ■ ■ ■

◆LOW FUEL message is **shown**:

G-CPEP, G-OOOZ
▶▶**Go to step 15**

G-BYAD through G-BYAY, G-CPEU through G-OOOX, SE-RFO, SE-RFP
▶▶**Go to step 16**

G-CPEP, G-OOOZ
15 FUEL CROSSFEED switch . . . . On

This ensures all fuel is available if the low tank empties.

G-BYAD through G-BYAY, G-CPEU through G-OOOX, SE-RFO, SE-RFP
16 FWD and AFT FUEL XFEED switches . . . . On

This ensures all fuel is available if the low tank empties.

▼ Continued on next page ▼

▼ **Engine Fuel Leak continued** ▼

17 PUMP switches (all) . . . . ON

This ensures all fuel is available.

18 Plan to land at nearest suitable airport.

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

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

LOW FUEL

■ ■ ■ ■

21 A/T ARM switch . . . . OFF

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

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

24 Choose one:

◆APU is **available**:

▶▶**Go to step 25**

◆APU is **not available**:

▶▶**Go to step 26**

25 APU selector . . . . START, then ON

26 GND PROX FLAP OVRD switch . . . . OVRD

27 Transponder mode selector . . . . TA

28 Plan to land at the nearest suitable airport.

29 **If** wing anti–ice needed:

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

ISOLATION switch . . . . On

When wing anti–ice no longer needed:

ISOLATION switch . . . . Off

▼ **Continued on next page** ▼

▼ Engine Fuel Leak continued ▼

30 Choose one:

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

▶▶**Go to step 33**

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

▶▶**Go to step 31**

31 PROGRESS PAGE 2 . . . . SELECT

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

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

34 Use Flaps 20 and VREF 20 for landing

35 Use Flaps 5 for go-around

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

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

ENGINE SHUTDOWN

PACK OFF

38 Choose one:

◆LOW FUEL message **not** shown:

▶▶**Go to step 45**

◆LOW FUEL message is **shown**:

G-CPEP, G-OOOZ
▶▶**Go to step 39**

G-BYAD through G-BYAY, G-CPEU through G-OOOX, SE-RFO, SE-RFP
▶▶**Go to step 40**

▼ Continued on next page ▼

▼ Engine Fuel Leak continued ▼

G-CPEP, G-OOOZ

39 FUEL CROSSFEED switch . . . . On

This ensures all fuel is available if the low tank empties.

G-BYAD through G-BYAY, G-CPEU through G-OOOX, SE-RFO, SE-RFP

40 FWD and AFT FUEL XFEED switches . . . . On

This ensures all fuel is available if the low tank empties.

41 PUMP switches (all) . . . . ON

This ensures all fuel is available.

42 Plan to land at nearest suitable airport.

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

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

LOW FUEL

45 **Checklist Complete Except Deferred Items**

▼ Continued on next page ▼

▼ Engine Fuel Leak continued ▼

Deferred Items

Descent Checklist (PM)

Pressurization	LDG ALT___	PM
Recall	Checked	PM
Autobrake	___	PM
Landing data	**VREF 20,** Minimums___	BOTH
Approach briefing	Completed	PM

Approach Checklist (PM)

Altimeters	QNH___	BOTH
Nav aids	Set	PM

Landing Checklist (PM)

Cabin	Secure	PF
Speedbrake	ARMED	PF
Landing gear	Down	PF
Flaps	***20**	PF

■ ■ ■ ■

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

Intentionally
Blank

FUEL CONFIG

FUEL CONFIGURATION

Messages: FUEL CONFIG

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

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

Total fuel quantity remaining compared to planned fuel remaining.

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

Individual tank quantities.

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

2 Choose one:

◆Engine fuel leak **indicated**:

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

■ ■ ■ ■

◆Engine fuel leak **not indicated**:

G-CPEP, G-OOOZ
►►**Go to step 3**

G-BYAD through G-BYAY, G-CPEU through G-OOOX, SE-RFO, SE-RFP
►►**Go to step 4**

G-CPEP, G-OOOZ
3 FUEL CROSSFEED switch . . . . On

G-BYAD through G-BYAY, G-CPEU through G-OOOX, SE-RFO, SE-RFP
4 FWD and AFT FUEL XFEED switches . . . . On

▼ Continued on next page ▼

▼ FUEL CONFIGURATION continued ▼

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

This ensures fuel from the high tank feeds both engines.

6 **When** fuel balancing complete:

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

G-CPEP, G-OOOZ
FUEL CROSSFEED switch. . . . . Off

G-BYAD through G-BYAY, G-CPEU through G-OOOX, SE-RFO, SE-RFP
FWD and AFT FUEL XFEED switches . . . . Off

7 Choose one:

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

►►**Go to the LOW FUEL checklist on page 12.16**

■ ■ ■ ■

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

■ ■ ■ ■

VALVE

FUEL CROSSFEED

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

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

G-CPEP, G-OOOZ

1 Choose one:

◆FUEL CROSSFEED switch is **on**:

Crossfeed valve is failed closed.

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

■ ■ ■ ■

◆FUEL CROSSFEED switch is **off**:

Crossfeed valve is failed open.

■ ■ ■ ■

G-BYAD through G-BYAY, G-CPEU through G-OOOX, SE-RFO, SE-RFP

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

■ ■ ■ ■

Intentionally
Blank

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 Do not reset any tripped fuel pump circuit breaker.

2 Choose one:

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

PUMP switch (affected pump) . . . . Off

■ ■ ■ ■

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

▶▶**Go to step 3**

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

G-CPEP, G-OOOZ
▶▶**Go to step 7**

G-BYAD through G-BYAY, G-CPEU through G-OOOX, SE-RFO, SE-RFP
▶▶**Go to step 8**

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

G-CPEP, G-OOOZ
4 FUEL CROSSFEED switch . . . . On

G-BYAD through G-BYAY, G-CPEU through G-OOOX, SE-RFO, SE-RFP
5 FWD and AFT FUEL XFEED switches . . . . On

6 **When** center tank fuel depleted:

G-CPEP, G-OOOZ
FUEL CROSSFEED switch. . . . . .Off

G-BYAD through G-BYAY, G-CPEU through G-OOOX, SE-RFO, SE-RFP
FWD and AFT FUEL XFEED switches . . . . . . .Off

■ ■ ■ ■

G-CPEP, G-OOOZ
7 C LEFT and C RIGHT PUMP switches . . . . .Off

▼ Continued on next page ▼

▼ **FUEL PUMP continued** ▼

G-BYAD through G-BYAY, G-CPEU through G-OOOX, SE-RFO, SE-RFP

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

G-CPEP, G-OOOZ

9 FUEL CROSSFEED switch . . . . Off

G-BYAD through G-BYAY, G-CPEU through G-OOOX, SE-RFO, SE-RFP

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

11 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:

G-CPEP, G-OOOZ
FUEL CROSSFEED switch . . . . On

G-BYAD through G-BYAY, G-CPEU through G-OOOX, SE-RFO, SE-RFP
FWD and AFT FUEL XFEED switches . . On

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

2 Do **not** balance fuel.

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

FUEL CONFIGURATION

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

G-CPEP, G-OOOZ
FUEL CROSSFEED switch . . . . Off

G-BYAD through G-BYAY, G-CPEU through G-OOOX, SE-RFO, SE-RFP
FUEL CROSSFEED switches (Both) . . . . Off

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 a lower altitude.

■ ■ ■ ■

Intentionally
Blank

FUEL CONFIG

LOW FUEL

Messages: LOW FUEL

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

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

Total fuel quantity remaining compared to planned fuel remaining.

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

Individual tank quantities.

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

2 Choose one:

◆**Indication** of engine fuel leak:

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

■ ■ ■ ■

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

G-CPEP, G-OOOZ
▶▶**Go to step 3**

G-BYAD through G-BYAY, G-CPEU through G-OOOX, SE-RFO, SE-RFP
▶▶**Go to step 4**

G-CPEP, G-OOOZ
3 FUEL CROSSFEED switch . . . . On

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

▼ **Continued on next page** ▼

▼ LOW FUEL continued ▼

G-BYAD through G-BYAY, G-CPEU through G-OOOX, SE-RFO, SE-RFP

4 FWD and AFT FUEL XFEED switches . . . . On

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

5 PUMP switches (all) . . . . ON

This ensures all fuel is available.

6 Plan to land at nearest suitable airport.

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

■ ■ ■ ■

Low Fuel Temperature

Condition: Fuel temperature is near the minimum.

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

Increase speed, change altitude, and or deviate to a warmer air mass to achieve a TAT equal to or higher than the fuel temperature limit.

TAT will increase approximately 0.5 to 0.7 °C for each .01 Mach increase in speed.

In extreme conditions it may be necessary to descend as low as FL250.

■ ■ ■ ■

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OVHT

ELECTRIC HYDRAULIC OVERHEAT

Messages: L ELEC HYD OVHT R ELEC HYD OVHT

Condition: The pump temperature is high.

1 ELEC HYD PUMP switch . . . . Off

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

HYDRAULIC ELECTRIC PUMP

■ ■ ■ ■

OVHT

ENGINE HYDRAULIC OVERHEAT

Messages: L ENG HYD OVHT R ENG HYD OVHT

Condition: The pump temperature is high.

1 ENG HYD PUMP switch . . . . Off

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

HYDRAULIC ENGINE PUMP

■ ■ ■ ■

OVHT

HYDRAULIC (1 or 2) OVERHEAT

Messages: C HYD 1 OVHT C HYD 2 OVHT

Condition: The pump temperature is high.

1 ELEC HYD PUMP switch . . . . Off

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

HYDRAULIC ELECTRIC (1 or 2)

■ ■ ■ ■

PRESS

HYDRAULIC ELECTRIC (1 or 2)

Messages: C HYD ELEC 1 C HYD ELEC 2

Condition: The pump pressure is low.

1 ELEC HYD PUMP switch . . . . Off

■ ■ ■ ■

PRESS

HYDRAULIC ELECTRIC PUMP

Messages: L HYD ELEC PUMP   R HYD ELEC PUMP

Condition: The pump pressure is low.

1 ELEC HYD PUMP switch . . . . Off

■ ■ ■ ■

PRESS

HYDRAULIC ENGINE PUMP

Messages: L HYD ENG PUMP   R HYD ENG PUMP

Condition: The pump pressure is low.

1 ENG HYD PUMP switch . . . . Off

■ ■ ■ ■

RSVR

HYDRAULIC QUANTITY

Messages: C HYD QTY   R HYD QTY
L HYD QTY

Condition: The hydraulic quantity is low.

■ ■ ■ ■

RSVR

HYDRAULIC RESERVOIR PRESSURE

Messages: C HYD RSVR PRESS   R HYD RSVR PRESS
L HYD RSVR PRESS

Condition: The hydraulic reservoir air pressure 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 avoid further damage.

1 C1 AND C2 ELEC HYD PUMP switches (both) . . Off

2 Do **not** autoland.

Inoperative Items

Center autopilot inop

Left autopilot stabilizer trim inop

One spoiler panel 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

Right system powers the trim at half rate.

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

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

HYDRAULIC ELECTRIC (1 or 2)

STABILIZER TRIM

SPOILERS

YAW DAMPER

■ ■ ■ ■

SYS PRESS

HYDRAULIC SYSTEM PRESSURE (L only)

Messages: L HYD SYS PRESS

Condition: The hydraulic system pressure is low.

Objective: To avoid further system damage, and configure for landing using alternate systems, if needed.

1 L ENG HYD PUMP switch . . . . Off

2 L ELEC HYD PUMP switch . . . . Off

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

4 Do **not** autoland.

5 Do **not** use the autobrake.

6 Plan additional time for flap and gear extension.

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.

Rudder ratio inop

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 ELECTRIC PUMP

HYDRAULIC ENGINE PUMP

SPOILERS

RUDDER RATIO

YAW DAMPER

9 **Checklist Complete Except Deferred Items**

▼ Continued on next page ▼

▼ HYDRAULIC SYSTEM PRESSURE (L only) continued ▼

Deferred Items

Descent Checklist (PM)

Pressurization . . . . LDG ALT___ PM

Recall . . . . .Checked PM

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

Landing data . . . . VREF__, Minimums___ BOTH

Approach briefing . . . . Completed PM

Approach Checklist (PM)

Altimeters .QNH___ BOTH

Nav aids . . . . Set PM

Alternate Flap Extension (if required)

If TE FLAP DISAGREE **is shown** during normal flap extension:

Use flaps 20 and VREF 20 for landing

GND PROX FLAP OVRD switch . . . . .OVRD

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

LE ALTN FLAPS arm switch . . . . ALTN

TE ALTN FLAPS arm switch . . . . ALTN

ALTN FLAPS selector . . . . Extend or retract flaps, as needed

Do **not** accomplish the following checklist:

TRAILING EDGE FLAP DISAGREE

▼ Continued on next page ▼

▼ HYDRAULIC SYSTEM PRESSURE (L only) continued ▼

Alternate Gear Extension (if required)

If GEAR DISAGREE **is shown** during normal gear extension:

Landing gear lever . . . . OFF

G-CPEP, G-OOBI through G-OOOX
GND PROX/CONFIG GEAR OVRD switch . OVRD

G-BYAD through G-BYAY, G-CPEU through G-OOBH, G-OOOZ through SE-RFP
GND PROX GEAR OVRD switch . . . . OVRD

G-OOOZ

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

ALTN GEAR EXTEND switch . . . . Push

G-BYAD through G-OOOX, SE-RFO, SE-RFP

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

ALTN GEAR EXTEND switch . . . . DN

After gear down lights illuminate:

Landing gear lever . . . . DN

Do **not** arm speedbrakes. Automatic speedbrake is inoperative.

Nose wheel steering is inoperative. Differential braking is available.

Do **not** accomplish the following checklist:

GEAR DOORS

Landing Checklist (PM)

Cabin.	Secure	PF
Speedbrake	**DOWN**	PF

Ensure speedbrakes are extended before using right thrust reverser.

Landing gear	Down	PF
Flaps	*___	PF

■ ■ ■ ■

Intentionally
Blank

SYS PRESS

HYDRAULIC SYSTEM PRESSURE (R only)

Messages: R HYD SYS PRESS

Condition: The hydraulic system pressure is low.

Objective: To avoid further system damage.

1 R ENG HYD PUMP switch . . . . Off

2 R ELEC HYD PUMP switch. . . . . Off

3 Do **not** autoland.

Inoperative Items

Right autopilot inop

Right stabilizer trim inop.
Center stabilizer powers the trim at half trim rate.

Autobrake 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.

Right thrust reverser inop

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

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

HYDRAULIC ELECTRIC PUMP

HYDRAULIC ENGINE PUMP

SPOILERS

STABILIZER TRIM

6 **Checklist Complete Except Deferred Items**

▼ Continued on next page ▼

▼ HYDRAULIC SYSTEM PRESSURE (R only) continued ▼

Deferred Items

Descent Checklist (PM)

Pressurization	LDG ALT___	PM
Recall	Checked	PM
Autobrake	**OFF**	PM
Landing data	VREF__, Minimums___	BOTH
Approach briefing	Completed	PM

Approach Checklist (PM)

Altimeters	QNH___	BOTH
Nav aids	Set	PM

Landing Checklist (PM)

Cabin	Secure	PF
Speedbrake	ARMED	PF
Landing gear	Down	PF
Flaps	*___	PF

■ ■ ■ ■

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 avoid further system damage, and configure for landing using alternate systems, if needed.

1 L ENG HYD PUMP switch . . . . Off

2 L ELEC HYD PUMP switch . . . . Off

3 C1 and C2 ELEC HYD PUMP switches (both) . . . Off

4 SPEEDBRAKE lever . . . . DOWN

Do **not** arm SPEEDBRAKE lever.

5 Plan to land at the nearest suitable airport.

6 Crosswind limit is 20 knots.

7 Do **not** autoland.

8 Manually extend speedbrakes after landing.

9 Do **not** use auto brakes.

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

11 Avoid large or abrupt rudder inputs above 160 knots.

12 GND PROX FLAP OVRD switch . . . . OVRD

13 Plan additional time for flap and gear extension.

Inoperative Items

Left and Center autopilots inop

Left thrust reverser inop

Some spoiler panels on each wing inop

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

Center stabilizer trim inop

Right stabilizer powers the trim at half speed.

Rudder ratio system inop

▼ Continued on next page ▼

▼ HYDRAULIC SYSTEM PRESSURE (L and C) continued ▼

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

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

HYDRAULIC ELECTRIC PUMP

HYDRAULIC ENGINE PUMP

HYDRAULIC ELECTRIC (1 or 2)

RUDDER RATIO

SPOILERS

STABILIZER TRIM

YAW DAMPER

16 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist (PM)

Pressurization . . . . LDG ALT___		PM
Recall . . . . Checked		PM
Autobrake . . . . **OFF**		PM
Landing data . . . . **VREF 30+20,** Minimums___		BOTH
Approach briefing . . . . Completed		PM

Approach Checklist (PM)

Altimeters . . . . QNH___	BOTH
Nav aids . . . . Set	PM

▼ Continued on next page ▼

▼ HYDRAULIC SYSTEM PRESSURE (L and C) continued ▼

Alternate Flap Extension (if required)

If TE FLAP DISAGREE **is shown** during normal flap extension:

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

LE ALTN FLAPS arm switch . . . . ALTN

TE ALTN FLAPS arm switch . . . . ALTN

ALTN FLAPS selector . . . . Extend or retract flaps as needed

Do **not** accomplish the following checklist:

TRAILING EDGE FLAP DISAGREE

Alternate Gear Extension (if required)

If GEAR DISAGREE **is shown** during normal gear extension:

Landing gear lever . . . . OFF

G-CPEP, G-OOBI through G-OOOX
GND PROX/CONFIG GEAR OVRD switch . OVRD

G-BYAD through G-BYAY, G-CPEU through G-OOBH, G-OOOZ through SE-RFP
GND PROX GEAR OVRD switch . . . . OVRD

G-OOOZ

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

⚠ ALTN GEAR EXTEND switch . . . . Push

G-BYAD through G-OOOX, SE-RFO, SE-RFP

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 (L and C) continued** ▼

Nose wheel steering is inoperative. Differential braking is available.

Do **not** accomplish the following checklist:

GEAR DOORS

Landing Checklist (PM)

Cabin . . . . Secure		PF
Speedbrake . . . . **DOWN**		PF

Extend speedbrakes before using right thrust reverser.

Landing gear . . . . Down		PF
Flaps. ***20**		PF

■ ■ ■ ■

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 avoid further system damage, and configure for landing using alternate systems.	

1 L and R ENG HYD PUMP switches . . . . .Off

2 L and R ELEC HYD PUMP switches. . . . . .Off

3 SPEEDBRAKE lever . . . . DOWN

Do **not** arm SPEEDBRAKE lever.

4 Plan to land at the nearest suitable airport.

5 Crosswind limit is 20 knots.

6 Do **not** autoland.

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

G-CPEP, G-OOBI through G-OOOX

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

G-BYAD through G-BYAY, G-CPEU through G-OOBH, G-OOOZ through SE-RFP

11 GND PROX GEAR OVRD switch . . . . .OVRD

12 Plan additional time for flap and gear extension.

▼ Continued on next page ▼

▼ HYDRAULIC SYSTEM PRESSURE (L and R) continued ▼

Inoperative Items

Left and Right autopilots inop

Left and Right thrust reversers inop

Nose wheel steering inop

Normal and alternate brakes inop
Reserve brakes source to normal brakes 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.

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

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.

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

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

AUTOBRAKES

BRAKE SOURCE

HYDRAULIC ELECTRIC PUMP

HYDRAULIC ENGINE PUMP

GEAR DOORS

RUDDER RATIO

SPOILERS

STABILIZER TRIM

YAW DAMPER

15 **Checklist Complete Except Deferred Items**

▼ Continued on next page ▼

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

Deferred Items

Descent Checklist (PM)

Pressurization . . . . LDG ALT___ PM

Recall . . . . .Checked PM

Autobrake . . . . ___ PM

Landing data . . . . **VREF 30+20,** Minimums___ BOTH

Approach briefing . . . . Completed PM

Approach Checklist (PM)

Altimeters . . . . .QNH___ BOTH

Nav aids. . . . . Set PM

Alternate Flap Extension

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

LE ALTN FLAPS arm switch . . . . ALTN

TE ALTN FLAPS arm switch . . . . ALTN

ALTN FLAPS selector . . . . Extend or retract flaps, as needed

Alternate Gear Extension

Landing gear lever . . . . OFF

G-OOOZ

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

ALTN GEAR EXTEND switch . . . . PUSH

G-BYAD through G-OOOX, SE-RFO, SE-RFP

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 (L and R) continued** ▼

RESERVE BRAKES switch . . . . **ON**

Do **not** accomplish the following checklist:

GEAR DOORS

Landing Checklist (PM)

Cabin	Secure	PF
Speedbrake	**Down**	PF
Landing gear	Down	PF
Flaps.	***20**	PF

■ ■ ■ ■

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 avoid further system damage.

1 R ENG HYD PUMP switch . . . . Off

2 R ELEC HYD PUMP switch. . . . . Off

3 C1 and C2 ELEC HYD PUMP switches. . . . . Off

4 Do **not** autoland.

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 GND PROX FLAP OVRD switch . . . . OVRD

Inoperative Items

All autopilots inop

All stabilizer trim inop

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

Autobrake inop

Right thrust reverser 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.

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

▼ Continued on next page ▼

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

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

HYDRAULIC ELECTRIC PUMP
HYDRAULIC ENGINE PUMP
HYDRAULIC ELECTRIC (1 or 2)
SPOILERS
STABILIZER TRIM
YAW DAMPER

11 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist (PM)

Pressurization	LDG ALT___	PM
Recall	Checked	PM
Autobrake	**OFF**	PM
Landing data	**VREF 30+20** Minimums__	BOTH
Approach briefing	Completed	PM

Approach Checklist (PM)

Altimeters	QNH___	BOTH
Nav aids	Set	PM

Landing Checklist (PM)

Cabin	Secure	PF
Speedbrake	ARMED	PF
Landing gear	Down	PF
Flaps.	***20**	PF

■ ■ ■ ■

UNLKD

RAT UNLOCKED

Messages: RAT UNLOCKED

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

■ ■ ■ ■

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AIR/GROUND SYSTEM

Messages: AIR/GND SYS

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

Inoperative Items

One or both thrust reversers inop

Automatic speedbrake inop
Manual speedbrake extension after landing is needed.

Autobrake 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**

Deferred Items

Descent Checklist (PM)

Pressurization	LDG ALT___	PM
Recall	Checked	PM
Autobrake	**OFF**	PM
Landing data	VREF__, Minimums___	BOTH
Approach briefing	Completed	PM

Approach Checklist (PM)

Altimeters	QNH___	BOTH
Nav aids	Set	PM

Landing Checklist (PM)

Cabin	Secure	PF
Speedbrake	**DOWN**	PF
Landing gear	Down	PF
Flaps	*___	PF

■ ■ ■ ■

ANTISKID

ANTISKID

Messages: ANTISKID

Condition: An antiskid system fault occurs.

1 Braking effectiveness may be reduced.

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

3 Autobrake system is inoperative.

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

5 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist (PM)

Pressurization . . . . LDG ALT___		PM
Recall . . . . .Checked		PM
Autobrake	**OFF**	PM
Landing data . . . . VREF__, Minimums___		BOTH
Approach briefing . . . . Completed		PM

Approach Checklist (PM)

Altimeters .QNH___		BOTH
Nav aids. . . . . Set		PM

Landing Checklist (PM)

Cabin. . . . . .Secure		PF
Speedbrake . . . . ARMED		PF
Landing gear .Down		PF
Flaps . . . . *___		PF

■ ■ ■ ■

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

3 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist (PM)

Pressurization	LDG ALT___	PM
Recall	Checked	PM
Autobrake	**OFF**	PM
Landing data	VREF__, Minimums___	BOTH
Approach briefing	Completed	PM

Approach Checklist (PM)

Altimeters	QNH___	BOTH
Nav aids	Set	PM

Landing Checklist (PM)

Cabin	Secure	PF
Speedbrake	ARMED	PF
Landing gear	Down	PF
Flaps	*___	PF

■ ■ ■ ■

BRAKE SOURCE

BRAKE SOURCE

Messages: BRAKE SOURCE

Condition: Normal and alternate brake system pressures are low.

1 RESERVE BRAKES switch . . . . .ON

2 Choose one:

◆BRAKE SOURCE light **extinguishes**:

■ ■ ■ ■

◆BRAKE SOURCE light **stays illuminated**:

►►**Go to step 3**

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

4 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist (PM)

Pressurization	LDG ALT___	PM
Recall	Checked	PM
Autobrake	**OFF**	PM
Landing data	VREF__, Minimums___	BOTH
Approach briefing	Completed	PM

Approach Checklist (PM)

Altimeters	QNH___	BOTH
Nav aids.	Set	PM

Landing Checklist (PM)

Cabin.	Secure	PF
Speedbrake	ARMED	PF
Landing gear	Down	PF
Flaps	*___	PF

▼ Continued on next page ▼

▼ **BRAKE SOURCE continued** ▼

After Landing

Do **not** taxi.

■ ■ ■ ■

GEAR

GEAR DISAGREE

Messages: GEAR DISAGREE

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

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

1 Choose one:

◆ Landing gear lever **UP**:

Observe the gear extend or extended limit speed of 270 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.

■ ■ ■ ■

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

▶▶**Go to step 2**

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

G-BYAD through G-BYAX, G-CPEP, G-OOBI through SE-RFP
GND PROX/CONFIG
GEAR OVRD switch . . . . OVRD

G-BYAY, G-CPEU through G-OOBH
GND PROX GEAR OVRD switch . . . . OVRD

Accomplish normal landing.

■ ■ ■ ■

2 Landing gear lever . . . . OFF

G-OOOZ

Maximum 250K/.75M

3 ⚠ ALTN GEAR EXTEND switch . . . . . Push and hold for 1 second

▼ Continued on next page ▼

▼ GEAR DISAGREE continued ▼

G-BYAD through G-OOOX, SE-RFO, SE-RFP

Maximum 250K/.75M

4 ALTN GEAR EXTEND switch . . . . DN

5 Choose one:

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

Landing gear lever . . . . DN

■ ■ ■ ■

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

►►**Go to step 6**

6 Plan to land on available gear.

7 Landing gear lever . . . . DN

G-BYAD through G-BYAX, G-CPEP, G-OOBI through SE-RFP

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

G-BYAY, G-CPEU through G-OOBH

9 GND PROX GEAR OVRD switch . . . . OVRD

10 Use flaps 30 for landing.

This ensures slowest landing speed.

11 Do **not** arm speedbrake lever.

12 Choose one:

◆Stopping distance is **not critical**:

►►**Go to step 15**

◆Stopping distance is **critical**:

►►**Go to step 13**

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

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

15 **Checklist Complete Except Deferred Items**

▼ Continued on next page ▼

▼ GEAR DISAGREE continued ▼

Deferred Items

Descent Checklist (PM)

Pressurization . . . . LDG ALT___		PM
Recall . . . . .Checked		PM
Autobrake . . . . ___		PM
Landing data . . . . **VREF 30,** Minimums___		BOTH
Approach briefing . . . . Completed		PM

Approach Checklist (PM)

Altimeters . . . . .QNH___	BOTH
Nav aids. . . . . Set	PM

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 (PM)

Cabin. . . . . .Secure	PF
Speedbrake . . . . **DOWN**	PF
Landing gear .Down	PF
Flaps. ***30**	PF

■ ■ ■ ■

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 knots and .82 Mach.

■ ■ ■ ■

◆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.

■ ■ ■ ■

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ALT ALERT

ALTITUDE ALERT

Message: ALTITUDE ALERT

Condition: A deviation from the MCP set altitude occurs.

■ ■ ■ ■

ALTITUDE CALLOUTS

G-BYAD through G-BYAY, G-CPEU, G-CPEV, G-OOBC through G-OOBJ, G-OOOZ through SE-RFP

Message: ALT CALLOUTS

Condition: Altitude voice annunciations during approach are not supplied.

■ ■ ■ ■

CONFIG

CONFIG FLAPS

Message: FLAPS

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

■ ■ ■ ■

CONFIG

CONFIG GEAR NOT DOWN

Message: GEAR NOT DOWN

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

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

■ ■ ■ ■

CONFIG

CONFIG PARKING BRAKE

Message: PARKING BRAKE

Condition: The parking brake is set during takeoff.

■ ■ ■ ■

CONFIG

CONFIG SPOILERS

Message: SPOILERS

Condition: The speedbrake lever is not DOWN during takeoff.

■ ■ ■ ■

CONFIG

CONFIG STABILIZER

Message: STABILIZER

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

■ ■ ■ ■

EICAS CONTROL PANEL

Message: EICAS CONT PNL

Condition: The EICAS control panel is failed.

■ ■ ■ ■

EICAS DISPLAY

Message: EICAS DISPLAY

Condition: One EICAS display is failed.

■ ■ ■ ■

GROUND PROXIMITY SYSTEM

G-BYAY, G-CPEU through G-OOBH

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

G-BYAX, G-BYAY, G-OOBC through G-OOBF

Message: PILOT RESPONSE

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

■ ■ ■ ■

TCAS

G-OOBA through G-OOBF

Message: TCAS

Condition: TCAS system is failed.

■ ■ ■ ■

TCAS OFF

G-OOBA through G-OOBF

Message: TCAS OFF

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

■ ■ ■ ■

TERRAIN OVERRIDE

G-BYAY, G-CPEU through G-OOBH

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

G-BYAY, G-CPEU through G-OOBH

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.

■ ■ ■ ■

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Operational Procedures
Introduction

Operational Procedures frequently accomplished in flight should be performed from memory. Fuel balancing may be performed from memory provided the centre tank contains no fuel and no leaks exist. Infrequently used procedures (such as engine crossbleed start), should be performed by reference or by memory having reviewed the procedure prior to accomplishment. The Electrical Power Up procedure should be accomplished by reference.

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APU To Pack Takeoff

This procedure is used to make a takeoff using no bleed air from the engines. Air for left pack operation is supplied from the APU.

Caution! This procedure is not allowed if icing conditions exist for taxi or takeoff.

After Engine Start

1 APU selector . . . . START or ON

Start APU or leave APU running.

Before Takeoff

1 Engine bleed air switches . . . . OFF

After Takeoff

Note: If engine failure occurs, engine bleed air switches should remain OFF until reaching 1,500 feet or until obstacle clearance height has been attained, whichever is higher.

1 Right engine bleed air switch . . . . ON

After engine thrust is reduced from takeoff, position right engine bleed air switch ON.

2 Left engine bleed air switch . . . . ON

After cabin rate of climb stabilizes, position left engine bleed air switch ON.

3 APU selector . . . . OFF

■ ■ ■ ■

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Autoland

Requirements Prior To Commencement Of Approach

Warning! When Low Visibility Procedures are not in force, interference of ILS signals may occur; the flight path must be closely monitored and autopilots disengaged immediately if excessive disturbances occur near the ground.

Note: Autoland above Maximum Landing Mass is not certified.

1	**BOTH PILOTS QUALIFIED**
2	**FLIGHT GUIDE** Cat I/II: Verify runway is listed as suitable for autoland in the Company Procedures. Cat III: Check runway is listed and approved minima.
3	**STABILISER TRIM SWITCH** PF's must be serviceable
4	**AUTOLAND STATUS ANNUNCIATOR** PM's must be tested and serviceable For DH less than 15ft RA, both ASAs must be tested and serviceable
5	**EADI's** Both must be supplied by different sources
6	**HYDRAULIC SYSTEMS** Verify no HYD SYS PRESS messages
7	**ELECTRICAL SYSTEMS** A minimum of two sources of AC electrical power must be available (engine driven or APU generators)
8	**BOTH ENGINES RUNNING**
9	**FLAPS** Use flaps 25 or 30 for landing
10	**RUNWAY VISUAL RANGE** "Controlling RVR" is the value relevant to the approach ban requirements. The approach shall not be continued beyond the outer marker, or equivalent, if the controlling RVR is below that required for the approach being flown. The touch-down zone RVR (may be replaced by midpoint RVR if touchdown not available) is always controlling. If reported and relevant, the mid point and stop end RVR are also controlling. "Relevant", in this context, means that part of the runway used during the high speed phase of the landing down to a speed of approximately 60 knots. The minimum RVR value for the mid-point is 125m or the RVR required for the touch-down zone if less, and 75m for the stop-end. For aeroplanes equipped with a roll-out guidance or control system, the minimum RVR value for the mid-point is 75m. Absolute Minima for B757 are: Cat II/IIIA mid-point: 125m stop-end: 75m Cat IIIB mid-point: 75m stop-end: 75m

Continued on next page

Requirements Prior To Commencement Of Approach (Continued)	
If weather conditions are below Cat IIIA, the following are also required:	
1	**WINDSHIELD WIPERS** Both windshield wipers are not known to be unserviceable
2	**AUTOTHROTTLE** Serviceable
Maximum Winds for Autoland: Headwind 25kts Crosswind 25kts Tailwind 15kts (BI, BJ 10kts)	

Action In The Event Of Failures On CAT II/III Approach After Initial ASA Annunciation

In the event of an autoland status downgrade a go-around should be executed unless:

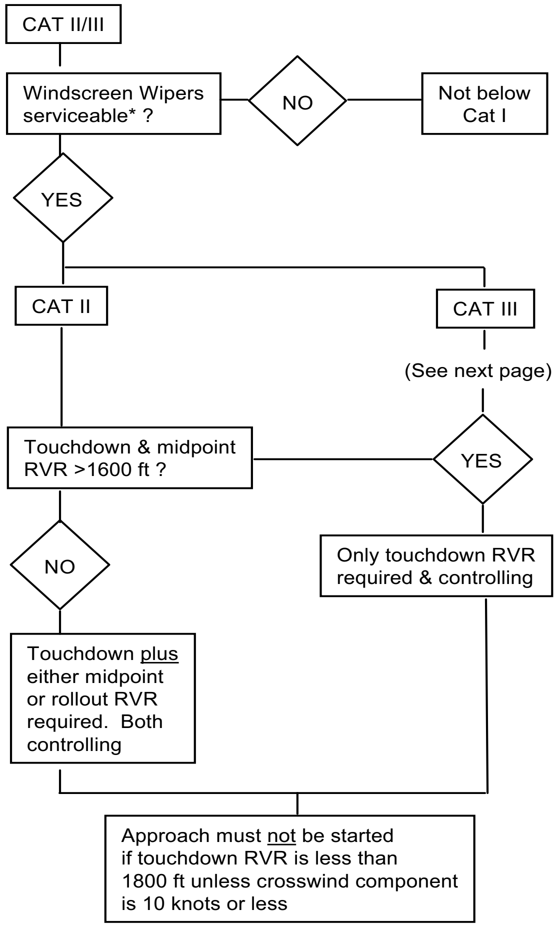
(a) Weather conditions and time permit a reversion to appropriate higher minima, or

(b) Landing is considered to be the safer course of action and required visual references have been achieved

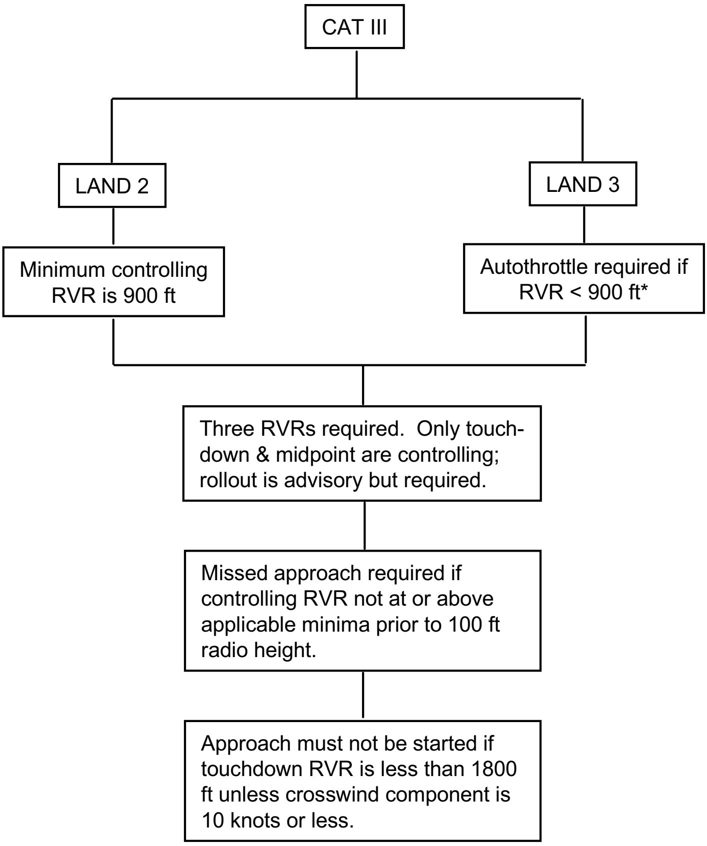
<table>
<tr><th>FAILURE</th><th>CAT III</th><th>CAT II</th></tr>
<tr><td rowspan="3">ENGINE FAILURE
Disconnect A/T
Flaps 25 or 30 for Landing
Flaps 20 for G/A</td><td>CHECK ASA
LAND 3 or 2 continue Cat IIIA minima (50ft/200m)</td><td>CHECK ASA
LAND 3 or 2 continue Cat II</td></tr>
<tr><td colspan="2">BELOW 200ft RA</td></tr>
<tr><td colspan="2">Continue approach with no change to minima</td></tr>
<tr><td rowspan="3">GENERATOR FAILURE</td><td>CHECK ASA
LAND 3 continue Cat IIIB
LAND 2 revert Cat IIIA
NO AUTOLAND revert Cat I</td><td>CHECK ASA
LAND 2 continue Cat II
NO AUTOLAND revert Cat I</td></tr>
<tr><td colspan="2">BELOW 200ft RA</td></tr>
<tr><td colspan="2">Continue approach with no change to minima</td></tr>
<tr><td>CRITICAL GROUND EQUIPMENT</td><td colspan="2">Revert to CAT I or Go-Around</td></tr>
<tr><td>PM ASA FAILURE</td><td colspan="2">Revert to CAT I or Go-Around</td></tr>
<tr><td>PF ASA FAILURE</td><td>Revert to CAT IIIA</td><td>Continue approach with no change to minima</td></tr>
<tr><td>AUTOPILOT DISCONNECT</td><td colspan="2">Revert to CAT I or Go-Around</td></tr>
<tr><td>AUTOTHROTTLE FAILURE</td><td colspan="2">Continue approach with no change to minima</td></tr>
<tr><td>ILS DEVIATION</td><td colspan="2">Persistent above 200ft - Go around
Occurs below 200ft - Immediate go-around</td></tr>
</table>

UNITED STATES CATEGORY II/III

NOTE: "Controlling RVR" is the RVR value relevant to approach ban regulations.



(*) Windscreen wipers do not need to be serviceable at both speeds and should not be check on a dry screen. It is sufficient that they are not recorded as unserviceable.



* if Autothrottle fails following annunciation of LAND 3 the approach may be continued.

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Cold Weather Ground Operations

Note: Note:This Operational Procedure (OP) should be accomplished when required in conjunction with the appropriate Normal Procedure. Review each OP section BEFORE performing the related NP. Refer to OMB Supplementary Procedures “Adverse Weather” for full details on all cold weather procedures.

- - - - Exterior Inspection - - - -

Do the normal Exterior Inspection with the following additional steps:

Surfaces . . . . Check

Cold-soaked fuel frost on lower wing, max 3mm is permitted. All leading edge devices, all control surfaces and upper wing surfaces must be free of snow or ice. Thin hoarfrost on upper fuselage is acceptable provided all vents and ports are clear.

Pitot probes, static ports, Pack and APU inlets, Ldg Gear doors, fuel tank vents, engine inlets and fan blades free of ice and snow.

- - - - Takeoff Performance - - - -

Review the following items prior to the taxi and takeoff briefing:

Max crosswind . . . . Review

Takeoff thrust . . . . Full if runway contaminated

Takeoff Flaps. Highest practicable setting if runway is contaminated

- - - - On Stand De-icing - - - -

Perform the following procedure for on stand de-icing with engines shutdown:

Cabin crew and passengers . . . . Advise

Flaps . . . . UP

APU bleed air switch. . . . . .OFF

Start time, fluid type, mixture. . . . . Note

Holdover time . . . . Check

After de-icing:

Wait approximately 1 minute before switching APU bleed ON.

APU bleed air switch. . . . . .ON

- - - - Engine Start - - - -

Do the normal Engine Start procedure with the following modifications:

Pushback before engine start . . . . . Consider on slippery apron

Oil pressure may be slow to rise.

Initial oil pressure may rise higher than normal.

Additional warm up time may be needed.

Engine Anti-ice (if required) . ON after both engines are started

- - - - Before Taxi - - - -

Do the normal Before Taxi procedure with the following modifications:

Flaps . . . . UP if TWY is contaminated

If taxi route is through slush, or standing water in low temperatures, or if precipitation is falling with temperatures below freezing, taxi out with the flaps up.

Flight controls . . . . Check

In contaminated conditions flight control checks should be completed prior to taxi or after remote de-icing.

- - - - Taxi - - - -

Perform the normal Taxi procedure with the following modifications:

Engine run-ups . . . . As high as practicable up to 60% N1

If engine A/I is required and OAT ≤ 3°C run-up for 10 sec. every 60 min.

- - - - Remote De-icing (engines running) - - - -

Perform the following procedure if de-icing with engines running:

Cabin crew and passengers . . . . Advise

Flaps . . . . UP

Thrust levers . . . . Idle

Engine and APU bleed air switches . . . . .OFF

Start time, fluid type, mixture. . . . . Note

Holdover time . . . . Check

After de-icing

Flaps . . . . UP if TWY is contaminated

If taxi route is through slush, or standing water in low temperatures, or if precipitation is falling with temperatures below freezing, taxi out with the flaps up.

Flight controls . . . . Check

Engine and APU bleed air switches . . . . .ON

Wait approximately one minute after de-icing is completed to turn engine and APU BLEED air switches ON to ensure all de-icing fluid has been cleared from the engines.

Before Taxi checklist . . . . .Complete

In the case of remote de-icing the Before Taxi checklist will be completed twice.

- - - - Before takeoff - - - -

Do the normal Before Takeoff procedure with the following modifications:

Flaps . . . . Takeoff position

Before Takeoff checklist . . . . .Complete

Holdover time . . . . Review

If necessary inspect wing visually just prior to takeoff.

- - - - Takeoff - - - -

Do the normal Takeoff procedure with the following modification:

Static engine run-up . . . . As high as practicable up to 60% N1

If engine A/I is required and OAT ≤ 3°C run-up for 10 sec. and confirm stable engine operation.

- - - - After Landing - - - -

Do the normal After Landing procedure with the following modifications:

Flaps . . . . As required

Do not retract the flaps to less than flaps 20 until the flap areas have been checked to be free of contaminants after prolonged operation in icing conditions with the flaps extended, or when an accumulation of airframe ice is observed, or when landing on a runway contaminated with ice, snow, or slush.

Engine run-ups . . . . As high as practicable up to 60% N1

If engine A/I is required and OAT ≤ 3°C run-up for 10 sec. every 60 min.

- - - - Secure - - - -

Do the normal Secure Procedure with the following modifications:

If the airplane will be attended:

Packs . . . . AUTO

If the airplane will not be attended:

Cabin altitude mode selector . . . . MAN

Cabin altitude manual control . DESCEND (close outflow valve)

Wheel chocks . . . . Verify in place

Parking brake . . . . Released

Cold Temperature Altitude Corrections

Extremely low temperatures create significant altimeter errors and greater potential for reduced terrain clearance. When the temperature is colder than ISA, true altitude will be lower than indicated altitude. Altimeter errors become significantly larger when the surface temperature approaches -30°C or colder, and also become larger with increasing height above the altimeter reference source.

Apply the altitude correction table when needed:

- no corrections are needed for reported temperatures above 0°C or if the airport temperature is at or above the minimum published temperature for the procedure being flown
- do not correct altimeter barometric reference settings
- ATC assigned altitudes or flight levels should not be adjusted for temperature when under radar control
- corrections apply to QNH and QFE operations
- apply corrections to all published minimum departure, en route and approach altitudes, including missed approach altitudes, according to the table below. Advise ATC of the corrections
- MDA/DA settings should be set at the corrected minimum altitudes for the approach
- subtract the elevation of the altimeter barometric reference setting source (normally the departure or destination airport elevation) from the published minimum altitude to be flown to determine "height above altimeter reference source"
- enter the table with Airport Temperature and with "height above altimeter reference source." Read the correction where these two entries intersect. Add the correction to the published minimum altitude to be flown to determine the corrected indicated altitude to be flown. To correct an altitude above the altitude in the last column, use linear extrapolation (e.g., to correct 6000 feet or 1800 meters, use twice the correction for 3000 feet or 900 meters, respectively) The corrected altitude must always be greater than the published minimum altitude
- if the corrected indicated altitude to be flown is between 100 foot increments, set the MCP altitude to the closest 100 foot increment above the corrected indicated altitude to be flown.

Altitude Correction Table
Heights and Altitudes in Feet

Airport Temp °C	Height Above Altimeter Source											
	200 feet	300 feet	400 feet	500 feet	600 feet	700 feet	800 feet	900 feet	1000 feet	1500 feet	2000 feet	3000 feet
0°	20	20	30	30	40	40	50	50	60	90	120	170
-10°	20	30	40	50	60	70	80	90	100	150	200	290
-20°	30	50	60	70	90	100	120	130	140	210	280	420
-30°	40	60	80	100	120	140	150	170	190	280	380	570
-40°	50	80	100	120	150	170	190	220	240	360	480	720
-50°	60	90	120	150	180	210	240	270	300	450	590	890

Altitude Correction Table
Heights and Altitudes in Meters

Airport Temp °C	Height Above Altimeter Source											
	60 mtrs	90 mtrs	120 mtrs	150 mtrs	180 mtrs	210 mtrs	240 mtrs	270 mtrs	300 mtrs	450 mtrs	600 mtrs	900 mtrs
0°	5	5	10	10	10	15	15	15	20	25	35	50
-10°	10	10	15	15	20	20	25	30	30	45	60	90
-20°	10	15	20	25	25	30	35	40	45	65	85	130
-30°	15	20	25	30	35	40	45	55	60	85	115	170
-40°	15	25	30	40	45	50	60	65	75	110	145	220
-50°	20	30	40	45	55	65	75	80	90	135	180	270

Electrical Power Up

The following procedure is accomplished to permit safe application of electrical power

1 Battery switch . . . . ON

2 Standby Power selector. . . . . AUTO

Verify APU BAT DISCH and MAIN BAT DISCH lights illuminated and standby bus OFF light extinguishes

3 Hydraulic Electric Pump switches . . . . Off

4 Landing Gear Lever . . . . DN

5 Alternate Flaps selector. . . . . Norm

6 Electrical Power . . . . .Establish

7 Bus Tie switches. . . . . AUTO

8 **If** external power is desired:

External Power AVAIL light . . . . . . Illuminated

External Power switch. . . . . .Push

9 **If** APU power is desired:

APU Generator switch . . . . ON

APU selector . . . . START, THEN ON

Position the APU selector back to the ON position. Do not allow the APU Selector to spring back to the ON position.

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Engine Crossbleed Start

1 The APU must be shut down or the APU bleed air switch must be OFF.

2 Check that the area behind the airplane is clear.

3 Engine Bleed Air switch (operating engine) . . . ON

4 Advance thrust on operating engine to approximately 65% N3 and accomplish normal Engine Start procedure.

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Flight Navigator Areas

For definition of Flight Navigator Areas, see Ops Manual Part A Section 8.14.

FLIGHT NAVIGATOR AREAS ETOPS OUTSIDE MNPSA

Minimum equipment required prior to entry into Flight Navigator Area

- 2 x IRS, 2 x FMC and 2 x CDU

OR, if aircraft is fitted with Standby Navigation System

- 2 x IRS, 1 x FMC and 2 x CDU

Less than the above remain serviceable prior to entry into Flight Navigator Area

- Return to effect repair, or
- Reroute clear of Flight Navigator Area

Only 2 x IRS (no FMS) remain serviceable when within Flight Navigator Area

- Advise ATC
- Navigate using IRS information
- Maintain flight plan route
- Plot IRS co-ordinates every 20 minutes

FLIGHT NAVIGATOR AREAS NON-ETOPS, NON-MNPSA

Minimum equipment required prior to entry into Flight Navigator Area

- 1 x IRS, 1 FMC and 1 x CDU
- 1 x ADF, 1 x VOR and 1 x DME

Less than 1 x IRS and 1 x FMC and 1 x CDU remain serviceable prior to entry into Flight Navigator Area

- Continue if sufficient ground aids are available, or else
- Return to effect repair, or
- Reroute clear of Flight Navigator Area

Only 1 x IRS (no FMS) remains serviceable when within Flight Navigator Area

- Advise ATC
- Continue by using IRS, ADF, VOR and DME
- Maintain flight plan route

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Fuel Balancing

Condition: Fuel Balancing is required

1 **If** an engine fuel leak is suspected:

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

Note: Fuel pump pressure should be supplied to the engines at all times. At high altitude, without fuel pump pressure, thrust deterioration or engine flameout may occur.

2 **When** the fuel quantities in left main and right main tanks differ by an appreciable amount:

CROSSFEED SWITCHES (Both) . . . . .ON

FUEL PUMP SWITCHES
(low quantity tank). . . . . OFF

3 **When** fuel load balanced:

FUEL PUMP SWITCHES . . . . .ON

CROSSFEED SWITCHES (Both) . . . . OFF

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MNPS Airspace (Not Prescribed Routes)

For definition of MNPS Airspace and Prescribed Routes, see Ops Manual Part A Section 8.14.

Minimum equipment required prior to entry into MNPS Airspace

- 2 x IRS, 2 x FMC and 2 x CDU

OR, if aircraft is fitted with Standby Navigation System

- 2 x IRS, 1 x FMC and 2 x CDU

Less than the above remain serviceable prior to entry into MNPS Airspace

- Return to effect repair, or
- Reroute via a prescribed route, or
- Obtain reclearance above or below MNPS airspace (FL 285-FL 420)

Only 1 x IRS and 1 x FMS remain serviceable when within MNPS Airspace

- Continue on flight plan route
- Advise ATC and consult on best action
- Obtain reclearance prior to any deviation from current oceanic clearance
- Compare main and standby compasses
- Check previous performance or remaining equipment

If performance of remaining equipment is in doubt

- Attempt visual sightings of other aircraft or contrails to obtain track information
- Request information on adjacent aircraft from ATC
- Request drift, magnetic heading and wind velocity from adjacent aircraft

No IRS or FMC remain serviceable or reliable when within MNPS Airspace (complete FMC failure)

- Advise ATC
- Make best use of above procedures
- Keep a good lookout
- Switch on all exterior lights
- If no ATC instructions received, consider climbing or descending 500 feet
- Broadcast actions on 121.5 Mhz

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MNPS Airspace (Prescribed Routes)

For definition of MNPS Airspace Prescribed Routes, see Ops Manual Part A Section 8.14.

PRESCRIBED ROUTES via G3 AND G11

Minimum equipment required prior to entry into MNPS Airspace on a Prescribed Route

- 1 x ADF, 1 x VOR and 1 x DME

Less than minimum equipment when within MNPS Airspace on a Prescribed Route

- Maintain cleared route
- Advise ATC

PRESCRIBED ROUTES EXCEPT via G3 AND G11

Minimum equipment required prior to entry into MNPS Airspace on a Prescribed Route

- 1 x IRS and 1 x FMS
- 1 x ADF, 1 x VOR and 1 x DME

Less than 1 x IRS and 1 x FMS remain serviceable when within MNPS Airspace on a Prescribed Route

- Maintain cleared route
- Advise ATC

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MNPS Diversion

DIVERSION FOLLOWING ENGINE FAILURE or IF UNABLE TO MAINTAIN ALTITUDE

Organised Track Structure/Random Route

- Set MCT on operating engine
- Complete memory items and NNC as appropriate
- Turn at least 45° off track/route
- Turn on all exterior lights and make MAYDAY call (Track, Westerly, Altitude, Nature, Intentions) on 121.5 MHz
- Establish 15nm offset
- Descend at Mach 0.80/300 knots until clear of MNPS airspace (FL285 or below)
- Set course to alternate maintaining a flight level that differs by 500 feet from those normally used e.g. FL225, when possible.

■ ■ ■ ■

DIVERSION WHEN ABLE TO MAINTAIN ALTITUDE

Organised Track Structure/Random Route

- Obtain revised ATC clearance using MAYDAY or PAN, PAN as appropriate
- If unable to obtain revised ATC clearance broadcast intentions on 121.5 MHz and
  - Turn at least 45° off track/route
  - After deviating 10nm from assigned route or track:
    - Climb or descend 1000ft if above FL410
    - Climb or descend 500ft when below FL410
    - Climb 1000ft or descend 500ft if at FL410
  - Establish 15nm offset
  - Set course direct to alternate when possible.

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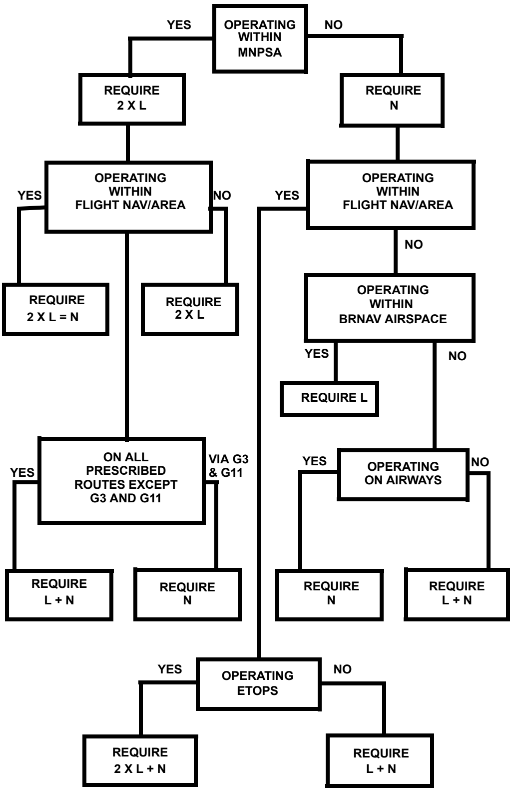
Navigation Requirements Before Entry Into MNPS Airspace Or Flight Navigator Areas

For definition of MNPS Airspace and Flight Navigator Areas, see Ops Manual Part A Section 8.14.



L = Long Range Navigation System consists of 1 x IRS, 1 x FMS and associated CDU
2 x L for aircraft equipped with Standby Navigation System (SNS) consists of 2 x IRS, 1 or 2 x FMC and both CDUs
2 x L for aircraft not equipped with SNS consists of 2 x IRS, 2 x FMC and both CDUs

N = Normal Navigation Equipment consists of 1 x ADF, 1 x VOR and 1 x DME

FLIGHT NAV AREAS: See Part A General/Basic Section 8.5.22 Annexe A

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Packs Off Takeoff

1 Pack control selectors (both) . . . . OFF

2 After Takeoff

Note: If engine failure occurs, pack control selectors should remain OFF until reaching 1,500 feet or until obstacle clearance height has been attained, whichever is higher.

3 Pack control selector (one only) . . . . AUTO

After engine thrust is reduced from takeoff, position one pack selector to AUTO

4 Pack control selector (remaining pack) . . . . AUTO

When cabin pressurization stabilizes, position remaining pack selector to AUTO

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RNP10 Airspace

For definition of RNP10 Airspace see Ops Manual Part A Section 8.14

Minimum equipment required prior to entry into RNP 10 Airspace

- 2 x IRS, 2 x FMC and 2 x CDU

OR, if aircraft is fitted with Standby Navigation System

- 2 x IRS, 1 x FMC and 2 x CDU

If GPS updating is not available see OMA 8.14 for navigation time limitations

Less than the above remain serviceable prior to entry into RNP10 Airspace

- Remain clear of RNP10 airspace and
- Return to effect repair, or
- Reroute via a prescribed route, or
- Obtain re-clearance above or below RNP10 airspace

▼ Continued on next page ▼

▼ RNP10 Airspace continued ▼

Only 1 x IRS and 1 x FMS remain serviceable when within RNP10 Airspace

- Advise ATC
- Continue on cleared route if able to navigate within 10nm of centreline
- Obtain re-clearance prior to any deviation from current clearance
- Compare main and standby compasses frequently
- Plot position at 15 minute intervals if a suitable chart is available
- Check previous performance of remaining equipment
- Closely monitor remaining navigational equipment

If performance of remaining equipment is in doubt, or unable to navigate within 10nm of centreline, or No LRNS remain serviceable

- Advise ATC and request information on adjacent aircraft
- Keep a good lookout
- Attempt visual sightings of other aircraft or contrails to obtain track information
- Request drift, magnetic heading and wind velocity from adjacent aircraft
- Switch on all exterior lights
- If no ATC instructions received, consider climbing or descending 500 feet
- Broadcast actions on 121.5 Mhz

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RVSM Airspace

For definition of RVSM Airspace, see Ops Manual Part A Section 8.9.

Minimum equipment required prior to entry into RVSM Airspace

- 2 x Main Altimeters
- 2 x Air Data Computer (ADC) Systems
- 1 x Altitiude Keeping Device (AKD) (Autopilot in CMD mode with VNAV PATH, or ALT HOLD mode operational)
- Altitude Alert System
- Mode S Transponder with altitude alerting

If the required equipment is not serviceable prior to entry

- Inform ATC
- Do not enter RVSM airspace
- If possible, replan above, below or around RVSM airspace

Failure of equipment within RVSM Airspace

- Failure of one Main Altimeter - Notify ATC
- Failure of both Main Altimeters - Notify ATC then exit RVSM airspace
- Failure of all AKDs - Notify ATC and consider exit from RVSM airspace

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Performance Inflight - QRH — Chapter PI-QRH

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Performance Inflight - QRH — Chapter PI-QRH

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757-200 535E4 KG CAA

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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) 60	80	100	120
40000	**PITCH ATT**	**4.5**	**4.5**		
	V/S (FT/MIN)	2000	1000		
30000	**PITCH ATT**	**4.5**	**4.0**	**4.0**	**4.0**
	V/S (FT/MIN)	2700	1900	1300	800
20000	**PITCH ATT**	**7.5**	**6.5**	**6.0**	**6.0**
	V/S (FT/MIN)	4200	3000	2200	1600
10000	**PITCH ATT**	**10.5**	**8.5**	**8.0**	**7.5**
	V/S (FT/MIN)	5400	3900	3000	2300
SEA LEVEL	**PITCH ATT**	**14.0**	**11.0**	**10.0**	**9.0**
	V/S (FT/MIN)	6500	4700	3600	2900

Cruise (.78/290)

Flaps Up, EPR for Level Flight

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG) 60	80	100	120
40000	**PITCH ATT**	**2.0**	**3.0**		
	EPR	1.50	1.61		
	(Alt Mode %N1)	(82.9)	(87.9)		
35000	**PITCH ATT**	**1.5**	**2.5**	**3.0**	**4.0**
	EPR	1.44	1.50	1.59	1.73
	(Alt Mode %N1)	(80.7)	(83.4)	(87.4)	(94.7)
30000	**PITCH ATT**	**1.0**	**1.5**	**2.5**	**3.0**
	EPR	1.41	1.44	1.48	1.55
	(Alt Mode %N1)	(80.1)	(81.8)	(84.3)	(87.6)
25000	**PITCH ATT**	**1.0**	**2.0**	**2.5**	**3.5**
	EPR	1.34	1.37	1.40	1.46
	(Alt Mode %N1)	(76.3)	(78.0)	(80.3)	(83.3)
20000	**PITCH ATT**	**1.5**	**2.0**	**2.5**	**3.5**
	EPR	1.28	1.31	1.34	1.38
	(Alt Mode %N1)	(72.7)	(74.5)	(76.7)	(79.4)
15000	**PITCH ATT**	**1.5**	**2.0**	**3.0**	**3.5**
	EPR	1.24	1.26	1.28	1.32
	(Alt Mode %N1)	(69.3)	(71.1)	(73.3)	(76.0)

Descent (.78/290)

Flaps Up, Set Idle Thrust

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG) 60	80	100	120
40000	**PITCH ATT**	**-1.5**	**0.0**		
	V/S (FT/MIN)	-2700	-2500		
30000	**PITCH ATT**	**-3.0**	**-1.5**	**-0.5**	**0.5**
	V/S (FT/MIN)	-3200	-2600	-2300	-2200
20000	**PITCH ATT**	**-3.0**	**-1.5**	**-0.5**	**0.5**
	V/S (FT/MIN)	-2900	-2400	-2100	-2000
10000	**PITCH ATT**	**-3.0**	**-1.5**	**-0.5**	**0.5**
	V/S (FT/MIN)	-2600	-2100	-1900	-1800
SEA LEVEL	**PITCH ATT**	**-3.5**	**-1.5**	**-0.5**	**0.5**
	V/S (FT/MIN)	-2400	-1900	-1700	-1600

Holding (VREF30 + 80)

Flaps Up, EPR for Level Flight

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG) 60	80	100	120
10000	**PITCH ATT**	**5.0**	**5.5**	**6.0**	**6.5**
	EPR	1.15	1.19	1.23	1.28
	(Alt Mode %N1)	(53.8)	(60.5)	(66.2)	(71.0)
	KIAS	185	204	221	237
5000	**PITCH ATT**	**5.0**	**5.5**	**6.0**	**6.5**
	EPR	1.12	1.16	1.20	1.23
	(Alt Mode %N1)	(50.4)	(56.8)	(62.2)	(67.0)
	KIAS	185	204	221	237

Flight With Unreliable Airspeed / Turbulent Air Penetration

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

Terminal Area (5000 FT)

EPR for Level Flight

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG)			
		60	80	100	120
FLAPS 1 (GEAR UP) (VREF30 + 60)	**PITCH ATT**	**6.5**	**7.0**	**7.5**	**8.0**
	EPR	1.13	1.18	1.22	1.26
	KIAS	165	184	201	218
	(Alt Mode %N1)	(51.4)	(58.0)	(64.3)	(68.9)
FLAPS 5 (GEAR UP) (VREF30 + 40)	**PITCH ATT**	**7.0**	**7.5**	**7.5**	**8.0**
	EPR	1.14	1.18	1.23	1.27
	KIAS	145	164	181	197
	(Alt Mode %N1)	(51.8)	(59.0)	(65.2)	(70.2)
FLAPS 15 (GEAR UP) (VREF30 + 20)	**PITCH ATT**	**7.5**	**8.0**	**8.0**	**7.5**
	EPR	1.16	1.21	1.26	1.31
	KIAS	125	144	161	177
	(Alt Mode %N1)	(54.1)	(62.0)	(67.7)	(72.9)
FLAPS 20 (GEAR UP) (VREF30 + 20)	**PITCH ATT**	**5.0**	**5.0**	**5.0**	**5.0**
	EPR	1.17	1.22	1.28	1.33
	KIAS	125	144	161	177
	(Alt Mode %N1)	(55.9)	(63.6)	(69.7)	(74.8)

Final Approach (1500 FT)

Gear Down, EPR for 3° Glideslope

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG)			
		60	80	100	120
FLAPS 25 (VREF25 + 10)	**PITCH ATT**	**2.5**	**2.5**	**2.5**	**2.5**
	EPR	1.12	1.15	1.19	1.22
	KIAS	118	136	153	168
	(Alt Mode %N1)	(47.7)	(53.9)	(59.9)	(64.6)
FLAPS 30 (VREF30 + 10)	**PITCH ATT**	**1.0**	**1.0**	**0.5**	**0.5**
	EPR	1.14	1.18	1.23	1.27
	KIAS	115	134	151	167
	(Alt Mode %N1)	(51.3)	(58.9)	(64.8)	(70.0)

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	1.41	1.41	1.40	1.40	1.40	1.39	1.39	1.39	1.38
50	1.45	1.45	1.45	1.45	1.44	1.43	1.44	1.44	1.43
40	1.50	1.50	1.50	1.50	1.49	1.49	1.49	1.49	1.48
30	1.52	1.56	1.55	1.55	1.55	1.54	1.54	1.55	1.53
20	1.52	1.57	1.61	1.61	1.61	1.60	1.60	1.61	1.60
10	1.52	1.57	1.61	1.66	1.67	1.66	1.67	1.67	1.66
0	1.52	1.57	1.61	1.66	1.69	1.72	1.72	1.73	1.72
-10	1.52	1.57	1.61	1.66	1.69	1.72	1.75	1.77	1.76
-20 & BELOW	1.52	1.57	1.61	1.66	1.69	1.72	1.75	1.79	1.80

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	0.01	0.01
ENGINE ANTI-ICE ON	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.02	-0.02
ENGINE & WING ANTI-ICE ON	-0.02	-0.02	-0.02	-0.02	-0.02	-0.03	-0.03	-0.04	-0.05

VREF (KIAS)

WEIGHT (1000 KG)	FLAPS		
	30	25	20
120	157	158	167
110	149	151	159
100	140	142	151
90	132	134	143
80	124	126	135
70	115	117	125
60	106	108	116

Stab Trim Setting

WEIGHT (1000 KG)	C.G. %MAC						
	9	14	19	24	29	34	39
120	7	7	6	5	4 1/4	3 1/4	2 1/2
110	7	6 3/4	5 3/4	4 3/4	4	3 1/4	2 1/2
100	7	6 1/4	5 1/4	4 1/4	3 3/4	3	2 1/2
90	7	6	4 3/4	4	3 1/2	2 3/4	2 1/4
80	6 1/2	5 1/2	4 1/2	3 3/4	3 1/4	2 1/2	2 1/4
70	6	5	4 1/4	3 1/2	3	2 1/4	2
60	5 1/2	4 1/2	4	3 1/4	2 3/4	2 1/4	2

Performance Inflight - QRH — Chapter PI-QRH
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ADVISORY INFORMATION

Normal Configuration Landing Distance
Flaps 30
Dry Runway

BRAKING CONFIGURATION	LANDING DISTANCE AND ADJUSTMENTS (FT) REF DIST 86000 KG LANDING WEIGHT	WT ADJ PER 5000 KG ABOVE/ BELOW 86000 KG	ALT ADJ PER 1000 FT STD/ HIGH*	WIND ADJ PER 10 KTS HEAD WIND	WIND ADJ PER 10 KTS TAIL WIND	SLOPE ADJ PER 1% DOWN HILL	SLOPE ADJ PER 1% UP HILL	TEMP ADJ PER 10°C ABV ISA	TEMP ADJ PER 10°C BLW ISA	VREF ADJ PER 10 KTS ABOVE VREF30	REVERSE THRUST ADJ ONE REV	REVERSE THRUST ADJ NO REV
MAX MANUAL	2670	+110/-100	60/70	-110	380	40	-30	50	-50	220	50	100
MAX AUTO	4050	+180/-180	90/120	-180	580	50	-50	90	-90	310	130	260
AUTOBRAKE 4	4380	+210/-200	110/140	-210	680	60	-60	100	-100	360	140	290
AUTOBRAKE 3	4970	+260/-250	130/170	-260	850	70	-70	130	-130	450	160	330
AUTOBRAKE 2	5500	+320/-310	160/210	-300	1010	120	-130	150	-150	460	270	450
AUTOBRAKE 1	5890	+360/-360	190/250	-350	1170	200	-210	160	-160	460	600	900

Good Reported Braking Action

MAX MANUAL	3500	+170/-150	90/120	-170	610	80	-70	80	-80	290	180	430
MAX AUTO	4230	+200/-200	100/140	-200	690	100	-90	90	-90	310	310	730
AUTOBRAKE 4	4430	+210/-210	110/140	-220	730	80	-70	100	-100	360	180	530
AUTOBRAKE 3	4970	+260/-250	130/170	-260	850	80	-70	130	-130	450	160	330

Medium Reported Braking Action

MAX MANUAL	4600	+260/-230	130/180	-260	980	190	-150	110	-110	370	520	1350
MAX AUTO	4940	+280/-260	140/190	-290	1020	200	-170	120	-120	360	650	1680
AUTOBRAKE 4	4940	+280/-260	140/190	-290	1020	200	-170	120	-120	360	640	1670
AUTOBRAKE 3	5170	+290/-260	140/190	-300	1050	160	-120	130	-130	450	450	1430

Poor Reported Braking Action

MAX MANUAL	5740	+350/-310	180/250	-380	1500	420	-280	140	-140	420	1080	3250
MAX AUTO	5810	+360/-330	190/260	-380	1510	420	-310	140	-150	410	1180	3540
AUTOBRAKE 4	5810	+360/-330	190/260	-380	1510	420	-310	140	-150	410	1180	3540
AUTOBRAKE 3	5820	+360/-330	190/260	-380	1520	410	-290	140	-150	450	1160	3510

Reference distance is for sea level, standard day, no wind or slope, VREF30 approach speed and 2 engine reverse thrust.
Max Manual braking data valid for auto speedbrakes. For manual speedbrakes, increase reference landing distance by 280 ft.
Autobrake data valid for both auto and manual speedbrakes.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above threshold (1000 ft of air distance).

***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft, then apply the HIGH adjustment to this new reference distance.**

ADVISORY INFORMATION

Normal Configuration Landing Distance

Flaps 25

Dry Runway

BRAKING CONFIGURATION	REF DIST 86000 KG LANDING WEIGHT	WT ADJ PER 5000 KG ABOVE/ BELOW 86000 KG	ALT ADJ PER 1000 FT STD/ HIGH*	WIND ADJ PER 10 KTS HEAD WIND	WIND ADJ PER 10 KTS TAIL WIND	SLOPE ADJ PER 1% DOWN HILL	SLOPE ADJ PER 1% UP HILL	TEMP ADJ PER 10°C ABV ISA	TEMP ADJ PER 10°C BLW ISA	VREF ADJ PER 10 KTS ABOVE VREF25	REVERSE THRUST ADJ ONE REV	REVERSE THRUST ADJ NO REV
MAX MANUAL	2700	+110/-100	60/70	-110	380	40	-30	50	-50	220	50	110
MAX AUTO	4200	+180/-180	90/120	-180	590	60	-50	90	-90	320	140	280
AUTOBRAKE 4	4540	+210/-210	110/140	-210	690	60	-60	110	-110	380	150	300
AUTOBRAKE 3	5170	+260/-250	140/180	-260	870	80	-80	140	-140	480	170	340
AUTOBRAKE 2	5760	+320/-310	170/220	-310	1040	120	-130	160	-160	490	260	460
AUTOBRAKE 1	6200	+370/-370	200/260	-360	1210	210	-220	170	-170	490	630	920

Good Reported Braking Action

MAX MANUAL	3580	+170/-160	90/120	-170	610	90	-70	80	-80	300	190	450
MAX AUTO	4380	+200/-200	110/140	-210	710	110	-100	100	-100	320	330	780
AUTOBRAKE 4	4590	+210/-210	110/150	-220	740	80	-70	110	-110	380	190	560
AUTOBRAKE 3	5170	+260/-250	140/180	-260	870	80	-80	140	-140	480	170	350

Medium Reported Braking Action

MAX MANUAL	4760	+260/-240	140/190	-270	990	200	-160	110	-120	380	550	1460
MAX AUTO	5130	+280/-260	150/200	-300	1040	210	-180	120	-130	380	700	1830
AUTOBRAKE 4	5130	+280/-260	150/200	-300	1040	210	-180	120	-130	380	690	1810
AUTOBRAKE 3	5380	+290/-260	150/200	-310	1080	170	-120	140	-140	480	490	1560

Poor Reported Braking Action

MAX MANUAL	5990	+360/-320	190/270	-390	1530	440	-300	150	-150	440	1180	3600
MAX AUTO	6070	+370/-350	200/280	-390	1550	440	-330	150	-150	430	1300	3920
AUTOBRAKE 4	6070	+370/-350	200/280	-390	1550	440	-330	150	-150	430	1290	3920
AUTOBRAKE 3	6090	+360/-340	200/270	-390	1550	430	-310	150	-160	480	1270	3900

Reference distance is for sea level, standard day, no wind or slope, VREF25 approach speed and 2 engine reverse thrust.
Max Manual braking data valid for auto speedbrakes. For manual speedbrakes, increase reference landing distance by 290 ft.
Autobrake data valid for both auto and manual speedbrakes.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above threshold (1000 ft of air distance).

***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft, then apply the HIGH adjustment to this new reference distance.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Dry Runway

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENTS (FT) REFERENCE DISTANCE* FOR 86000 KG LANDING WEIGHT	WT ADJ PER 2000 KG ABOVE/ BELOW 86000 KG	ALTITUDE ADJ PER 1000 FT STD/HIGH ***	WIND ADJ PER 10 KTS HEAD WIND	WIND ADJ PER 10 KTS TAIL WIND	SLOPE ADJ PER 1% DOWN HILL	SLOPE ADJ PER 1% UP HILL	APPROACH SPEED PER 10 KTS ABOVE VREF
AIR-GROUND LOGIC IN AIR MODE	VREF30	3535	60/-55	75/105	-150	530	75	-65	400
ANTI-SKID SYSTEM INOP	VREF30	4110	80/-70	100/130	-200	745	100	-85	335
FLAPS UP	VREF30+50	3715	155/-55	105/165	-160	615	60	-55	305
HYDRAULIC SYSTEM CENTER INOP	VREF30	2745	50/-40	60/75	-110	400	40	-35	240
HYDRAULIC SYSTEM LEFT INOP	VREF30	3205	55/-50	70/90	-130	465	50	-45	310
HYDRAULIC SYSTEM LEFT INOP WITH LE SLAT OR TE FLAPS DISAGREE FOR FLAPS ≥ 20	VREF20	3485	55/-55	75/105	-140	485	55	-45	310
HYDRAULIC SYSTEM RIGHT INOP	VREF30	3245	60/-55	75/105	-140	505	70	-60	355
HYDRAULIC SYSTEMS CENTER AND LEFT INOP FLAPS 20	VREF30+20	3905	65/-55	90/120	-150	525	70	-60	365
HYDRAULIC SYSTEMS CENTER AND RIGHT INOP FLAPS 20	VREF30+20	4045	75/-65	105/140	-165	580	100	-85	430
HYDRAULIC SYSTEM** LEFT & RIGHT INOP FLAPS 20	VREF30+20	5240	95/-85	140/185	-220	750	375	-280	690

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

***** For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft, then apply HIGH adjustment to this new reference distance.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Dry Runway

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENTS (FT)							
		REFERENCE DISTANCE* FOR 86000 KG LANDING WEIGHT	WT ADJ PER 2000 KG ABOVE/ BELOW 86000 KG	ALTITUDE ADJ PER 1000 FT STD/HIGH ***	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		APPROACH SPEED
					HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	PER 10 KTS ABOVE VREF
LE SLAT ASYMMETRY FLAPS>20	VREF20	2885	60/-45	65/85	-115	440	40	-35	230
LE SLAT ASYMMETRY FLAPS ≤ 20	VREF30+30	3305	90/-50	75/105	-135	495	45	-45	255
LE SLAT DISAGREE	VREF20	2885	60/-45	65/85	-115	440	40	-35	230
ONE ENGINE INOP	VREF20	2935	65/-45	65/85	-120	455	45	-40	240
REVERSER UNLOCK FLAPS 20	VREF30+30	3385	95/-50	80/105	-140	515	55	-50	275
TRAILING EDGE FLAP ASYMMETRY FLAPS ≥ 20	VREF20	2885	60/-45	65/85	-115	440	40	-35	230
TRAILING EDGE ASYMMETRY 5<FLAPS<20	VREF30+30	3295	110/-50	75/105	-140	510	50	-45	260
TRAILING EDGE ASYMMETRY FLAPS ≤ 5	VREF30+40	3505	130/-50	85/125	-145	545	55	-50	275
TRAILING EDGE FLAP DISAGREE	VREF20	2885	60/-45	65/85	-115	440	40	-35	230

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

***** For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft, then apply HIGH adjustment to this new reference distance.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Good Reported Braking Action

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENTS (FT)							
		REFERENCE DISTANCE* FOR 86000 KG LANDING WEIGHT	WT ADJ PER 2000 KG ABOVE/ BELOW 86000 KG	ALTITUDE ADJ PER 1000 FT STD/HIGH ***	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		APPROACH SPEED
					HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	PER 10 KTS ABOVE VREF
AIR-GROUND LOGIC IN AIR MODE	VREF30	5130	95/-85	130/165	-265	950	245	-185	590
ANTI-SKID SYSTEM INOP	VREF30	4970	105/-90	135/180	-280	1070	195	-155	390
FLAPS UP	VREF30+50	5130	95/-85	145/205	-215	770	125	-105	305
HYDRAULIC SYSTEM CENTER INOP	VREF30	3605	75/-60	90/120	-175	645	95	-80	315
HYDRAULIC SYSTEM LEFT INOP	VREF30	4255	85/-75	110/140	-205	750	130	-105	415
HYDRAULIC SYSTEM LEFT INOP WITH LE SLAT OR TE FLAPS DISAGREE FOR FLAPS ≥ 20	VREF20	4710	85/-85	125/170	-220	790	145	-120	430
HYDRAULIC SYSTEM RIGHT INOP	VREF30	4145	90/-75	110/150	-205	745	145	-120	445
HYDRAULIC SYSTEMS CENTER AND LEFT INOP FLAPS 20	VREF30+20	5320	100/-95	145/200	-240	855	180	-145	490
HYDRAULIC SYSTEMS CENTER AND RIGHT INOP FLAPS 20	VREF30+20	5260	105/-95	150/210	-245	855	205	-165	535
HYDRAULIC SYSTEM** LEFT & RIGHT INOP FLAPS 20	VREF30+20	6740	130/-115	195/265	-310	1060	1320	-780	865

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

***** For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft, then apply HIGH adjustment to this new reference distance.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Good Reported Braking Action

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENTS (FT)							
		REFERENCE DISTANCE* FOR 86000 KG LANDING WEIGHT	WT ADJ PER 2000 KG ABOVE/ BELOW 86000 KG	ALTITUDE ADJ PER 1000 FT STD/HIGH ***	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		APPROACH SPEED
					HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	PER 10 KTS ABOVE VREF
LE SLAT ASYMMETRY FLAPS>20	VREF20	3870	100/-95	100/140	-240	855	180	-145	490
LE SLAT ASYMMETRY FLAPS ≤ 20	VREF30+30	4445	80/-75	120/165	-200	720	110	-95	305
LE SLAT DISAGREE	VREF20	3870	100/-95	100/140	-240	855	180	-145	490
ONE ENGINE INOP	VREF20	4065	75/-70	105/145	-195	705	120	-100	335
REVERSER UNLOCK FLAPS 20	VREF30+30	4695	85/-80	125/175	-215	760	135	-115	340
TRAILING EDGE FLAP ASYMMETRY FLAPS ≥ 20	VREF20	3875	70/-65	100/140	-185	670	100	-85	300
TRAILING EDGE ASYMMETRY 5<FLAPS<20	VREF30+30	4480	85/-75	120/170	-200	720	110	-95	305
TRAILING EDGE ASYMMETRY FLAPS ≤ 5	VREF30+40	4795	90/-80	135/180	-205	740	115	-100	305
TRAILING EDGE FLAP DISAGREE	VREF20	3875	70/-65	100/140	-185	670	100	-85	300

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

***** For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft, then apply HIGH adjustment to this new reference distance.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Medium Reported Braking Action

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENTS (FT): REFERENCE DISTANCE* FOR 86000 KG LANDING WEIGHT	WT ADJ PER 2000 KG ABOVE/ BELOW 86000 KG	ALTITUDE ADJ PER 1000 FT STD/HIGH ***	WIND ADJ PER 10 KTS: HEAD WIND	WIND ADJ PER 10 KTS: TAIL WIND	SLOPE ADJ PER 1%: DOWN HILL	SLOPE ADJ PER 1%: UP HILL	APPROACH SPEED: PER 10 KTS ABOVE VREF
AIR-GROUND LOGIC IN AIR MODE	VREF30	8370	140/-105	225/300	-530	2000	1125	-620	830
ANTI-SKID SYSTEM INOP	VREF30	6160	140/-130	185/245	-400	1655	465	-300	445
FLAPS UP	VREF30+50	7060	140/-130	225/315	-340	1260	315	-240	405
HYDRAULIC SYSTEM CENTER INOP	VREF30	4750	110/-95	140/180	-270	1055	230	-170	390
HYDRAULIC SYSTEM LEFT INOP	VREF30	5800	130/-115	170/235	-335	1270	355	-250	525
HYDRAULIC SYSTEM LEFT INOP WITH LE SLAT OR TE FLAPS DISAGREE FOR FLAPS ≥ 20	VREF20	6590	135/-130	200/290	-365	1350	410	-290	565
HYDRAULIC SYSTEM RIGHT INOP	VREF30	5770	135/-120	180/245	-335	1275	395	-275	550
HYDRAULIC SYSTEMS CENTER AND LEFT INOP FLAPS 20	VREF30+20	7435	155/-140	235/330	-395	1450	495	-345	625
HYDRAULIC SYSTEMS CENTER AND RIGHT INOP FLAPS 20	VREF30+20	7505	165/-145	250/355	-400	1470	550	-385	675
HYDRAULIC SYSTEM** LEFT & RIGHT INOP FLAPS 20	VREF30+20	10625	205/-185	350/490	-555	1970	5660	-1995	1190

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

***** For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft, then apply HIGH adjustment to this new reference distance.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Medium Reported Braking Action

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENTS (FT): REFERENCE DISTANCE* FOR 86000 KG LANDING WEIGHT	WT ADJ PER 2000 KG ABOVE/ BELOW 86000 KG	ALTITUDE ADJ PER 1000 FT STD/HIGH ***	WIND ADJ PER 10 KTS: HEAD WIND	WIND ADJ PER 10 KTS: TAIL WIND	SLOPE ADJ PER 1%: DOWN HILL	SLOPE ADJ PER 1%: UP HILL	APPROACH SPEED: PER 10 KTS ABOVE VREF
LE SLAT ASYMMETRY FLAPS>20	VREF20	5235	155/-140	155/225	-395	1450	495	-345	625
LE SLAT ASYMMETRY FLAPS ≤ 20	VREF30+30	5970	125/-110	185/260	-310	1175	275	-210	380
LE SLAT DISAGREE	VREF20	5235	155/-140	155/225	-395	1450	495	-345	625
ONE ENGINE INOP	VREF20	5760	120/-115	170/235	-325	1215	335	-245	450
REVERSER UNLOCK FLAPS 20	VREF30+30	6610	135/-130	200/280	-350	1290	365	-270	445
TRAILING EDGE FLAP ASYMMETRY FLAPS ≥ 20	VREF20	5240	110/-100	155/225	-290	1110	255	-190	385
TRAILING EDGE ASYMMETRY 5<FLAPS<20	VREF30+30	6140	130/-115	190/270	-315	1190	285	-215	395
TRAILING EDGE ASYMMETRY FLAPS ≤ 5	VREF30+40	6540	130/-125	205/290	-325	1220	295	-225	395
TRAILING EDGE FLAP DISAGREE	VREF20	5240	110/-100	155/225	-290	1110	255	-190	385

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

***** For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft, then apply HIGH adjustment to this new reference distance.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Poor Reported Braking Action

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENTS (FT)							
		REFERENCE DISTANCE* FOR 86000 KG LANDING WEIGHT	WT ADJ PER 2000 KG ABOVE/ BELOW 86000 KG	ALTITUDE ADJ PER 1000 FT STD/HIGH ***	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		APPROACH SPEED
					HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	PER 10 KTS ABOVE VREF
AIR-GROUND LOGIC IN AIR MODE	VREF30	> 15000	-	-	-	-	-	-	-
ANTI-SKID SYSTEM INOP	VREF30	8075	200/-180	260/350	-660	3115	3435	-690	490
FLAPS UP	VREF30+50	9135	205/-185	315/470	-505	1965	765	-470	480
HYDRAULIC SYSTEM CENTER INOP	VREF30	5970	145/-130	190/255	-400	1645	545	-320	435
HYDRAULIC SYSTEM LEFT INOP	VREF30	7695	180/-160	255/355	-525	2125	1035	-530	605
HYDRAULIC SYSTEM LEFT INOP WITH LE SLAT OR TE FLAPS DISAGREE FOR FLAPS ≥ 20	VREF20	8895	200/-185	305/475	-570	2265	1200	-620	675
HYDRAULIC SYSTEM RIGHT INOP	VREF30	7735	190/-165	270/370	-530	2145	1110	-565	630
HYDRAULIC SYSTEMS CENTER AND LEFT INOP FLAPS 20	VREF30+20	10030	225/-200	355/525	-625	2420	1430	-730	725
HYDRAULIC SYSTEMS CENTER AND RIGHT INOP FLAPS 20	VREF30+20	10230	240/-210	375/560	-635	2460	1555	-790	770
HYDRAULIC SYSTEM** LEFT & RIGHT INOP FLAPS 20	VREF30+20	> 15000	-	-	-	-	-	-	-

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

***** For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft, then apply HIGH adjustment to this new reference distance.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Poor Reported Braking Action

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENTS (FT)							
		REFERENCE DISTANCE* FOR 86000 KG LANDING WEIGHT	WT ADJ PER 2000 KG ABOVE/ BELOW 86000 KG	ALTITUDE ADJ PER 1000 FT STD/HIGH ***	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		APPROACH SPEED
					HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	PER 10 KTS ABOVE VREF
LE SLAT ASYMMETRY FLAPS>20	VREF20	6760	225/-200	220/330	-625	2420	1430	-730	725
LE SLAT ASYMMETRY FLAPS ≤ 20	VREF30+30	7605	170/-155	255/375	-460	1830	670	-400	435
LE SLAT DISAGREE	VREF20	6760	225/-200	220/330	-625	2420	1430	-730	725
ONE ENGINE INOP	VREF20	7815	175/-170	255/355	-505	1990	925	-515	545
REVERSER UNLOCK FLAPS 20	VREF30+30	8835	200/-180	290/410	-535	2080	975	-555	525
TRAILING EDGE FLAP ASYMMETRY FLAPS ≥ 20	VREF20	6765	155/-140	220/330	-435	1755	640	-375	450
TRAILING EDGE ASYMMETRY 5<FLAPS<20	VREF30+30	7945	180/-165	270/395	-475	1865	705	-420	465
TRAILING EDGE ASYMMETRY FLAPS ≤ 5	VREF30+40	8415	190/-170	290/420	-485	1900	720	-435	460
TRAILING EDGE FLAP DISAGREE	VREF20	6765	155/-140	220/330	-435	1755	640	-375	450

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

***** For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft, then apply HIGH adjustment to this new reference distance.**

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)	PRESS ALT			PRESS ALT			PRESS ALT			PRESS ALT			PRESS ALT			PRESS ALT		
		0	5	10	0	5	10	0	5	10	0	5	10	0	5	10	0	5	10
120	0	9.5	11.1	12.8	14.4	17.1	19.8	20.1	24.1	28.1	26.6	31.9	37.2	33.4	39.8		40.3		
	10	9.8	11.5	13.3	14.9	17.7	20.5	20.8	25.0	29.1	27.5	33.0	38.4	34.5	41.1		41.7		
	15	9.9	11.7	13.5	15.1	18.0	20.9	21.2	25.4	29.6	27.9	33.5	39.1	35.1	41.8		42.4		
	20	10.1	11.9	13.7	15.4	18.3	21.2	21.5	25.8	30.1	28.4	34.0	39.7	35.7	42.5		43.0		
	30	10.4	12.2	14.1	15.8	18.8	21.8	22.1	26.6	31.0	29.2	35.1	40.9	36.7	43.8		44.3		
	40	10.6	12.5	14.4	16.2	19.3	22.4	22.7	27.2	31.8	30.0	36.0	42.0	37.7	44.9		45.5		
110	0	8.8	10.3	11.9	13.3	15.8	18.3	18.5	22.2	25.9	24.5	29.4	34.3	30.8	36.8	42.8	37.3		
	10	9.1	10.7	12.3	13.8	16.3	18.9	19.2	23.0	26.8	25.3	30.4	35.4	31.9	38.1	44.3	38.6		
	15	9.2	10.9	12.5	14.0	16.6	19.3	19.5	23.4	27.2	25.7	30.9	36.0	32.4	38.7	45.0	39.2		
	20	9.4	11.0	12.7	14.2	16.9	19.6	19.8	23.8	27.7	26.1	31.4	36.6	32.9	39.3	45.7	39.9		
	30	9.6	11.3	13.1	14.6	17.4	20.1	20.4	24.5	28.5	26.9	32.3	37.7	33.9	40.5	47.1	41.1		
	40	9.8	11.6	13.4	15.0	17.8	20.6	20.9	25.1	29.2	27.6	33.2	38.7	34.8	41.6	48.4	42.2		
100	0	8.1	9.5	10.9	12.2	14.5	16.8	17.0	20.3	23.6	22.3	26.8	31.3	28.1	33.7	39.3	34.2	40.7	
	10	8.4	9.8	11.3	12.6	15.0	17.3	17.6	21.0	24.4	23.1	27.7	32.4	29.1	34.9	40.6	35.4	42.1	
	15	8.5	10.0	11.5	12.9	15.2	17.6	17.9	21.4	24.8	23.5	28.2	32.9	29.6	35.4	41.3	36.0	42.8	
	20	8.7	10.2	11.7	13.1	15.5	17.9	18.2	21.7	25.2	23.9	28.7	33.4	30.1	36.0	41.9	36.5	43.5	
	30	8.9	10.4	12.0	13.4	15.9	18.4	18.7	22.3	26.0	24.6	29.5	34.4	31.0	37.1	43.2	37.6	44.8	
	40	9.1	10.7	12.3	13.7	16.3	18.9	19.1	22.9	26.7	25.2	30.3	35.3	31.8	38.1	44.4	38.6	46.0	
90	0	7.4	8.7	10.0	11.1	13.2	15.2	15.4	18.4	21.3	20.2	24.2	28.2	25.4	30.5	35.5	30.9	36.9	43.0
	10	7.7	9.0	10.3	11.5	13.6	15.7	15.9	19.0	22.1	20.9	25.0	29.2	26.3	31.5	36.8	32.0	38.2	44.4
	15	7.8	9.2	10.5	11.7	13.9	16.0	16.2	19.3	22.4	21.2	25.5	29.7	26.7	32.0	37.4	32.5	38.8	45.2
	20	7.9	9.3	10.7	11.9	14.1	16.3	16.5	19.6	22.8	21.6	25.9	30.2	27.1	32.6	38.0	33.0	39.4	45.9
	30	8.1	9.5	11.0	12.2	14.5	16.7	16.9	20.2	23.5	22.2	26.6	31.1	27.9	33.5	39.1	34.0	40.6	47.2
	40	8.3	9.7	11.2	12.5	14.8	17.1	17.4	20.7	24.1	22.8	27.3	31.9	28.7	34.4	40.2	34.9	41.7	48.5
80	0	6.8	7.9	9.0	10.0	11.9	13.7	13.8	16.4	19.0	18.0	21.5	25.1	22.6	27.1	31.6	27.4	32.9	38.4
	10	7.0	8.2	9.3	10.4	12.3	14.1	14.3	17.0	19.7	18.6	22.3	25.9	23.3	28.0	32.7	28.4	34.0	39.7
	15	7.1	8.3	9.5	10.6	12.5	14.4	14.5	17.3	20.0	18.9	22.7	26.4	23.7	28.5	33.3	28.9	34.6	40.3
	20	7.2	8.4	9.6	10.7	12.7	14.6	14.8	17.6	20.4	19.2	23.0	26.8	24.1	29.0	33.8	29.3	35.2	41.0
	30	7.4	8.7	9.9	11.0	13.0	15.0	15.2	18.1	21.0	19.8	23.7	27.6	24.8	29.8	34.8	30.2	36.2	42.2
	40	7.5	8.8	10.1	11.3	13.3	15.4	15.5	18.5	21.5	20.3	24.3	28.3	25.5	30.6	35.7	31.0	37.2	43.3
70	0	6.1	7.1	8.1	9.0	10.5	12.1	12.2	14.5	16.7	15.8	18.8	21.9	19.7	23.6	27.5	23.8	28.6	33.4
	10	6.3	7.3	8.4	9.3	10.9	12.5	12.6	15.0	17.3	16.3	19.5	22.6	20.4	24.4	28.4	24.7	29.6	34.5
	15	6.4	7.4	8.5	9.4	11.1	12.7	12.8	15.2	17.6	16.6	19.8	23.0	20.7	24.8	28.9	25.1	30.1	35.1
	20	6.5	7.6	8.6	9.6	11.3	13.0	13.0	15.5	17.9	16.9	20.1	23.4	21.0	25.2	29.4	25.5	30.6	35.7
	30	6.7	7.8	8.9	9.8	11.6	13.3	13.4	15.9	18.4	17.4	20.7	24.1	21.7	26.0	30.3	26.2	31.5	36.7
	40	6.8	7.9	9.0	10.0	11.8	13.6	13.7	16.3	18.9	17.8	21.2	24.7	22.2	26.6	31.1	26.9	32.3	37.7

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

Adjusted Brake Energy Per Brake (Millions of Foot Pounds)
No Reverse Thrust

		REFERENCE BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS)										
EVENT		10	12	14	16	18	20	22	24	26	28	30
RTO MAX MAN		10.0	12.0	14.0	16.0	18.0	20.0	22.0	24.0	26.0	28.0	30.0
LANDING	MAX MAN	8.6	10.5	12.4	14.3	16.2	18.1	20.0	22.0	23.9	25.8	27.7
	MAX AUTO	8.5	10.3	12.1	13.9	15.7	17.5	19.3	21.1	22.9	24.7	26.6
	AUTOBRAKE 4	8.4	10.2	11.9	13.6	15.3	17.0	18.7	20.4	22.1	23.8	25.6
	AUTOBRAKE 3	8.3	9.9	11.5	13.1	14.7	16.3	17.9	19.5	21.1	22.7	24.3
	AUTOBRAKE 2	8.1	9.6	11.1	12.6	14.1	15.5	17.0	18.5	19.9	21.4	22.8
	AUTOBRAKE 1	7.9	9.3	10.7	12.0	13.3	14.6	15.9	17.2	18.5	19.8	21.1

Two Engine Reverse

		REFERENCE BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS)										
EVENT		10	12	14	16	18	20	22	24	26	28	30
RTO MAX MAN		10.0	12.0	14.0	16.0	18.0	20.0	22.0	24.0	26.0	28.0	30.0
LANDING	MAX MAN	7.6	9.2	10.9	12.6	14.4	16.1	17.9	19.7	21.4	23.2	24.8
	MAX AUTO	5.8	7.2	8.6	10.0	11.5	12.9	14.4	15.9	17.3	18.8	20.3
	AUTOBRAKE 4	4.5	5.7	6.8	8.0	9.1	10.3	11.5	12.7	14.0	15.2	16.5
	AUTOBRAKE 3	3.3	4.2	5.1	5.9	6.9	7.8	8.7	9.7	10.7	11.7	12.7
	AUTOBRAKE 2	2.3	2.9	3.5	4.1	4.8	5.5	6.2	6.9	7.6	8.3	9.0
	AUTOBRAKE 1	1.7	2.1	2.4	2.8	3.2	3.6	4.0	4.5	4.9	5.4	5.9

ADVISORY INFORMATION

Recommended Brake Cooling Schedule

Cooling Time (Minutes)

	ADJUSTED BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS)								
	8 & BELOW	9	10	12	14	16	17	18 TO 27	28 & ABOVE
INFLIGHT GEAR DOWN	NO SPECIAL PROCEDURE REQUIRED	1	2	4	5	7	7	CAUTION	FUSE PLUG MELT ZONE
GROUND		10	20	38	51	62	66		
BTMS	UP TO 2	2	2	3	3	4	5	5 TO 8	8 & ABOVE

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 0.65 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 8 minutes.
When in fuse plug melt zone, clear runway immediately. Unless required, do not set parking brake. Do not attempt to taxi for one hour. Tire, wheel and brake replacement may be required. If overheat occurs after takeoff, extend gear soon for at least 12 minutes.
Brake temperature monitor system (BTMS) indication on EICAS may be used to 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 EPR
Based on engine bleed for one pack on

PRESSURE ALTITUDE (FT)		CRUISE MACH NUMBER		
		.72	.76	.80
41000	EPR	1.81	1.80	1.79
	MAX TAT (SAT)	-23 (-46)	-20 (-46)	-17 (-46)
	EPR CORR	0.04	0.04	0.04
39000	EPR	1.81	1.80	1.79
	MAX TAT (SAT)	-23 (-46)	-20 (-46)	-17 (-46)
	EPR CORR	0.04	0.04	0.04
37000	EPR	1.82	1.80	1.79
	MAX TAT (SAT)	-23 (-46)	-20 (-46)	-17 (-46)
	EPR CORR	0.04	0.04	0.04
35000	EPR	1.81	1.80	1.79
	MAX TAT (SAT)	-21 (-44)	-18 (-44)	-15 (-44)
	EPR CORR	0.05	0.05	0.05
33000	EPR	1.80	1.79	1.78
	MAX TAT (SAT)	-16 (-40)	-14 (-41)	-11 (-41)
	EPR CORR	0.05	0.05	0.05
31000	EPR	1.79	1.78	1.77
	MAX TAT (SAT)	-12 (-36)	-9 (-36)	-6 (-36)
	EPR CORR	0.05	0.05	0.05

Decrease EPR by the EPR CORR for every 10°C above the MAX TAT shown.

ENGINE INOP

Max Continuous EPR

41000 FT to 22000 FT Pressure Altitudes

Based on engine bleed for one pack on and anti-ice off

PRESSURE ALTITUDE (FT)		KIAS					MACH NUMBER					
		180	200	220	240	260	.70	.72	.74	.76	.78	.80
41000	EPR		1.82	1.81	1.79		1.82	1.81	1.81	1.80	1.80	1.79
	MAX TAT		-25	-21	-17		-24	-23	-22	-20	-19	-17
	EPR CORR		0.04	0.04	0.04		0.04	0.04	0.04	0.04	0.04	0.04
39000	EPR		1.83	1.82	1.80	1.78	1.82	1.81	1.81	1.80	1.80	-1.79
	MAX TAT		-27	-23	-19	-15	-24	-23	-22	-20	-19	-17
	EPR CORR		0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
37000	EPR		1.84	1.82	1.81	1.79	1.82	1.82	1.81	1.80	1.80	1.79
	MAX TAT		-29	-25	-21	-17	-24	-23	-22	-20	-19	-17
	EPR CORR		0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
35000	EPR		1.84	1.82	1.81	1.80	1.81	1.81	1.80	1.80	1.79	1.79
	MAX TAT		-28	-24	-21	-17	-22	-21	-19	-18	-16	-15
	EPR CORR		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
33000	EPR		1.83	1.82	1.81	1.80	1.81	1.80	1.79	1.79	1.78	1.78
	MAX TAT		-25	-22	-19	-15	-18	-16	-15	-14	-12	-11
	EPR CORR		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
31000	EPR		1.83	1.82	1.81	1.79	1.80	1.79	1.78	1.78	1.77	1.77
	MAX TAT		-22	-19	-16	-13	-13	-12	-10	-9	-8	-6
	EPR CORR		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
29000	EPR		1.82	1.81	1.80	1.79	1.79	1.78	1.77	1.77	1.76	1.75
	MAX TAT		-19	-16	-13	-10	-9	-7	-6	-5	-3	-2
	EPR CORR		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
27000	EPR		1.82	1.81	1.80	1.79	1.78	1.77	1.76	1.76	1.75	1.74
	MAX TAT		-16	-13	-11	-8	-5	-3	-2	0	1	3
	EPR CORR		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
25000	EPR	1.82	1.81	1.80	1.80	1.79	1.77	1.76	1.75	1.75	1.74	1.73
	MAX TAT	-15	-13	-10	-8	-5	0	1	3	4	6	7
	EPR CORR	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
22000	EPR	1.81	1.80	1.80	1.79	1.78	1.75	1.74	1.73	1.72	1.72	
	MAX TAT	-10	-8	-6	-3	-1	6	8	9	11	12	
	EPR CORR	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	

Decrease EPR by the EPR CORR for every 10°C above the MAX TAT shown.

EPR Adjustments for Engine Bleed

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)				
	0	10	20	30	40
PACKS OFF	0.01	0.01	0.01	0.01	0.01
ENGINE ANTI-ICE ON	-0.01	-0.01	-0.01	-0.01	-0.02
ENGINE & WING ANTI-ICE ON	-0.03	-0.03	-0.03	-0.05	-0.08

ENGINE INOP

Max Continuous EPR

20000 FT to Sea Level Pressure Altitudes

Based on engine bleed for one pack on and anti-ice off

PRESSURE ALTITUDE (FT)		KIAS					MACH NUMBER					
		180	200	220	240	260	.70	.72	.74	.76	.78	.80
20000	EPR	1.80	1.80	1.79	1.78	1.77	1.73	1.72	1.71	1.71		
	MAX TAT	-6	-5	-3	0	2	11	12	14	15		
	EPR CORR	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06		
18000	EPR	1.79	1.78	1.78	1.77	1.76	1.71	1.70	1.69			
	MAX TAT	-3	-1	1	3	5	15	17	18			
	EPR CORR	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06			
16000	EPR	1.78	1.77	1.76	1.75	1.74	1.69					
	MAX TAT	0	2	4	6	8	19					
	EPR CORR	0.06	0.06	0.06	0.06	0.06	0.06					
14000	EPR	1.76	1.75	1.75	1.74	1.73						
	MAX TAT	4	6	7	9	11						
	EPR CORR	0.06	0.06	0.06	0.06	0.06						
12000	EPR	1.75	1.74	1.73	1.72	1.71						
	MAX TAT	8	9	11	12	14						
	EPR CORR	0.06	0.06	0.06	0.06	0.06						
10000	EPR	1.73	1.72	1.71	1.70	1.69						
	MAX TAT	11	13	14	16	17						
	EPR CORR	0.06	0.06	0.06	0.06	0.06						
5000	EPR	1.68	1.67	1.67	1.66	1.65						
	MAX TAT	20	21	23	24	26						
	EPR CORR	0.06	0.06	0.06	0.06	0.06						
1500	EPR	1.63	1.62	1.62	1.61	1.60						
	MAX TAT	27	28	29	30	32						
	EPR CORR	0.06	0.06	0.06	0.06	0.06						
0	EPR	1.61	1.60	1.60	1.59	1.58						
	MAX TAT	29	30	32	33	34						
	EPR CORR	0.06	0.06	0.06	0.06	0.06						

Decrease EPR by the EPR CORR for every 10°C above the MAX TAT shown.

EPR Adjustments for Engine Bleed

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)				
	0	10	20	30	40
PACKS OFF	0.01	0.01	0.01	0.01	0.01
ENGINE ANTI-ICE ON	-0.01	-0.01	-0.01	-0.01	-0.02
ENGINE & WING ANTI-ICE ON	-0.03	-0.03	-0.03	-0.05	-0.08

ENGINE INOP

MAX CONTINUOUS THRUST

Driftdown Speed/Level Off Altitude

100 ft/min residual rate of climb

Includes APU fuel burn

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
120	115	256	18800	17500	16000
110	106	246	21400	20400	19100
100	96	235	24000	23100	22000
90	87	223	26700	26000	25000
80	77	211	29600	28900	28100
70	67	198	32900	32200	31400
60	58	184	36500	35800	35100

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
278	258	241	225	212	200	189	180	171	163	156
557	516	481	451	424	400	379	359	342	326	312
831	772	720	675	635	600	568	540	514	491	469
1102	1025	957	899	846	800	758	721	687	656	628
1371	1277	1194	1121	1057	1000	949	902	860	822	787
1640	1528	1430	1344	1268	1200	1139	1084	1034	988	946
1910	1780	1667	1567	1479	1400	1329	1265	1207	1154	1105
2182	2034	1905	1791	1690	1600	1519	1446	1379	1319	1263
2457	2290	2144	2016	1902	1800	1709	1626	1551	1483	1420

Driftdown/Cruise Fuel and Time

AIR DIST (NM)	FUEL REQUIRED (1000 KG)							TIME (HR:MIN)
	WEIGHT AT START OF DRIFTDOWN (1000 KG)							
	60	70	80	90	100	110	120	
200	1.2	1.3	1.4	1.5	1.7	1.8	1.9	0:34
400	2.4	2.7	3.1	3.4	3.7	4.0	4.4	1:08
600	3.6	4.1	4.6	5.1	5.6	6.1	6.6	1:40
800	4.7	5.4	6.1	6.7	7.4	8.1	8.8	2:12
1000	5.9	6.7	7.5	8.4	9.2	10.1	11.0	2:42
1200	7.0	8.0	9.0	10.0	11.0	12.0	13.1	3:13
1400	8.1	9.2	10.4	11.6	12.8	14.0	15.2	3:44
1600	9.1	10.5	11.8	13.1	14.5	15.9	17.3	4:16
1800	10.2	11.7	13.2	14.7	16.2	17.7	19.3	4:49

Includes APU fuel burn.
Driftdown at optimum driftdown speed and cruise at Long Range Cruise speed.

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
120	13800	10500	7500
115	15700	12900	9500
110	17500	15200	11900
105	19200	17200	14500
100	20800	19200	16900
95	22400	21000	19200
90	24000	22600	21100
85	25600	24400	22900
80	27200	26000	24800
75	28800	27800	26500
70	30500	29600	28400
65	32400	31400	30400
60	34300	33400	32500

With packs off, increase altitude capability by 400 ft.
With engine anti-ice on, decrease altitude capability by 1000 ft.
With engine and wing anti-ice on, decrease altitude capability by 3400 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
120	EPR	1.58	1.66							
	MACH	.577	.609							
	KIAS	321	315							
	FF/ENG	4552	4530							
110	EPR	1.54	1.62	1.70						
	MACH	.559	.592	.626						
	KIAS	310	305	299						
	FF/ENG	4182	4144	4144						
100	EPR	1.50	1.57	1.66	1.72					
	MACH	.540	.572	.605	.632					
	KIAS	299	295	289	285					
	FF/ENG	3822	3769	3748	3761					
90	EPR	1.47	1.53	1.61	1.67	1.71	1.76			
	MACH	.517	.550	.584	.609	.628	.648			
	KIAS	287	283	279	274	272	269			
	FF/ENG	3472	3401	3367	3359	3366	3395			
80	EPR	1.43	1.49	1.55	1.61	1.66	1.70	1.75		
	MACH	.493	.526	.560	.585	.603	.621	.641		
	KIAS	273	270	267	263	260	257	255		
	FF/ENG	3126	3053	2999	2978	2972	2973	3000		
70	EPR	1.39	1.44	1.50	1.55	1.59	1.64	1.68	1.73	1.78
	MACH	.468	.498	.532	.558	.576	.593	.611	.631	.652
	KIAS	259	256	253	250	248	245	243	240	238
	FF/ENG	2794	2707	2646	2611	2598	2588	2586	2603	2647
60	EPR	1.34	1.39	1.45	1.49	1.53	1.57	1.61	1.66	1.70
	MACH	.435	.468	.500	.526	.544	.562	.580	.598	.617
	KIAS	240	240	237	235	234	232	230	227	225
	FF/ENG	2434	2376	2301	2262	2238	2221	2210	2205	2209

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
288	265	245	228	213	200	190	181	173	166	159
577	531	490	456	427	400	381	363	347	332	319
867	798	737	685	640	600	572	545	521	499	479
1158	1065	983	914	854	800	762	726	694	665	639
1450	1333	1230	1142	1067	1000	953	909	868	831	798
1744	1603	1477	1372	1281	1200	1143	1090	1041	997	957
2039	1873	1726	1602	1495	1400	1333	1271	1214	1163	1116
2336	2145	1975	1833	1710	1600	1523	1452	1387	1328	1275
2634	2417	2225	2063	1924	1800	1713	1634	1560	1493	1433

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	2.0	0:41	1.8	0:40	1.6	0:39	1.5	0:38	1.3	0:36
400	4.2	1:18	3.8	1:15	3.5	1:12	3.2	1:10	3.0	1:06
600	6.3	1:55	5.7	1:50	5.3	1:46	5.0	1:42	4.7	1:36
800	8.3	2:33	7.7	2:26	7.2	2:20	6.8	2:15	6.4	2:06
1000	10.4	3:11	9.6	3:02	9.0	2:54	8.5	2:48	8.0	2:37
1200	12.4	3:49	11.5	3:38	10.7	3:29	10.2	3:21	9.7	3:08
1400	14.5	4:28	13.4	4:15	12.5	4:04	11.8	3:54	11.2	3:39
1600	16.4	5:07	15.2	4:52	14.2	4:39	13.5	4:27	12.8	4:10
1800	18.4	5:47	17.1	5:30	16.0	5:14	15.1	5:01	14.4	4:41

Fuel Required Adjustment (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG)						
	60	70	80	90	100	110	120
2	-0.2	-0.2	-0.1	0.0	0.2	0.3	0.4
4	-0.5	-0.4	-0.2	0.0	0.3	0.6	1.0
6	-0.8	-0.6	-0.3	0.0	0.5	1.0	1.5
8	-1.1	-0.8	-0.4	0.0	0.7	1.4	2.1
10	-1.5	-1.0	-0.5	0.0	0.9	1.8	2.7
12	-1.8	-1.2	-0.6	0.0	1.1	2.2	3.2
14	-2.1	-1.4	-0.7	0.0	1.3	2.6	3.8
16	-2.4	-1.6	-0.8	0.0	1.5	2.9	4.4
18	-2.7	-1.8	-0.9	0.0	1.7	3.3	5.0
20	-3.1	-2.0	-1.0	0.0	1.9	3.7	5.5
22	-3.4	-2.2	-1.1	0.0	2.0	4.1	6.1

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
120	EPR	1.40	1.46	1.55	1.66			
	KIAS	237	237	237	237			
	FF/ENG	4020	3990	3970	4030			
110	EPR	1.37	1.42	1.50	1.61	1.73		
	KIAS	229	229	229	229	229		
	FF/ENG	3700	3650	3620	3640	3760		
100	EPR	1.34	1.38	1.46	1.55	1.67		
	KIAS	221	221	221	221	221		
	FF/ENG	3370	3330	3280	3270	3330		
90	EPR	1.31	1.35	1.42	1.50	1.61	1.74	
	KIAS	212	212	212	212	212	212	
	FF/ENG	3050	3010	2950	2930	2950	3050	
80	EPR	1.27	1.31	1.37	1.45	1.55	1.67	1.81
	KIAS	203	203	203	203	203	203	203
	FF/ENG	2730	2690	2640	2600	2590	2630	2810
70	EPR	1.24	1.27	1.33	1.40	1.48	1.59	1.72
	KIAS	194	194	194	194	194	194	194
	FF/ENG	2410	2380	2340	2290	2260	2260	2340
60	EPR	1.21	1.24	1.29	1.35	1.42	1.51	1.63
	KIAS	185	185	185	185	185	185	185
	FF/ENG	2100	2070	2030	1990	1950	1930	1950

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

Intentionally
Blank

Performance Inflight - QRH — Chapter PI-QRH

Gear Down — Section 13

GEAR DOWN

210 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	1.43	1.43	1.43	1.43	1.43	1.43	1.42	1.42	1.42	1.41	1.41	1.41	1.41	1.41	1.41
50	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.44	1.44	1.44	1.44	1.44	1.44	1.44	1.44
45	1.48	1.48	1.48	1.48	1.48	1.47	1.47	1.47	1.46	1.46	1.46	1.46	1.46	1.46	1.46
40	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.49	1.49	1.49	1.49	1.49	1.49	1.49	1.49
35	1.53	1.53	1.53	1.53	1.53	1.53	1.52	1.52	1.52	1.51	1.51	1.51	1.51	1.52	1.52
30	1.55	1.56	1.55	1.55	1.56	1.55	1.55	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54
25	1.55	1.58	1.58	1.58	1.58	1.58	1.58	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57
20	1.55	1.60	1.61	1.61	1.61	1.61	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.61
15	1.55	1.60	1.64	1.64	1.64	1.64	1.64	1.63	1.63	1.63	1.63	1.63	1.63	1.64	1.64
10	1.55	1.60	1.65	1.67	1.68	1.67	1.67	1.66	1.66	1.66	1.66	1.66	1.66	1.67	1.67
5	1.55	1.60	1.65	1.68	1.70	1.70	1.70	1.69	1.69	1.69	1.69	1.69	1.69	1.70	1.70
0	1.55	1.60	1.65	1.68	1.70	1.71	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.73
-5	1.55	1.60	1.65	1.68	1.70	1.71	1.73	1.74	1.75	1.74	1.74	1.75	1.75	1.75	1.75
-10	1.55	1.60	1.65	1.68	1.70	1.71	1.73	1.74	1.76	1.77	1.77	1.77	1.77	1.77	1.77
-15	1.55	1.60	1.65	1.68	1.70	1.71	1.73	1.74	1.76	1.77	1.78	1.79	1.79	1.79	1.79
-20	1.55	1.60	1.65	1.68	1.70	1.71	1.73	1.74	1.76	1.77	1.78	1.79	1.80	1.81	1.81
-25	1.55	1.60	1.65	1.68	1.70	1.71	1.73	1.74	1.76	1.77	1.78	1.79	1.80	1.82	1.83
-30	1.55	1.60	1.65	1.68	1.70	1.71	1.73	1.74	1.76	1.77	1.78	1.79	1.80	1.82	1.83

EPR Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)											
	0	5	10	12	16	20	24	26	28	30	32	34
PACKS OFF	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
ENGINE ANTI-ICE ON	0.00	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.02
ENGINE & WING ANTI-ICE ON	-0.01	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.03	-0.03	-0.03	-0.03	-0.04

Long Range Cruise Altitude Capability

WEIGHT (1000 KG)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
120	18900	15900	12600
115	20900	17900	15200
110	22700	20100	17200
105	24500	22300	19300
100	26400	24300	21700
95	28300	26500	24100
90	30000	28500	26500
85	31600	30300	28800
80	33200	32100	30600
75	34800	33800	32500
70	36300	35500	34500
65	37500	36900	36200
60	38900	38200	37500

GEAR DOWN

Long Range Cruise Control

WEIGHT (1000 KG)		PRESSURE ALTITUDE (1000 FT)										
		10	14	18	21	23	25	27	29	31	33	35
120	EPR	1.48	1.55	1.63								
	MACH	.458	.488	.519								
	KIAS	256	253	249								
	FF/ENG	3415	3351	3308								
110	EPR	1.45	1.51	1.59	1.65							
	MACH	.442	.472	.502	.526							
	KIAS	247	244	241	238							
	FF/ENG	3149	3083	3028	3007							
100	EPR	1.41	1.47	1.54	1.60	1.64	1.69					
	MACH	.424	.454	.485	.508	.524	.540					
	KIAS	236	235	232	229	227	225					
	FF/ENG	2877	2813	2760	2728	2713	2707					
90	EPR	1.38	1.43	1.50	1.55	1.59	1.64	1.68	1.73			
	MACH	.404	.435	.465	.488	.504	.520	.537	.554			
	KIAS	225	225	222	220	218	216	214	212			
	FF/ENG	2601	2554	2495	2458	2438	2423	2419	2431			
80	EPR	1.34	1.39	1.45	1.50	1.54	1.58	1.62	1.67	1.72	1.78	
	MACH	.380	.412	.443	.466	.482	.498	.515	.533	.556	.580	
	KIAS	212	213	211	210	208	207	205	203	203	203	
	FF/ENG	2313	2283	2233	2196	2173	2152	2137	2138	2175	2233	
70	EPR	1.30	1.35	1.40	1.45	1.48	1.52	1.56	1.61	1.66	1.71	1.77
	MACH	.357	.385	.417	.441	.457	.473	.490	.511	.533	.556	.580
	KIAS	198	198	199	198	197	196	194	194	194	194	194
	FF/ENG	2033	2000	1969	1937	1912	1893	1873	1877	1890	1923	1971
60	EPR	1.26	1.30	1.35	1.40	1.43	1.46	1.50	1.54	1.59	1.64	1.69
	MACH	.333	.359	.388	.412	.429	.447	.466	.486	.508	.530	.553
	KIAS	185	185	185	185	185	185	185	185	185	185	185
	FF/ENG	1762	1736	1702	1677	1663	1651	1642	1638	1638	1651	1673

Long Range Cruise Enroute Fuel and Time

Ground to Air Miles Conversion

AIR DISTANCE (NM) HEADWIND COMPONENT (KTS)					GROUND DISTANCE (NM)	AIR DISTANCE (NM) TAILWIND COMPONENT (KTS)				
100	80	60	40	20		20	40	60	80	100
327	292	261	237	217	200	188	178	168	160	152
661	588	525	476	435	400	376	355	336	319	304
1000	888	792	716	654	600	565	533	504	478	456
1345	1192	1060	957	873	800	753	710	671	637	607
1696	1499	1331	1199	1093	1000	941	887	838	796	758
2054	1811	1604	1443	1313	1200	1129	1064	1006	954	909
2418	2127	1880	1688	1534	1400	1316	1240	1172	1112	1059
2789	2448	2158	1934	1755	1600	1504	1417	1339	1269	1208
3167	2773	2439	2182	1977	1800	1691	1593	1504	1425	1357

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	3.8	0:51	3.4	0:49	3.1	0:47	2.8	0:45	2.5	0:43
400	7.7	1:39	7.1	1:34	6.5	1:30	6.0	1:26	5.4	1:21
600	11.5	2:28	10.6	2:20	9.8	2:13	9.0	2:07	8.2	1:59
800	15.3	3:19	14.1	3:07	13.0	2:57	12.1	2:49	10.9	2:38
1000	18.9	4:11	17.5	3:55	16.2	3:42	15.0	3:31	13.7	3:17
1200	22.5	5:04	20.8	4:44	19.3	4:28	17.9	4:14	16.3	3:56
1400	26.0	5:58	24.1	5:35	22.3	5:15	20.8	4:58	18.9	4:36
1600	29.3	6:54	27.3	6:26	25.3	6:02	23.5	5:42	21.4	5:17
1800	32.6	7:50	30.4	7:19	28.2	6:51	26.3	6:28	23.9	5:58

Fuel Required Adjustment (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG)					
	70	80	90	100	110	120
5	-0.5	-0.3	0.0	0.4	0.8	1.3
10	-1.2	-0.6	0.0	0.8	1.7	2.6
15	-1.8	-0.9	0.0	1.2	2.5	3.8
20	-2.4	-1.2	0.0	1.6	3.3	5.0
25	-3.0	-1.5	0.0	1.9	4.0	6.2
30	-3.6	-1.8	0.0	2.3	4.7	7.3
35	-4.2	-2.1	0.0	2.6	5.3	8.3

GEAR DOWN

Descent at VREF30 + 80

PRESSURE ALT (1000 FT)	5	10	15	17	19	21	23	25	27	29	31	33	35
DISTANCE (NM)	12	21	30	34	38	41	45	49	53	57	61	65	69
TIME (MINUTES)	7	9	11	12	13	13	14	15	16	16	17	18	18

Holding

Flaps Up

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)						
		1500	5000	10000	15000	20000	25000	30000
120	EPR	1.33	1.38	1.45	1.54	1.65		
	KIAS	237	237	237	237	237		
	FF/ENG	3400	3350	3300	3270	3310		
110	EPR	1.31	1.35	1.42	1.51	1.61		
	KIAS	229	229	229	229	229		
	FF/ENG	3150	3110	3040	3000	3010		
100	EPR	1.29	1.32	1.39	1.47	1.56	1.68	
	KIAS	221	221	221	221	221	221	
	FF/ENG	2900	2860	2790	2750	2730	2780	
90	EPR	1.26	1.30	1.36	1.43	1.52	1.63	1.76
	KIAS	212	212	212	212	212	212	212
	FF/ENG	2650	2610	2560	2500	2470	2490	2580
80	EPR	1.24	1.27	1.32	1.39	1.47	1.57	1.70
	KIAS	203	203	203	203	203	203	203
	FF/ENG	2400	2370	2320	2270	2230	2220	2260
70	EPR	1.22	1.24	1.29	1.35	1.43	1.52	1.63
	KIAS	194	194	194	194	194	194	194
	FF/ENG	2160	2130	2090	2040	2000	1970	1980
60	EPR	1.19	1.22	1.26	1.31	1.38	1.46	1.57
	KIAS	185	185	185	185	185	185	185
	FF/ENG	1920	1890	1850	1810	1770	1730	1720

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

Intentionally
Blank

Performance Inflight - QRH — Chapter PI-QRH

Gear Down, Engine Inop — Section 14

GEAR DOWN

ENGINE INOP

MAX CONTINUOUS THRUST

Driftdown Speed/Level Off Altitude

100 ft/min residual rate of climb

Includes APU fuel burn

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
110	103	226	2800		
100	94	218	6900	4800	2100
90	85	210	10800	9100	7000
80	76	201	14700	13300	11600
70	66	193	18400	17400	16100
60	57	183	22000	21200	20300

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
100	2700		
95	5900	2400	
90	8500	5900	1900
85	11000	8800	5900
80	13100	11500	9200
75	15200	13800	11900
70	17200	16000	14500
65	19100	18100	16800
60	21100	20200	19100

Long Range Cruise Control

WEIGHT (1000 KG)		PRESSURE ALTITUDE (1000 FT)							
		6	8	10	12	14	16	18	20
90	EPR	1.61	1.66	1.70					
	MACH	.362	.373	.382					
	KIAS	217	215	213					
	FF/ENG	4854	4837	4812					
80	EPR	1.56	1.59	1.63	1.68	1.74			
	MACH	.346	.356	.367	.380	.395			
	KIAS	207	206	204	203	203			
	FF/ENG	4331	4295	4268	4289	4345			
70	EPR	1.50	1.53	1.57	1.61	1.66	1.72	1.77	
	MACH	.328	.338	.350	.364	.378	.393	.408	
	KIAS	196	195	194	194	194	194	194	
	FF/ENG	3813	3765	3759	3769	3792	3833	3900	
60	EPR	1.44	1.47	1.51	1.55	1.59	1.64	1.69	1.74
	MACH	.309	.321	.333	.346	.359	.374	.388	.404
	KIAS	185	185	185	185	185	185	185	185
	FF/ENG	3328	3310	3296	3290	3292	3305	3333	3379

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
171	151	133	120	109	100	94	88	82	78	74
347	304	269	241	219	200	187	174	164	155	147
524	459	405	362	329	300	280	262	246	232	220
703	615	541	484	439	400	373	349	328	309	293
883	772	678	606	549	500	466	436	409	386	366
1065	930	816	729	660	600	559	523	490	462	438
1248	1088	954	851	770	700	652	610	572	539	511
1432	1248	1093	974	881	800	745	696	653	615	583

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	2.0	0:29	1.8	0:28	1.6	0:27	1.5	0:26
200	4.1	0:55	3.8	0:53	3.5	0:51	3.4	0:48
300	6.1	1:21	5.7	1:18	5.4	1:15	5.2	1:11
400	8.1	1:48	7.6	1:44	7.2	1:38	7.0	1:33
500	10.1	2:15	9.5	2:09	9.1	2:02	8.8	1:56
600	12.1	2:41	11.4	2:35	10.8	2:27	10.6	2:18
700	14.1	3:09	13.2	3:01	12.6	2:51	12.3	2:41
800	16.0	3:36	15.0	3:27	14.3	3:15	14.0	3:04

Fuel Required Adjustment (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG)				
	70	80	90	100	110
2	-0.2	-0.1	0.0	0.1	0.3
4	-0.5	-0.2	0.0	0.3	0.7
6	-0.7	-0.4	0.0	0.5	1.0
8	-0.9	-0.5	0.0	0.7	1.4
10	-1.2	-0.6	0.0	0.9	1.8
12	-1.4	-0.7	0.0	1.1	2.2
14	-1.6	-0.8	0.0	1.3	2.5
16	-1.9	-1.0	0.0	1.5	2.9
18	-2.1	-1.1	0.0	1.7	3.3

Includes APU fuel burn.

Holding
Flaps Up

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)			
		1500	5000	10000	15000
110	EPR	1.61			
	KIAS	229			
	FF/ENG	6040			
100	EPR	1.56	1.63		
	KIAS	221	221		
	FF/ENG	5490	5510		
90	EPR	1.51	1.58	1.70	
	KIAS	212	212	212	
	FF/ENG	4970	4960	5040	
80	EPR	1.46	1.53	1.63	
	KIAS	203	203	203	
	FF/ENG	4480	4450	4470	
70	EPR	1.42	1.47	1.57	1.69
	KIAS	194	194	194	194
	FF/ENG	4010	3970	3950	4000
60	EPR	1.37	1.42	1.51	1.61
	KIAS	185	185	185	185
	FF/ENG	3550	3510	3460	3460

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 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

The Reference Speed table contains flaps 30, 25 and 20 landing speeds for a given weight.

Advisory Information

Normal Configuration Landing Distance

Tables are provided as advisory information for normal configuration landing distance on dry runways and slippery runways with good, medium, and poor reported braking action. These values are actual landing distances and do not include the 1.67 regulatory factor. Therefore, they cannot be used to determine the dispatch required landing field length.

To use these tables, 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 conservative to add the effects of slope and inoperative reversers when using the autobrake system.

Non-normal Configuration Landing Distance

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

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

Recommeded Brake Cooling Schedule

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

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

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

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

The recommended cooling time is found in the final table by entering with the adjusted brake energy per brake 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. Cruise is continued at level off altitude and Long Range Cruise speed.

To determine fuel required, enter the Ground to Air Miles Conversion table with the desired ground distance and adjust for anticipated winds to obtain air distance to destination. Then enter the Driftdown/Cruise Fuel and Time table with air distance and weight at start of driftdown to determine fuel and time required. If altitudes other than the level off altitude 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.

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 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)			
		60	80	100	120
40000	**PITCH ATT**	**4.5**	**4.5**		
	V/S (FT/MIN)	2000	1100		
30000	**PITCH ATT**	**4.5**	**4.0**	**4.0**	**4.0**
	V/S (FT/MIN)	2700	1900	1300	900
20000	**PITCH ATT**	**7.5**	**6.5**	**6.0**	**6.0**
	V/S (FT/MIN)	4200	3000	2200	1600
10000	**PITCH ATT**	**10.5**	**8.5**	**8.0**	**7.5**
	V/S (FT/MIN)	5400	3900	3000	2300
SEA LEVEL	**PITCH ATT**	**14.0**	**11.5**	**10.0**	**9.5**
	V/S (FT/MIN)	6500	4700	3600	2900

Cruise (.78/290)

Flaps Up, EPR for Level Flight

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG)			
		60	80	100	120
40000	**PITCH ATT**	**2.0**	**3.0**		
	EPR	1.49	1.57		
	(Alt Mode %N1)	(82.5)	(86.4)		
35000	**PITCH ATT**	**1.5**	**2.5**	**3.0**	**4.0**
	EPR	1.45	1.49	1.56	1.69
	(Alt Mode %N1)	(80.8)	(82.9)	(86.0)	(92.2)
30000	**PITCH ATT**	**1.0**	**1.5**	**2.5**	**3.0**
	EPR	1.41	1.44	1.47	1.52
	(Alt Mode %N1)	(80.4)	(81.8)	(83.7)	(86.3)
25000	**PITCH ATT**	**1.0**	**2.0**	**2.5**	**3.5**
	EPR	1.34	1.36	1.40	1.44
	(Alt Mode %N1)	(76.2)	(77.9)	(80.0)	(82.4)
20000	**PITCH ATT**	**1.5**	**2.0**	**2.5**	**3.5**
	EPR	1.28	1.30	1.33	1.37
	(Alt Mode %N1)	(72.7)	(74.3)	(76.3)	(78.7)
15000	**PITCH ATT**	**1.5**	**2.0**	**3.0**	**3.5**
	EPR	1.24	1.26	1.28	1.31
	(Alt Mode %N1)	(69.3)	(70.9)	(72.9)	(75.3)

Descent (.78/290)

Flaps Up, Set Idle Thrust

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG)			
		60	80	100	120
40000	**PITCH ATT**	**-1.0**	**0.0**	**0.5**	**0.0**
	V/S (FT/MIN)	-2600	-2400	-2700	-4000
30000	**PITCH ATT**	**-3.0**	**-1.5**	**-0.5**	**0.5**
	V/S (FT/MIN)	-3200	-2600	-2200	-2000
20000	**PITCH ATT**	**-3.0**	**-1.5**	**0.0**	**0.5**
	V/S (FT/MIN)	-2900	-2300	-2000	-1900
10000	**PITCH ATT**	**-3.0**	**-1.5**	**-0.5**	**0.5**
	V/S (FT/MIN)	-2600	-2100	-1800	-1700
SEA LEVEL	**PITCH ATT**	**-3.5**	**-1.5**	**-0.5**	**0.5**
	V/S (FT/MIN)	-2400	-1900	-1700	-1500

Holding (VREF30 + 80)

Flaps Up, EPR for Level Flight

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG)			
		60	80	100	120
10000	**PITCH ATT**	**5.0**	**5.0**	**5.0**	**5.0**
	EPR	1.14	1.18	1.22	1.26
	(Alt Mode %N1)	(52.9)	(59.8)	(65.4)	(70.0)
	KIAS	185	213	239	262
5000	**PITCH ATT**	**5.0**	**5.0**	**5.0**	**5.0**
	EPR	1.12	1.15	1.18	1.22
	(Alt Mode %N1)	(49.6)	(55.9)	(61.4)	(66.1)
	KIAS	185	213	238	261

Flight With Unreliable Airspeed / Turbulent Air Penetration

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

Terminal Area (5000 FT)

EPR for Level Flight

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG)			
		60	80	100	120
FLAPS 1 (GEAR UP) (VREF30 + 60)	**PITCH ATT**	**6.5**	**7.0**	**7.5**	**8.0**
	EPR	1.13	1.17	1.20	1.24
	KIAS	166	183	201	217
	(Alt Mode %N1)	(51.0)	(57.7)	(63.4)	(68.2)
FLAPS 5 (GEAR UP) (VREF30 + 40)	**PITCH ATT**	**7.0**	**7.5**	**7.5**	**8.0**
	EPR	1.13	1.17	1.22	1.26
	KIAS	146	163	181	197
	(Alt Mode %N1)	(51.1)	(58.2)	(64.2)	(69.1)
FLAPS 15 (GEAR UP) (VREF30 + 20)	**PITCH ATT**	**8.0**	**8.0**	**8.0**	**7.5**
	EPR	1.15	1.20	1.24	1.29
	KIAS	126	143	161	177
	(Alt Mode %N1)	(53.7)	(61.3)	(67.4)	(72.1)
FLAPS 20 (GEAR UP) (VREF30 + 20)	**PITCH ATT**	**5.0**	**5.0**	**5.0**	**5.0**
	EPR	1.16	1.21	1.26	1.32
	KIAS	126	143	161	177
	(Alt Mode %N1)	(55.8)	(63.6)	(69.6)	(74.4)

Final Approach (1500 FT)

Gear Down, EPR for 3° Glideslope

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG)			
		60	80	100	120
FLAPS 25 (VREF25 + 10)	**PITCH ATT**	**2.5**	**2.5**	**2.5**	**2.5**
	EPR	1.11	1.15	1.18	1.21
	KIAS	118	136	152	168
	(Alt Mode %N1)	(47.1)	(53.5)	(59.1)	(64.0)
FLAPS 30 (VREF30 + 10)	**PITCH ATT**	**1.0**	**1.0**	**0.5**	**0.5**
	EPR	1.14	1.18	1.22	1.27
	KIAS	116	133	151	167
	(Alt Mode %N1)	(51.4)	(58.6)	(64.7)	(69.7)

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	1.41	1.41	1.40	1.40	1.40	1.39	1.39	1.39	1.38
50	1.45	1.45	1.45	1.45	1.44	1.43	1.44	1.44	1.43
40	1.50	1.50	1.50	1.50	1.49	1.49	1.49	1.49	1.48
30	1.52	1.56	1.55	1.55	1.55	1.54	1.54	1.55	1.53
20	1.52	1.57	1.61	1.61	1.61	1.60	1.60	1.61	1.60
10	1.52	1.57	1.61	1.66	1.67	1.66	1.67	1.67	1.66
0	1.52	1.57	1.61	1.66	1.69	1.72	1.72	1.73	1.72
-10	1.52	1.57	1.61	1.66	1.69	1.72	1.75	1.77	1.76
-20 & BELOW	1.52	1.57	1.61	1.66	1.69	1.72	1.75	1.79	1.80

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	0.01	0.01
ENGINE ANTI-ICE ON	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.02	-0.02
ENGINE & WING ANTI-ICE ON	-0.02	-0.02	-0.02	-0.02	-0.02	-0.03	-0.03	-0.04	-0.05

VREF (KIAS)

WEIGHT (1000 KG)	FLAPS		
	30	25	20
120	157	158	167
110	149	151	159
100	140	142	151
90	132	134	143
80	124	126	135
70	115	117	125
60	106	108	116

Stab Trim Setting

WEIGHT (1000 KG)	C.G. %MAC						
	9	14	19	24	29	34	39
120	7	7	6	5	4 1/4	3 1/4	2 1/2
110	7	6 3/4	5 3/4	4 3/4	4	3 1/4	2 1/2
100	7	6 1/4	5 1/4	4 1/4	3 3/4	3	2 1/2
90	7	6	4 3/4	4	3 1/2	2 3/4	2 1/4
80	6 1/2	5 1/2	4 1/2	3 3/4	3 1/4	2 1/2	2 1/4
70	6	5	4 1/4	3 1/2	3	2 1/4	2
60	5 1/2	4 1/2	4	3 1/4	2 3/4	2 1/4	2

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Advisory Information — Section 21

ADVISORY INFORMATION

Normal Configuration Landing Distance
Flaps 30
Dry Runway

BRAKING CONFIGURATION	LANDING DISTANCE AND ADJUSTMENTS (FT)											
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		TEMP ADJ PER 10°C		VREF ADJ	REVERSE THRUST ADJ	
	86000 KG LANDING WEIGHT	PER 5000 KG ABOVE/ BELOW 86000 KG	PER 1000 FT STD/ HIGH*	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 10 KTS ABOVE VREF30	ONE REV	NO REV
MAX MANUAL	2670	+110/-100	60/70	-110	380	40	-30	50	-50	220	50	100
MAX AUTO	4050	+180/-180	90/120	-180	580	50	-50	90	-90	310	130	260
AUTOBRAKE 4	4380	+210/-200	110/140	-210	680	60	-60	100	-100	360	140	290
AUTOBRAKE 3	4970	+260/-250	130/170	-260	850	70	-70	130	-130	450	160	330
AUTOBRAKE 2	5500	+320/-310	160/210	-300	1010	120	-130	150	-150	460	270	450
AUTOBRAKE 1	5890	+360/-360	190/250	-350	1170	200	-210	160	-160	460	600	900

Good Reported Braking Action

MAX MANUAL	3500	+170/-150	90/120	-170	610	80	-70	80	-80	290	180	430
MAX AUTO	4230	+200/-200	100/140	-200	690	100	-90	90	-90	310	310	730
AUTOBRAKE 4	4430	+210/-210	110/140	-220	730	80	-70	100	-100	360	180	530
AUTOBRAKE 3	4970	+260/-250	130/170	-260	850	80	-70	130	-130	450	160	330

Medium Reported Braking Action

MAX MANUAL	4600	+260/-230	130/180	-260	980	190	-150	110	-110	370	520	1350
MAX AUTO	4940	+280/-260	140/190	-290	1020	200	-170	120	-120	360	650	1680
AUTOBRAKE 4	4940	+280/-260	140/190	-290	1020	200	-170	120	-120	360	640	1670
AUTOBRAKE 3	5170	+290/-260	140/190	-300	1050	160	-120	130	-130	450	450	1430

Poor Reported Braking Action

MAX MANUAL	5740	+350/-310	180/250	-380	1500	420	-280	140	-140	420	1080	3250
MAX AUTO	5810	+360/-330	190/260	-380	1510	420	-310	140	-150	410	1180	3540
AUTOBRAKE 4	5810	+360/-330	190/260	-380	1510	420	-310	140	-150	410	1180	3540
AUTOBRAKE 3	5820	+360/-330	190/260	-380	1520	410	-290	140	-150	450	1160	3510

Reference distance is for sea level, standard day, no wind or slope, VREF30 approach speed and 2 engine reverse thrust.
Max Manual braking data valid for auto speedbrakes. For manual speedbrakes, increase reference landing distance by 280 ft.
Autobrake data valid for both auto and manual speedbrakes.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above threshold (1000 ft of air distance).

***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft, then apply the HIGH adjustment to this new reference distance.**

ADVISORY INFORMATION

Normal Configuration Landing Distance

Flaps 25

Dry Runway

	LANDING DISTANCE AND ADJUSTMENTS (FT)											
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		TEMP ADJ PER 10°C		VREF ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	86000 KG LANDING WEIGHT	PER 5000 KG ABOVE/ BELOW 86000 KG	PER 1000 FT STD/ HIGH*	HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA	PER 10 KTS ABOVE VREF25	ONE REV	NO REV
MAX MANUAL	2700	+110/-100	60/70	-110	380	40	-30	50	-50	220	50	110
MAX AUTO	4200	+180/-180	90/120	-180	590	60	-50	90	-90	320	140	280
AUTOBRAKE 4	4540	+210/-210	110/140	-210	690	60	-60	110	-110	380	150	300
AUTOBRAKE 3	5170	+260/-250	140/180	-260	870	80	-80	140	-140	480	170	340
AUTOBRAKE 2	5760	+320/-310	170/220	-310	1040	120	-130	160	-160	490	260	460
AUTOBRAKE 1	6200	+370/-370	200/260	-360	1210	210	-220	170	-170	490	630	920

Good Reported Braking Action

MAX MANUAL	3580	+170/-160	90/120	-170	610	90	-70	80	-80	300	190	450
MAX AUTO	4380	+200/-200	110/140	-210	710	110	-100	100	-100	320	330	780
AUTOBRAKE 4	4590	+210/-210	110/150	-220	740	80	-70	110	-110	380	190	560
AUTOBRAKE 3	5170	+260/-250	140/180	-260	870	80	-80	140	-140	480	170	350

Medium Reported Braking Action

MAX MANUAL	4760	+260/-240	140/190	-270	990	200	-160	110	-120	380	550	1460
MAX AUTO	5130	+280/-260	150/200	-300	1040	210	-180	120	-130	380	700	1830
AUTOBRAKE 4	5130	+280/-260	150/200	-300	1040	210	-180	120	-130	380	690	1810
AUTOBRAKE 3	5380	+290/-260	150/200	-310	1080	170	-120	140	-140	480	490	1560

Poor Reported Braking Action

MAX MANUAL	5990	+360/-320	190/270	-390	1530	440	-300	150	-150	440	1180	3600
MAX AUTO	6070	+370/-350	200/280	-390	1550	440	-330	150	-150	430	1300	3920
AUTOBRAKE 4	6070	+370/-350	200/280	-390	1550	440	-330	150	-150	430	1290	3920
AUTOBRAKE 3	6090	+360/-340	200/270	-390	1550	430	-310	150	-160	480	1270	3900

Reference distance is for sea level, standard day, no wind or slope, VREF25 approach speed and 2 engine reverse thrust.
Max Manual braking data valid for auto speedbrakes. For manual speedbrakes, increase reference landing distance by 290 ft.
Autobrake data valid for both auto and manual speedbrakes.
Actual (unfactored) distances are shown.
Includes distance from 50 ft above threshold (1000 ft of air distance).

***For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft, then apply the HIGH adjustment to this new reference distance.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Dry Runway

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENTS (FT)							
		REFERENCE DISTANCE* FOR 86000 KG LANDING WEIGHT	WT ADJ PER 2000 KG ABOVE/ BELOW 86000 KG	ALTITUDE ADJ PER 1000 FT STD/HIGH ***	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		APPROACH SPEED
					HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	PER 10 KTS ABOVE VREF
AIR-GROUND LOGIC IN AIR MODE	VREF30	3535	60/-55	75/105	-150	530	75	-65	400
ANTI-SKID SYSTEM INOP	VREF30	4110	80/-70	100/130	-200	745	100	-85	335
FLAPS UP	VREF30+50	3715	155/-55	105/165	-160	615	60	-55	305
HYDRAULIC SYSTEM CENTER INOP	VREF30	2745	50/-40	60/75	-110	400	40	-35	240
HYDRAULIC SYSTEM LEFT INOP	VREF30	3205	55/-50	70/90	-130	465	50	-45	310
HYDRAULIC SYSTEM LEFT INOP WITH LE SLAT OR TE FLAPS DISAGREE FOR FLAPS ≥ 20	VREF20	3485	55/-55	75/105	-140	485	55	-45	310
HYDRAULIC SYSTEM RIGHT INOP	VREF30	3245	60/-55	75/105	-140	505	70	-60	355
HYDRAULIC SYSTEMS CENTER AND LEFT INOP FLAPS 20	VREF30+20	3905	65/-55	90/120	-150	525	70	-60	365
HYDRAULIC SYSTEMS CENTER AND RIGHT INOP FLAPS 20	VREF30+20	4045	75/-65	105/140	-165	580	100	-85	430
HYDRAULIC SYSTEM** LEFT & RIGHT INOP FLAPS 20	VREF30+20	5240	95/-85	140/185	-220	750	375	-280	690

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

***** For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft, then apply HIGH adjustment to this new reference distance.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Dry Runway

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENTS (FT)							
		REFERENCE DISTANCE* FOR 86000 KG LANDING WEIGHT	WT ADJ PER 2000 KG ABOVE/ BELOW 86000 KG	ALTITUDE ADJ PER 1000 FT STD/HIGH ***	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		APPROACH SPEED
					HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	PER 10 KTS ABOVE VREF
LE SLAT ASYMMETRY FLAPS>20	VREF20	2885	60/-45	65/85	-115	440	40	-35	230
LE SLAT ASYMMETRY FLAPS ≤ 20	VREF30+30	3305	90/-50	75/105	-135	495	45	-45	255
LE SLAT DISAGREE	VREF20	2885	60/-45	65/85	-115	440	40	-35	230
ONE ENGINE INOP	VREF20	2935	65/-45	65/85	-120	455	45	-40	240
REVERSER UNLOCK FLAPS 20	VREF30+30	3385	95/-50	80/105	-140	515	55	-50	275
TRAILING EDGE FLAP ASYMMETRY FLAPS ≥ 20	VREF20	2885	60/-45	65/85	-115	440	40	-35	230
TRAILING EDGE ASYMMETRY 5<FLAPS<20	VREF30+30	3295	110/-50	75/105	-140	510	50	-45	260
TRAILING EDGE ASYMMETRY FLAPS ≤ 5	VREF30+40	3505	130/-50	85/125	-145	545	55	-50	275
TRAILING EDGE FLAP DISAGREE	VREF20	2885	60/-45	65/85	-115	440	40	-35	230

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

***** For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft, then apply HIGH adjustment to this new reference distance.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Good Reported Braking Action

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENTS (FT)							
		REFERENCE DISTANCE* FOR 86000 KG LANDING WEIGHT	WT ADJ PER 2000 KG ABOVE/ BELOW 86000 KG	ALTITUDE ADJ PER 1000 FT STD/HIGH ***	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		APPROACH SPEED
					HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	PER 10 KTS ABOVE VREF
AIR-GROUND LOGIC IN AIR MODE	VREF30	5130	95/-85	130/165	-265	950	245	-185	590
ANTI-SKID SYSTEM INOP	VREF30	4970	105/-90	135/180	-280	1070	195	-155	390
FLAPS UP	VREF30+50	5130	95/-85	145/205	-215	770	125	-105	305
HYDRAULIC SYSTEM CENTER INOP	VREF30	3605	75/-60	90/120	-175	645	95	-80	315
HYDRAULIC SYSTEM LEFT INOP	VREF30	4255	85/-75	110/140	-205	750	130	-105	415
HYDRAULIC SYSTEM LEFT INOP WITH LE SLAT OR TE FLAPS DISAGREE FOR FLAPS ≥ 20	VREF20	4710	85/-85	125/170	-220	790	145	-120	430
HYDRAULIC SYSTEM RIGHT INOP	VREF30	4145	90/-75	110/150	-205	745	145	-120	445
HYDRAULIC SYSTEMS CENTER AND LEFT INOP FLAPS 20	VREF30+20	5320	100/-95	145/200	-240	855	180	-145	490
HYDRAULIC SYSTEMS CENTER AND RIGHT INOP FLAPS 20	VREF30+20	5260	105/-95	150/210	-245	855	205	-165	535
HYDRAULIC SYSTEM** LEFT & RIGHT INOP FLAPS 20	VREF30+20	6740	130/-115	195/265	-310	1060	1320	-780	865

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

***** For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft, then apply HIGH adjustment to this new reference distance.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Good Reported Braking Action

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENTS (FT)							
		REFERENCE DISTANCE* FOR 86000 KG LANDING WEIGHT	WT ADJ PER 2000 KG ABOVE/ BELOW 86000 KG	ALTITUDE ADJ PER 1000 FT STD/HIGH ***	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		APPROACH SPEED
					HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	PER 10 KTS ABOVE VREF
LE SLAT ASYMMETRY FLAPS>20	VREF20	3870	100/-95	100/140	-240	855	180	-145	490
LE SLAT ASYMMETRY FLAPS ≤ 20	VREF30+30	4445	80/-75	120/165	-200	720	110	-95	305
LE SLAT DISAGREE	VREF20	3870	100/-95	100/140	-240	855	180	-145	490
ONE ENGINE INOP	VREF20	4065	75/-70	105/145	-195	705	120	-100	335
REVERSER UNLOCK FLAPS 20	VREF30+30	4695	85/-80	125/175	-215	760	135	-115	340
TRAILING EDGE FLAP ASYMMETRY FLAPS ≥ 20	VREF20	3875	70/-65	100/140	-185	670	100	-85	300
TRAILING EDGE ASYMMETRY 5<FLAPS<20	VREF30+30	4480	85/-75	120/170	-200	720	110	-95	305
TRAILING EDGE ASYMMETRY FLAPS ≤ 5	VREF30+40	4795	90/-80	135/180	-205	740	115	-100	305
TRAILING EDGE FLAP DISAGREE	VREF20	3875	70/-65	100/140	-185	670	100	-85	300

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

***** For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft, then apply HIGH adjustment to this new reference distance.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Medium Reported Braking Action

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENTS (FT) REFERENCE DISTANCE* FOR 86000 KG LANDING WEIGHT	WT ADJ PER 2000 KG ABOVE/ BELOW 86000 KG	ALTITUDE ADJ PER 1000 FT STD/HIGH ***	WIND ADJ PER 10 KTS HEAD WIND	WIND ADJ PER 10 KTS TAIL WIND	SLOPE ADJ PER 1% DOWN HILL	SLOPE ADJ PER 1% UP HILL	APPROACH SPEED PER 10 KTS ABOVE VREF
AIR-GROUND LOGIC IN AIR MODE	VREF30	8370	140/-105	225/300	-530	2000	1125	-620	830
ANTI-SKID SYSTEM INOP	VREF30	6160	140/-130	185/245	-400	1655	465	-300	445
FLAPS UP	VREF30+50	7060	140/-130	225/315	-340	1260	315	-240	405
HYDRAULIC SYSTEM CENTER INOP	VREF30	4750	110/-95	140/180	-270	1055	230	-170	390
HYDRAULIC SYSTEM LEFT INOP	VREF30	5800	130/-115	170/235	-335	1270	355	-250	525
HYDRAULIC SYSTEM LEFT INOP WITH LE SLAT OR TE FLAPS DISAGREE FOR FLAPS ≥ 20	VREF20	6590	135/-130	200/290	-365	1350	410	-290	565
HYDRAULIC SYSTEM RIGHT INOP	VREF30	5770	135/-120	180/245	-335	1275	395	-275	550
HYDRAULIC SYSTEMS CENTER AND LEFT INOP FLAPS 20	VREF30+20	7435	155/-140	235/330	-395	1450	495	-345	625
HYDRAULIC SYSTEMS CENTER AND RIGHT INOP FLAPS 20	VREF30+20	7505	165/-145	250/355	-400	1470	550	-385	675
HYDRAULIC SYSTEM** LEFT & RIGHT INOP FLAPS 20	VREF30+20	10625	205/-185	350/490	-555	1970	5660	-1995	1190

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

***** For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft, then apply HIGH adjustment to this new reference distance.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Medium Reported Braking Action

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENTS (FT): REFERENCE DISTANCE* FOR 86000 KG LANDING WEIGHT	WT ADJ PER 2000 KG ABOVE/ BELOW 86000 KG	ALTITUDE ADJ PER 1000 FT STD/HIGH ***	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		APPROACH SPEED
					HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	PER 10 KTS ABOVE VREF
LE SLAT ASYMMETRY FLAPS>20	VREF20	5235	155/-140	155/225	-395	1450	495	-345	625
LE SLAT ASYMMETRY FLAPS ≤ 20	VREF30+30	5970	125/-110	185/260	-310	1175	275	-210	380
LE SLAT DISAGREE	VREF20	5235	155/-140	155/225	-395	1450	495	-345	625
ONE ENGINE INOP	VREF20	5760	120/-115	170/235	-325	1215	335	-245	450
REVERSER UNLOCK FLAPS 20	VREF30+30	6610	135/-130	200/280	-350	1290	365	-270	445
TRAILING EDGE FLAP ASYMMETRY FLAPS ≥ 20	VREF20	5240	110/-100	155/225	-290	1110	255	-190	385
TRAILING EDGE ASYMMETRY 5<FLAPS<20	VREF30+30	6140	130/-115	190/270	-315	1190	285	-215	395
TRAILING EDGE ASYMMETRY FLAPS ≤ 5	VREF30+40	6540	130/-125	205/290	-325	1220	295	-225	395
TRAILING EDGE FLAP DISAGREE	VREF20	5240	110/-100	155/225	-290	1110	255	-190	385

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

***** For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft, then apply HIGH adjustment to this new reference distance.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Poor Reported Braking Action

LANDING CONFIGURATION	VREF	LANDING DISTANCE AND ADJUSTMENTS (FT): REFERENCE DISTANCE* FOR 86000 KG LANDING WEIGHT	WT ADJ PER 2000 KG ABOVE/ BELOW 86000 KG	ALTITUDE ADJ PER 1000 FT STD/HIGH ***	WIND ADJ PER 10 KTS: HEAD WIND	WIND ADJ PER 10 KTS: TAIL WIND	SLOPE ADJ PER 1%: DOWN HILL	SLOPE ADJ PER 1%: UP HILL	APPROACH SPEED: PER 10 KTS ABOVE VREF
AIR-GROUND LOGIC IN AIR MODE	VREF30	> 15000	-	-	-	-	-	-	-
ANTI-SKID SYSTEM INOP	VREF30	8075	200/-180	260/350	-660	3115	3435	-690	490
FLAPS UP	VREF30+50	9135	205/-185	315/470	-505	1965	765	-470	480
HYDRAULIC SYSTEM CENTER INOP	VREF30	5970	145/-130	190/255	-400	1645	545	-320	435
HYDRAULIC SYSTEM LEFT INOP	VREF30	7695	180/-160	255/355	-525	2125	1035	-530	605
HYDRAULIC SYSTEM LEFT INOP WITH LE SLAT OR TE FLAPS DISAGREE FOR FLAPS ≥ 20	VREF20	8895	200/-185	305/475	-570	2265	1200	-620	675
HYDRAULIC SYSTEM RIGHT INOP	VREF30	7735	190/-165	270/370	-530	2145	1110	-565	630
HYDRAULIC SYSTEMS CENTER AND LEFT INOP FLAPS 20	VREF30+20	10030	225/-200	355/525	-625	2420	1430	-730	725
HYDRAULIC SYSTEMS CENTER AND RIGHT INOP FLAPS 20	VREF30+20	10230	240/-210	375/560	-635	2460	1555	-790	770
HYDRAULIC SYSTEM** LEFT & RIGHT INOP FLAPS 20	VREF30+20	> 15000	-	-	-	-	-	-	-

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

***** For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft, then apply HIGH adjustment to this new reference distance.**

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

Poor Reported Braking Action

		LANDING DISTANCE AND ADJUSTMENTS (FT)							
LANDING CONFIGURATION	VREF	REFERENCE DISTANCE* FOR 86000 KG LANDING WEIGHT	WT ADJ PER 2000 KG ABOVE/ BELOW 86000 KG	ALTITUDE ADJ PER 1000 FT STD/HIGH ***	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		APPROACH SPEED
					HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	PER 10 KTS ABOVE VREF
LE SLAT ASYMMETRY FLAPS>20	VREF20	6760	225/-200	220/330	-625	2420	1430	-730	725
LE SLAT ASYMMETRY FLAPS ≤ 20	VREF30+30	7605	170/-155	255/375	-460	1830	670	-400	435
LE SLAT DISAGREE	VREF20	6760	225/-200	220/330	-625	2420	1430	-730	725
ONE ENGINE INOP	VREF20	7815	175/-170	255/355	-505	1990	925	-515	545
REVERSER UNLOCK FLAPS 20	VREF30+30	8835	200/-180	290/410	-535	2080	975	-555	525
TRAILING EDGE FLAP ASYMMETRY FLAPS ≥ 20	VREF20	6765	155/-140	220/330	-435	1755	640	-375	450
TRAILING EDGE ASYMMETRY 5<FLAPS<20	VREF30+30	7945	180/-165	270/395	-475	1865	705	-420	465
TRAILING EDGE ASYMMETRY FLAPS ≤ 5	VREF30+40	8415	190/-170	290/420	-485	1900	720	-435	460
TRAILING EDGE FLAP DISAGREE	VREF20	6765	155/-140	220/330	-435	1755	640	-375	450

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

***** For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft, then apply HIGH adjustment to this new reference distance.**

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)	PRESS ALT			PRESS ALT			PRESS ALT			PRESS ALT			PRESS ALT			PRESS ALT		
		0	5	10	0	5	10	0	5	10	0	5	10	0	5	10	0	5	10
120	0	9.5	11.1	12.8	14.4	17.1	19.8	20.1	24.1	28.1	26.6	31.9	37.2	33.4	39.8		40.3		
	10	9.8	11.5	13.3	14.9	17.7	20.5	20.8	25.0	29.1	27.5	33.0	38.4	34.5	41.1		41.7		
	15	9.9	11.7	13.5	15.1	18.0	20.9	21.2	25.4	29.6	27.9	33.5	39.1	35.1	41.8		42.4		
	20	10.1	11.9	13.7	15.4	18.3	21.2	21.5	25.8	30.1	28.4	34.0	39.7	35.7	42.5		43.0		
	30	10.4	12.2	14.1	15.8	18.8	21.8	22.1	26.6	31.0	29.2	35.1	40.9	36.7	43.8		44.3		
	40	10.6	12.5	14.4	16.2	19.3	22.4	22.7	27.2	31.8	30.0	36.0	42.0	37.7	44.9		45.5		
110	0	8.8	10.3	11.9	13.3	15.8	18.3	18.5	22.2	25.9	24.5	29.4	34.3	30.8	36.8	42.8	37.3		
	10	9.1	10.7	12.3	13.8	16.3	18.9	19.2	23.0	26.8	25.3	30.4	35.4	31.9	38.1	44.3	38.6		
	15	9.2	10.9	12.5	14.0	16.6	19.3	19.5	23.4	27.2	25.7	30.9	36.0	32.4	38.7	45.0	39.2		
	20	9.4	11.0	12.7	14.2	16.9	19.6	19.8	23.8	27.7	26.1	31.4	36.6	32.9	39.3	45.7	39.9		
	30	9.6	11.3	13.1	14.6	17.4	20.1	20.4	24.5	28.5	26.9	32.3	37.7	33.9	40.5	47.1	41.1		
	40	9.8	11.6	13.4	15.0	17.8	20.6	20.9	25.1	29.2	27.6	33.2	38.7	34.8	41.6	48.4	42.2		
100	0	8.1	9.5	10.9	12.2	14.5	16.8	17.0	20.3	23.6	22.3	26.8	31.3	28.1	33.7	39.3	34.2	40.7	
	10	8.4	9.8	11.3	12.6	15.0	17.3	17.6	21.0	24.4	23.1	27.7	32.4	29.1	34.9	40.6	35.4	42.1	
	15	8.5	10.0	11.5	12.9	15.2	17.6	17.9	21.4	24.8	23.5	28.2	32.9	29.6	35.4	41.3	36.0	42.8	
	20	8.7	10.2	11.7	13.1	15.5	17.9	18.2	21.7	25.2	23.9	28.7	33.4	30.1	36.0	41.9	36.5	43.5	
	30	8.9	10.4	12.0	13.4	15.9	18.4	18.7	22.3	26.0	24.6	29.5	34.4	31.0	37.1	43.2	37.6	44.8	
	40	9.1	10.7	12.3	13.7	16.3	18.9	19.1	22.9	26.7	25.2	30.3	35.3	31.8	38.1	44.4	38.6	46.0	
90	0	7.4	8.7	10.0	11.1	13.2	15.2	15.4	18.4	21.3	20.2	24.2	28.2	25.4	30.5	35.5	30.9	36.9	43.0
	10	7.7	9.0	10.3	11.5	13.6	15.7	15.9	19.0	22.1	20.9	25.0	29.2	26.3	31.5	36.8	32.0	38.2	44.4
	15	7.8	9.2	10.5	11.7	13.9	16.0	16.2	19.3	22.4	21.2	25.5	29.7	26.7	32.0	37.4	32.5	38.8	45.2
	20	7.9	9.3	10.7	11.9	14.1	16.3	16.5	19.6	22.8	21.6	25.9	30.2	27.1	32.6	38.0	33.0	39.4	45.9
	30	8.1	9.5	11.0	12.2	14.5	16.7	16.9	20.2	23.5	22.2	26.6	31.1	27.9	33.5	39.1	34.0	40.6	47.2
	40	8.3	9.7	11.2	12.5	14.8	17.1	17.4	20.7	24.1	22.8	27.3	31.9	28.7	34.4	40.2	34.9	41.7	48.5
80	0	6.8	7.9	9.0	10.0	11.9	13.7	13.8	16.4	19.0	18.0	21.5	25.1	22.6	27.1	31.6	27.4	32.9	38.4
	10	7.0	8.2	9.3	10.4	12.3	14.1	14.3	17.0	19.7	18.6	22.3	25.9	23.3	28.0	32.7	28.4	34.0	39.7
	15	7.1	8.3	9.5	10.6	12.5	14.4	14.5	17.3	20.0	18.9	22.7	26.4	23.7	28.5	33.3	28.9	34.6	40.3
	20	7.2	8.4	9.6	10.7	12.7	14.6	14.8	17.6	20.4	19.2	23.0	26.8	24.1	29.0	33.8	29.3	35.2	41.0
	30	7.4	8.7	9.9	11.0	13.0	15.0	15.2	18.1	21.0	19.8	23.7	27.6	24.8	29.8	34.8	30.2	36.2	42.2
	40	7.5	8.8	10.1	11.3	13.3	15.4	15.5	18.5	21.5	20.3	24.3	28.3	25.5	30.6	35.7	31.0	37.2	43.3
70	0	6.1	7.1	8.1	9.0	10.5	12.1	12.2	14.5	16.7	15.8	18.8	21.9	19.7	23.6	27.5	23.8	28.6	33.4
	10	6.3	7.3	8.4	9.3	10.9	12.5	12.6	15.0	17.3	16.3	19.5	22.6	20.4	24.4	28.4	24.7	29.6	34.5
	15	6.4	7.4	8.5	9.4	11.1	12.7	12.8	15.2	17.6	16.6	19.8	23.0	20.7	24.8	28.9	25.1	30.1	35.1
	20	6.5	7.6	8.6	9.6	11.3	13.0	13.0	15.5	17.9	16.9	20.1	23.4	21.0	25.2	29.4	25.5	30.6	35.7
	30	6.7	7.8	8.9	9.8	11.6	13.3	13.4	15.9	18.4	17.4	20.7	24.1	21.7	26.0	30.3	26.2	31.5	36.7
	40	6.8	7.9	9.0	10.0	11.8	13.6	13.7	16.3	18.9	17.8	21.2	24.7	22.2	26.6	31.1	26.9	32.3	37.7

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

Adjusted Brake Energy Per Brake (Millions of Foot Pounds)
No Reverse Thrust

		REFERENCE BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS)										
EVENT		10	12	14	16	18	20	22	24	26	28	30
RTO MAX MAN		10.0	12.0	14.0	16.0	18.0	20.0	22.0	24.0	26.0	28.0	30.0
LANDING	MAX MAN	8.6	10.5	12.4	14.3	16.2	18.1	20.0	22.0	23.9	25.8	27.7
	MAX AUTO	8.5	10.3	12.1	13.9	15.7	17.5	19.3	21.1	22.9	24.7	26.6
	AUTOBRAKE 4	8.4	10.2	11.9	13.6	15.3	17.0	18.7	20.4	22.1	23.8	25.6
	AUTOBRAKE 3	8.3	9.9	11.5	13.1	14.7	16.3	17.9	19.5	21.1	22.7	24.3
	AUTOBRAKE 2	8.1	9.6	11.1	12.6	14.1	15.5	17.0	18.5	19.9	21.4	22.8
	AUTOBRAKE 1	7.9	9.3	10.7	12.0	13.3	14.6	15.9	17.2	18.5	19.8	21.1

Two Engine Reverse

		REFERENCE BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS)										
EVENT		10	12	14	16	18	20	22	24	26	28	30
RTO MAX MAN		10.0	12.0	14.0	16.0	18.0	20.0	22.0	24.0	26.0	28.0	30.0
LANDING	MAX MAN	7.6	9.2	10.9	12.6	14.4	16.1	17.9	19.7	21.4	23.2	24.8
	MAX AUTO	5.8	7.2	8.6	10.0	11.5	12.9	14.4	15.9	17.3	18.8	20.3
	AUTOBRAKE 4	4.5	5.7	6.8	8.0	9.1	10.3	11.5	12.7	14.0	15.2	16.5
	AUTOBRAKE 3	3.3	4.2	5.1	5.9	6.9	7.8	8.7	9.7	10.7	11.7	12.7
	AUTOBRAKE 2	2.3	2.9	3.5	4.1	4.8	5.5	6.2	6.9	7.6	8.3	9.0
	AUTOBRAKE 1	1.7	2.1	2.4	2.8	3.2	3.6	4.0	4.5	4.9	5.4	5.9

ADVISORY INFORMATION

Recommended Brake Cooling Schedule

Cooling Time (Minutes)

<table>
<tr><td></td><td colspan="9">ADJUSTED BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS)</td></tr>
<tr><td></td><td>8 & BELOW</td><td>9</td><td>10</td><td>12</td><td>14</td><td>16</td><td>17</td><td>18 TO 27</td><td>28 & ABOVE</td></tr>
<tr><td>INFLIGHT GEAR DOWN</td><td rowspan="2">NO SPECIAL PROCEDURE REQUIRED</td><td>1</td><td>2</td><td>4</td><td>5</td><td>7</td><td>7</td><td rowspan="2">CAUTION</td><td rowspan="2">FUSE PLUG MELT ZONE</td></tr>
<tr><td>GROUND</td><td>10</td><td>20</td><td>38</td><td>51</td><td>62</td><td>66</td></tr>
<tr><td>BTMS</td><td>UP TO 2</td><td>2</td><td>2</td><td>3</td><td>3</td><td>4</td><td>5</td><td>5 TO 8</td><td>8 & ABOVE</td></tr>
</table>

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 0.65 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 8 minutes.

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

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

ENGINE INOP

Initial Max Continuous EPR

Based on engine bleed for one pack on

PRESSURE ALTITUDE (FT)		CRUISE MACH NUMBER		
		.72	.76	.80
41000	EPR	1.81	1.80	1.79
	MAX TAT (SAT)	-23 (-46)	-20 (-46)	-17 (-46)
	EPR CORR	0.04	0.04	0.04
39000	EPR	1.81	1.80	1.79
	MAX TAT (SAT)	-23 (-46)	-20 (-46)	-17 (-46)
	EPR CORR	0.04	0.04	0.04
37000	EPR	1.82	1.80	1.79
	MAX TAT (SAT)	-23 (-46)	-20 (-46)	-17 (-46)
	EPR CORR	0.04	0.04	0.04
35000	EPR	1.81	1.80	1.79
	MAX TAT (SAT)	-21 (-44)	-18 (-44)	-15 (-44)
	EPR CORR	0.05	0.05	0.05
33000	EPR	1.80	1.79	1.78
	MAX TAT (SAT)	-16 (-40)	-14 (-41)	-11 (-41)
	EPR CORR	0.05	0.05	0.05
31000	EPR	1.79	1.78	1.77
	MAX TAT (SAT)	-12 (-36)	-9 (-36)	-6 (-36)
	EPR CORR	0.05	0.05	0.05

Decrease EPR by the EPR CORR for every 10°C above the MAX TAT shown.

ENGINE INOP

Max Continuous EPR
41000 FT to 22000 FT Pressure Altitudes
Based on engine bleed for one pack on and anti-ice off

PRESSURE ALTITUDE (FT)		KIAS					MACH NUMBER					
		180	200	220	240	260	.70	.72	.74	.76	.78	.80
41000	EPR		1.82	1.81	1.79		1.82	1.81	1.81	1.80	1.80	1.79
	MAX TAT		-25	-21	-17		-24	-23	-22	-20	-19	-17
	EPR CORR		0.04	0.04	0.04		0.04	0.04	0.04	0.04	0.04	0.04
39000	EPR		1.83	1.82	1.80	1.78	1.82	1.81	1.81	1.80	1.80	-1.79
	MAX TAT		-27	-23	-19	-15	-24	-23	-22	-20	-19	-17
	EPR CORR		0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
37000	EPR		1.84	1.82	1.81	1.79	1.82	1.82	1.81	1.80	1.80	1.79
	MAX TAT		-29	-25	-21	-17	-24	-23	-22	-20	-19	-17
	EPR CORR		0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
35000	EPR		1.84	1.82	1.81	1.80	1.81	1.81	1.80	1.80	1.79	1.79
	MAX TAT		-28	-24	-21	-17	-22	-21	-19	-18	-16	-15
	EPR CORR		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
33000	EPR		1.83	1.82	1.81	1.80	1.81	1.80	1.79	1.79	1.78	1.78
	MAX TAT		-25	-22	-19	-15	-18	-16	-15	-14	-12	-11
	EPR CORR		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
31000	EPR		1.83	1.82	1.81	1.79	1.80	1.79	1.78	1.78	1.77	1.77
	MAX TAT		-22	-19	-16	-13	-13	-12	-10	-9	-8	-6
	EPR CORR		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
29000	EPR		1.82	1.81	1.80	1.79	1.79	1.78	1.77	1.77	1.76	1.75
	MAX TAT		-19	-16	-13	-10	-9	-7	-6	-5	-3	-2
	EPR CORR		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
27000	EPR		1.82	1.81	1.80	1.79	1.78	1.77	1.76	1.76	1.75	1.74
	MAX TAT		-16	-13	-11	-8	-5	-3	-2	0	1	3
	EPR CORR		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
25000	EPR	1.82	1.81	1.80	1.80	1.79	1.77	1.76	1.75	1.75	1.74	1.73
	MAX TAT	-15	-13	-10	-8	-5	0	1	3	4	6	7
	EPR CORR	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
22000	EPR	1.81	1.80	1.80	1.79	1.78	1.75	1.74	1.73	1.72	1.72	
	MAX TAT	-10	-8	-6	-3	-1	6	8	9	11	12	
	EPR CORR	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	

Decrease EPR by the EPR CORR for every 10°C above the MAX TAT shown.

EPR Adjustments for Engine Bleed

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)				
	0	10	20	30	40
PACKS OFF	0.01	0.01	0.01	0.01	0.01
ENGINE ANTI-ICE ON	-0.01	-0.01	-0.01	-0.01	-0.02
ENGINE & WING ANTI-ICE ON	-0.03	-0.03	-0.03	-0.05	-0.08

ENGINE INOP

Max Continuous EPR

20000 FT to Sea Level Pressure Altitudes

Based on engine bleed for one pack on and anti-ice off

PRESSURE ALTITUDE (FT)		KIAS					MACH NUMBER					
		180	200	220	240	260	.70	.72	.74	.76	.78	.80
20000	EPR	1.80	1.80	1.79	1.78	1.77	1.73	1.72	1.71	1.71		
	MAX TAT	-6	-5	-3	0	2	11	12	14	15		
	EPR CORR	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06		
18000	EPR	1.79	1.78	1.78	1.77	1.76	1.71	1.70	1.69			
	MAX TAT	-3	-1	1	3	5	15	17	18			
	EPR CORR	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06			
16000	EPR	1.78	1.77	1.76	1.75	1.74	1.69					
	MAX TAT	0	2	4	6	8	19					
	EPR CORR	0.06	0.06	0.06	0.06	0.06	0.06					
14000	EPR	1.76	1.75	1.75	1.74	1.73						
	MAX TAT	4	6	7	9	11						
	EPR CORR	0.06	0.06	0.06	0.06	0.06						
12000	EPR	1.75	1.74	1.73	1.72	1.71						
	MAX TAT	8	9	11	12	14						
	EPR CORR	0.06	0.06	0.06	0.06	0.06						
10000	EPR	1.73	1.72	1.71	1.70	1.69						
	MAX TAT	11	13	14	16	17						
	EPR CORR	0.06	0.06	0.06	0.06	0.06						
5000	EPR	1.68	1.67	1.67	1.66	1.65						
	MAX TAT	20	21	23	24	26						
	EPR CORR	0.06	0.06	0.06	0.06	0.06						
1500	EPR	1.63	1.62	1.62	1.61	1.60						
	MAX TAT	27	28	29	30	32						
	EPR CORR	0.06	0.06	0.06	0.06	0.06						
0	EPR	1.61	1.60	1.60	1.59	1.58						
	MAX TAT	29	30	32	33	34						
	EPR CORR	0.06	0.06	0.06	0.06	0.06						

Decrease EPR by the EPR CORR for every 10°C above the MAX TAT shown.

EPR Adjustments for Engine Bleed

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)				
	0	10	20	30	40
PACKS OFF	0.01	0.01	0.01	0.01	0.01
ENGINE ANTI-ICE ON	-0.01	-0.01	-0.01	-0.01	-0.02
ENGINE & WING ANTI-ICE ON	-0.03	-0.03	-0.03	-0.05	-0.08

ENGINE INOP

MAX CONTINUOUS THRUST

Driftdown Speed/Level Off Altitude
100 ft/min residual rate of climb
Includes APU fuel burn

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
120	115	258	20100	19000	17500
110	106	248	22600	21600	20500
100	96	237	25100	24300	23300
90	87	225	27800	27000	26200
80	77	213	30700	30000	29200
70	67	200	33900	33200	32500
60	58	188	37300	36700	36100

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
277	257	240	225	211	200	189	179	171	163	156
552	513	479	449	423	400	379	360	343	327	313
825	767	717	673	634	600	568	540	515	492	471
1096	1020	954	896	845	800	759	722	688	657	629
1365	1272	1191	1120	1056	1000	949	903	861	823	788
1635	1524	1428	1343	1267	1200	1139	1084	1034	989	947
1905	1777	1664	1566	1478	1400	1329	1265	1207	1154	1106
2176	2030	1902	1789	1689	1600	1519	1446	1380	1320	1265
2448	2284	2140	2013	1900	1800	1709	1627	1553	1485	1422

Driftdown/Cruise Fuel and Time

AIR DIST (NM)	FUEL REQUIRED (1000 KG)							TIME (HR:MIN)
	WEIGHT AT START OF DRIFTDOWN (1000 KG)							
	60	70	80	90	100	110	120	
200	1.1	1.2	1.3	1.5	1.6	1.7	1.8	0:34
400	2.3	2.6	2.9	3.2	3.5	3.8	4.1	1:06
600	3.5	3.9	4.4	4.9	5.3	5.8	6.3	1:38
800	4.6	5.2	5.8	6.5	7.1	7.8	8.4	2:10
1000	5.7	6.5	7.3	8.1	8.9	9.7	10.5	2:41
1200	6.8	7.7	8.7	9.6	10.6	11.6	12.6	3:12
1400	7.8	8.9	10.1	11.2	12.3	13.4	14.6	3:43
1600	8.9	10.1	11.4	12.7	14.0	15.3	16.6	4:14
1800	9.9	11.3	12.8	14.2	15.6	17.1	18.6	4:46

Includes APU fuel burn.
Driftdown at optimum driftdown speed and cruise at Long Range Cruise speed.

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
120	15100	12200	8800
115	16900	14400	11000
110	18600	16500	13500
105	20200	18400	15900
100	21700	20300	18200
95	23200	21900	20300
90	24800	23500	22000
85	26300	25200	23800
80	27900	26800	25600
75	29500	28500	27300
70	31300	30300	29200
65	33100	32200	31100
60	35000	34100	33200

With engine anti-ice on, decrease altitude capability by 1000 ft.
With engine and wing anti-ice on, decrease altitude capability by 3400 ft.

ENGINE INOP

MAX CONTINUOUS THRUST

Long Range Cruise Control

WEIGHT (1000 KG)		PRESSURE ALTITUDE (1000 FT)								
		10	15	17	19	21	23	25	27	29
120	EPR	1.57	1.66	1.71						
	MACH	.572	.613	.631						
	KIAS	318	310	308						
	FF/ENG	4427	4390	4400						
110	EPR	1.53	1.62	1.66	1.71					
	MACH	.554	.595	.612	.630					
	KIAS	308	301	298	295					
	FF/ENG	4072	4017	4010	4019					
100	EPR	1.49	1.58	1.62	1.66	1.70	1.75			
	MACH	.535	.575	.592	.609	.627	.647			
	KIAS	296	291	288	285	283	281			
	FF/ENG	3729	3656	3640	3632	3638	3669			
90	EPR	1.46	1.54	1.57	1.61	1.65	1.70	1.74		
	MACH	.512	.554	.571	.587	.604	.623	.643		
	KIAS	284	280	277	275	272	269	267		
	FF/ENG	3390	3302	3282	3265	3257	3258	3280		
80	EPR	1.42	1.49	1.52	1.56	1.60	1.64	1.69	1.73	1.78
	MACH	.488	.529	.546	.563	.580	.598	.616	.636	.658
	KIAS	270	267	265	263	261	258	255	253	251
	FF/ENG	3055	2963	2932	2911	2894	2884	2880	2897	2950
70	EPR	1.38	1.44	1.47	1.51	1.54	1.58	1.62	1.67	1.71
	MACH	.463	.501	.518	.535	.553	.571	.588	.606	.626
	KIAS	256	252	251	250	248	246	243	241	238
	FF/ENG	2732	2626	2596	2568	2543	2527	2513	2508	2515
60	EPR	1.33	1.40	1.42	1.45	1.48	1.52	1.55	1.60	1.64
	MACH	.430	.471	.487	.503	.521	.539	.557	.575	.593
	KIAS	238	237	235	234	233	231	230	228	225
	FF/ENG	2379	2303	2266	2233	2208	2183	2163	2149	2140

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
289	266	245	228	213	200	190	181	173	165	158
579	533	492	457	427	400	381	362	346	331	317
869	800	738	686	640	600	571	544	519	496	476
1161	1067	984	914	854	800	761	725	692	662	635
1454	1336	1232	1144	1068	1000	951	906	865	828	794
1749	1606	1480	1374	1282	1200	1141	1087	1038	993	952
2045	1877	1729	1604	1496	1400	1331	1268	1210	1157	1110
2343	2149	1978	1834	1711	1600	1521	1448	1382	1322	1268
2642	2422	2228	2065	1925	1800	1711	1629	1554	1486	1425

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	2.0	0:42	1.8	0:40	1.6	0:39	1.4	0:38	1.3	0:37
400	4.1	1:19	3.7	1:16	3.4	1:13	3.2	1:10	3.0	1:08
600	6.2	1:56	5.6	1:51	5.2	1:47	4.9	1:43	4.6	1:39
800	8.2	2:34	7.6	2:27	7.0	2:21	6.6	2:16	6.3	2:10
1000	10.3	3:13	9.5	3:04	8.8	2:56	8.3	2:49	7.9	2:42
1200	12.3	3:51	11.3	3:40	10.6	3:31	10.0	3:22	9.5	3:14
1400	14.3	4:30	13.2	4:17	12.3	4:06	11.6	3:56	11.1	3:46
1600	16.2	5:10	15.0	4:55	14.0	4:41	13.2	4:29	12.6	4:18
1800	18.2	5:50	16.8	5:33	15.7	5:17	14.8	5:03	14.2	4:50

Fuel Required Adjustment (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG)					
	70	80	90	100	110	120
2	-0.2	-0.1	0.0	0.1	0.3	0.4
4	-0.4	-0.2	0.0	0.3	0.6	0.9
6	-0.5	-0.3	0.0	0.5	1.0	1.5
8	-0.8	-0.4	0.0	0.7	1.4	2.1
10	-1.0	-0.5	0.0	0.8	1.7	2.6
12	-1.2	-0.6	0.0	1.0	2.1	3.2
14	-1.4	-0.7	0.0	1.2	2.4	3.7
16	-1.6	-0.8	0.0	1.3	2.8	4.3
18	-1.8	-0.9	0.0	1.5	3.1	4.9
20	-2.0	-1.0	0.0	1.6	3.4	5.4

Includes APU fuel burn.

Holding

Flaps Up

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)							
		1500	5000	10000	15000	20000	25000	30000	35000
120	EPR	1.38	1.43	1.51	1.62	1.74			
	KIAS	260	261	262	264	266			
	FF/ENG	3940	3900	3870	3920	4090			
110	EPR	1.35	1.40	1.48	1.57	1.69			
	KIAS	249	250	251	252	254			
	FF/ENG	3620	3580	3540	3540	3650			
100	EPR	1.32	1.37	1.44	1.53	1.64	1.77		
	KIAS	237	238	239	241	242	244		
	FF/ENG	3310	3260	3210	3190	3240	3410		
90	EPR	1.29	1.33	1.40	1.48	1.58	1.70		
	KIAS	225	225	227	228	229	231		
	FF/ENG	2990	2950	2890	2860	2870	2960		
80	EPR	1.26	1.30	1.36	1.43	1.52	1.64	1.78	
	KIAS	212	213	213	215	216	217	219	
	FF/ENG	2660	2630	2580	2540	2520	2560	2720	
70	EPR	1.23	1.26	1.32	1.38	1.46	1.57	1.69	
	KIAS	197	198	199	200	201	203	204	
	FF/ENG	2330	2310	2270	2230	2200	2200	2260	
60	EPR	1.20	1.23	1.28	1.33	1.41	1.49	1.61	1.75
	KIAS	185	185	185	185	186	187	188	190
	FF/ENG	2030	2000	1960	1920	1880	1860	1880	1990

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

GEAR DOWN

210 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	1.43	1.43	1.43	1.43	1.43	1.43	1.42	1.42	1.42	1.41	1.41	1.41	1.41	1.41	1.41
50	1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.44	1.44	1.44	1.44	1.44	1.44	1.44	1.44
45	1.48	1.48	1.48	1.48	1.48	1.47	1.47	1.47	1.46	1.46	1.46	1.46	1.46	1.46	1.46
40	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.49	1.49	1.49	1.49	1.49	1.49	1.49	1.49
35	1.53	1.53	1.53	1.53	1.53	1.53	1.52	1.52	1.52	1.51	1.51	1.51	1.51	1.52	1.52
30	1.55	1.56	1.55	1.55	1.56	1.55	1.55	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54
25	1.55	1.58	1.58	1.58	1.58	1.58	1.58	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57
20	1.55	1.60	1.61	1.61	1.61	1.61	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.61
15	1.55	1.60	1.64	1.64	1.64	1.64	1.64	1.63	1.63	1.63	1.63	1.63	1.63	1.64	1.64
10	1.55	1.60	1.65	1.67	1.68	1.67	1.67	1.66	1.66	1.66	1.66	1.66	1.66	1.67	1.67
5	1.55	1.60	1.65	1.68	1.70	1.70	1.70	1.69	1.69	1.69	1.69	1.69	1.69	1.70	1.70
0	1.55	1.60	1.65	1.68	1.70	1.71	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.72	1.73
-5	1.55	1.60	1.65	1.68	1.70	1.71	1.73	1.74	1.75	1.74	1.74	1.75	1.75	1.75	1.75
-10	1.55	1.60	1.65	1.68	1.70	1.71	1.73	1.74	1.76	1.77	1.77	1.77	1.77	1.77	1.77
-15	1.55	1.60	1.65	1.68	1.70	1.71	1.73	1.74	1.76	1.77	1.78	1.79	1.79	1.79	1.79
-20	1.55	1.60	1.65	1.68	1.70	1.71	1.73	1.74	1.76	1.77	1.78	1.79	1.80	1.81	1.81
-25	1.55	1.60	1.65	1.68	1.70	1.71	1.73	1.74	1.76	1.77	1.78	1.79	1.80	1.82	1.83
-30	1.55	1.60	1.65	1.68	1.70	1.71	1.73	1.74	1.76	1.77	1.78	1.79	1.80	1.82	1.83

EPR Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)											
	0	5	10	12	16	20	24	26	28	30	32	34
PACKS OFF	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
ENGINE ANTI-ICE ON	0.00	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.02
ENGINE & WING ANTI-ICE ON	-0.01	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.03	-0.03	-0.03	-0.03	-0.04

Long Range Cruise Altitude Capability

WEIGHT (1000 KG)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
120	20500	17500	14500
115	22400	19600	16600
110	24200	21800	18600
105	26000	23800	20800
100	27800	25900	23200
95	29500	27900	25600
90	31100	29700	27900
85	32600	31400	29900
80	34200	33100	31700
75	35700	34800	33600
70	36900	36300	35400
65	38100	37500	36700
60	39400	38700	38000

GEAR DOWN

Long Range Cruise Control

WEIGHT (1000 KG)		PRESSURE ALTITUDE (1000 FT) 10	15	17	19	21	23	25	27	29	31
120	EPR	1.47	1.55	1.59	1.63						
	MACH	.458	.496	.511	.527						
	KIAS	256	252	250	248						
	FF/ENG	3331	3241	3212	3191						
110	EPR	1.44	1.52	1.55	1.59	1.63	1.67				
	MACH	.442	.479	.494	.510	.526	.542				
	KIAS	247	243	242	240	238	235				
	FF/ENG	3076	2981	2953	2926	2907	2892				
100	EPR	1.40	1.48	1.51	1.55	1.59	1.63	1.67	1.71		
	MACH	.424	.461	.476	.492	.508	.524	.540	.557		
	KIAS	236	234	233	231	229	227	225	222		
	FF/ENG	2814	2730	2697	2669	2646	2625	2611	2607		
90	EPR	1.37	1.44	1.47	1.50	1.54	1.58	1.62	1.66	1.71	1.76
	MACH	.404	.442	.457	.472	.488	.504	.520	.537	.554	.578
	KIAS	225	224	223	222	220	218	216	214	212	212
	FF/ENG	2547	2478	2445	2419	2391	2367	2345	2334	2336	2389
80	EPR	1.33	1.40	1.43	1.46	1.49	1.53	1.56	1.60	1.65	1.70
	MACH	.380	.420	.435	.450	.466	.482	.498	.515	.533	.556
	KIAS	212	212	212	211	210	208	207	205	203	203
	FF/ENG	2265	2220	2198	2166	2142	2116	2091	2071	2066	2094
70	EPR	1.29	1.35	1.38	1.41	1.44	1.47	1.51	1.55	1.59	1.64
	MACH	.357	.393	.410	.425	.441	.457	.473	.490	.511	.533
	KIAS	198	199	199	199	198	197	196	194	194	194
	FF/ENG	1990	1953	1938	1915	1893	1867	1844	1822	1823	1832
60	EPR	1.25	1.31	1.33	1.36	1.39	1.42	1.45	1.49	1.53	1.57
	MACH	.333	.366	.381	.396	.412	.429	.447	.466	.486	.507
	KIAS	185	185	185	185	185	185	185	185	185	185
	FF/ENG	1727	1693	1677	1659	1642	1627	1615	1604	1623	1597

GEAR DOWN

Long Range Cruise Enroute Fuel and Time

Ground to Air Miles Conversion

AIR DISTANCE (NM)					GROUND DISTANCE (NM)	AIR DISTANCE (NM)				
HEADWIND COMPONENT (KTS)						TAILWIND COMPONENT (KTS)				
100	80	60	40	20		20	40	60	80	100
327	292	261	237	217	200	188	178	168	160	152
661	588	525	476	435	400	376	355	336	319	304
1000	888	792	716	654	600	565	533	504	478	456
1345	1192	1060	957	873	800	753	710	671	637	607
1695	1498	1330	1199	1092	1000	941	887	838	796	758
2052	1810	1604	1443	1313	1200	1129	1064	1006	954	909
2415	2125	1879	1687	1533	1400	1317	1241	1173	1112	1059
2785	2445	2157	1933	1755	1600	1504	1417	1339	1270	1209
3162	2769	2437	2180	1976	1800	1692	1593	1505	1427	1358

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	3.7	0:51	3.3	0:49	3.0	0:47	2.7	0:45	2.4	0:43
400	7.5	1:39	6.9	1:34	6.3	1:30	5.8	1:26	5.2	1:21
600	11.3	2:28	10.4	2:20	9.5	2:13	8.8	2:07	7.9	1:59
800	15.0	3:19	13.8	3:07	12.7	2:57	11.7	2:49	10.6	2:38
1000	18.6	4:10	17.1	3:55	15.8	3:42	14.6	3:31	13.2	3:17
1200	22.0	5:03	20.4	4:44	18.9	4:28	17.5	4:14	15.8	3:56
1400	25.5	5:57	23.6	5:34	21.8	5:14	20.3	4:57	18.3	4:36
1600	28.8	6:53	26.7	6:26	24.8	6:02	23.0	5:42	20.8	5:16
1800	32.0	7:49	29.8	7:18	27.6	6:50	25.7	6:27	23.2	5:57

Fuel Required Adjustment (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG)					
	70	80	90	100	110	120
2	-0.2	-0.1	0.0	0.1	0.3	0.4
6	-0.7	-0.3	0.0	0.4	0.9	1.5
10	-1.2	-0.6	0.0	0.8	1.6	2.5
14	-1.6	-0.8	0.0	1.1	2.2	3.4
18	-2.1	-1.0	0.0	1.3	2.8	4.3
22	-2.6	-1.3	0.0	1.6	3.4	5.2
26	-3.1	-1.5	0.0	1.9	3.9	6.1
30	-3.5	-1.8	0.0	2.2	4.4	6.9
34	-4.0	-2.0	0.0	2.4	4.9	7.7

Descent at VREF30 + 80

PRESSURE ALT (1000 FT)	5	10	15	17	19	21	23	25	27	29	31	33	35
DISTANCE (NM)	12	22	31	35	39	42	46	50	54	58	62	67	71
TIME (MINUTES)	7	9	11	12	13	14	15	15	16	17	17	18	19

GEAR DOWN

Holding

Flaps Up

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)							
		1500	5000	10000	15000	20000	25000	30000	35000
120	EPR	1.32	1.37	1.44	1.52	1.63			
	KIAS	237	237	237	237	237			
	FF/ENG	3300	3250	3190	3160	3180			
110	EPR	1.30	1.34	1.41	1.49	1.59			
	KIAS	229	229	229	229	229			
	FF/ENG	3060	3020	2950	2910	2900			
100	EPR	1.28	1.31	1.38	1.45	1.55	1.66		
	KIAS	221	221	221	221	221	221		
	FF/ENG	2820	2780	2720	2670	2640	2670		
90	EPR	1.26	1.29	1.35	1.42	1.50	1.61	1.74	
	KIAS	212	212	212	212	212	212	212	
	FF/ENG	2580	2540	2490	2430	2400	2400	2480	
80	EPR	1.23	1.26	1.31	1.38	1.46	1.56	1.68	
	KIAS	203	203	203	203	203	203	203	
	FF/ENG	2340	2310	2260	2210	2170	2150	2180	
70	EPR	1.21	1.24	1.28	1.34	1.42	1.50	1.61	1.75
	KIAS	194	194	194	194	194	194	194	194
	FF/ENG	2110	2080	2040	1990	1950	1920	1920	1990
60	EPR	1.19	1.21	1.25	1.31	1.37	1.45	1.55	1.67
	KIAS	185	185	185	185	185	185	185	185
	FF/ENG	1880	1850	1810	1780	1730	1700	1700	1710

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

GEAR DOWN
ENGINE INOP

MAX CONTINUOUS THRUST

Driftdown Speed/Level Off Altitude
100 ft/min residual rate of climb
Includes APU fuel burn

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
110	104	227	4400	1600	100
100	95	219	8200	6300	3800
90	85	210	12000	10300	8300
80	76	202	15600	14400	12700
70	67	193	19200	18200	17000
60	57	184	22600	21900	21000

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
105	300		
100	4800		
95	7400	4400	
90	10200	7500	4200
85	12200	10300	7500
80	14200	12700	10700
75	16200	14800	13100
70	18000	16900	15500
65	19900	18900	17700
60	21700	20900	19900

Long Range Cruise Control

WEIGHT (1000 KG)		PRESSURE ALTITUDE (1000 FT)						
		5	7	9	11	13	15	17
100	EPR	1.63	1.67					
	MACH	.371	.381					
	KIAS	227	224					
	FF/ENG	5253	5211					
90	EPR	1.58	1.62	1.66	1.70			
	MACH	.357	.367	.378	.389			
	KIAS	218	216	214	212			
	FF/ENG	4741	4701	4670	4654			
80	EPR	1.52	1.56	1.60	1.64	1.69	1.74	
	MACH	.341	.350	.361	.373	.387	.402	
	KIAS	207	206	205	203	203	203	
	FF/ENG	4233	4178	4149	4136	4170	4227	
70	EPR	1.47	1.50	1.54	1.58	1.62	1.67	1.72
	MACH	.323	.333	.344	.357	.371	.385	.400
	KIAS	197	195	194	194	194	194	194
	FF/ENG	3745	3701	3663	3661	3672	3696	3739
60	EPR	1.41	1.44	1.48	1.51	1.55	1.60	1.65
	MACH	.304	.315	.327	.339	.353	.366	.381
	KIAS	185	185	185	185	185	185	185
	FF/ENG	3270	3249	3231	3219	3214	3217	3232

GEAR DOWN
ENGINE INOP

MAX CONTINUOUS THRUST

Long Range Cruise Diversion Fuel and Time

Ground to Air Miles Conversion

AIR DISTANCE (NM)					GROUND DISTANCE (NM)	AIR DISTANCE (NM)				
HEADWIND COMPONENT (KTS)						TAILWIND COMPONENT (KTS)				
100	80	60	40	20		20	40	60	80	100
172	151	133	119	109	100	93	87	82	77	74
347	304	269	241	219	200	187	174	164	155	147
524	459	405	362	329	300	280	262	246	232	220
703	615	541	484	439	400	373	349	328	309	293
883	772	678	606	549	500	466	436	409	386	366
1064	930	816	729	660	600	559	523	490	462	438
1247	1088	954	851	770	700	652	610	572	539	511
1431	1248	1093	974	881	800	745	696	653	615	583
1617	1408	1232	1097	991	900	839	783	734	692	655
1804	1569	1371	1220	1102	1000	932	870	816	768	727

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	2.0	0:29	1.7	0:28	1.6	0:27	1.4	0:26
200	4.0	0:55	3.6	0:53	3.4	0:51	3.2	0:48
300	6.0	1:21	5.5	1:18	5.2	1:14	5.0	1:11
400	7.9	1:48	7.4	1:44	7.0	1:38	6.8	1:33
500	9.9	2:14	9.2	2:09	8.7	2:02	8.5	1:56
600	11.8	2:41	11.0	2:35	10.5	2:26	10.2	2:18
700	13.7	3:09	12.8	3:00	12.2	2:51	11.8	2:41
800	15.6	3:36	14.6	3:27	13.9	3:15	13.5	3:04
900	17.4	4:04	16.3	3:53	15.5	3:40	15.1	3:27
1000	19.3	4:32	18.0	4:19	17.2	4:05	16.7	3:51

Fuel Required Adjustment (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG)				
	70	80	90	100	110
2	-0.2	-0.1	0.0	0.1	0.3
4	-0.4	-0.2	0.0	0.3	0.7
6	-0.7	-0.3	0.0	0.5	1.0
8	-0.9	-0.5	0.0	0.7	1.4
10	-1.1	-0.6	0.0	0.9	1.8
12	-1.4	-0.7	0.0	1.1	2.1
14	-1.6	-0.8	0.0	1.2	2.5
16	-1.8	-0.9	0.0	1.4	2.9
18	-2.0	-1.0	0.0	1.6	3.2
20	-2.3	-1.1	0.0	1.8	3.6

Includes APU fuel burn.

GEAR DOWN
ENGINE INOP

MAX CONTINUOUS THRUST

Holding
Flaps Up

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)			
		1500	5000	10000	15000
110	EPR	1.59			
	KIAS	229			
	FF/ENG	5830			
100	EPR	1.54	1.61		
	KIAS	221	221		
	FF/ENG	5310	5320		
90	EPR	1.50	1.56	1.68	
	KIAS	212	212	212	
	FF/ENG	4820	4810	4860	
80	EPR	1.45	1.51	1.62	1.74
	KIAS	203	203	203	203
	FF/ENG	4360	4330	4330	4440
70	EPR	1.41	1.46	1.56	1.67
	KIAS	194	194	194	194
	FF/ENG	3920	3870	3840	3880
60	EPR	1.36	1.41	1.49	1.60
	KIAS	185	185	185	185
	FF/ENG	3480	3430	3390	3380

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

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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 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

The Reference Speed table contains flaps 30, 25 and 20 landing speeds for a given weight.

Advisory Information

Normal Configuration Landing Distance

Tables are provided as advisory information for normal configuration landing distance on dry runways and slippery runways with good, medium, and poor reported braking action. These values are actual landing distances and do not include the 1.67 regulatory factor. Therefore, they cannot be used to determine the dispatch required landing field length.

To use these tables, 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 conservative to add the effects of slope and inoperative reversers when using the autobrake system.

Non-normal Configuration Landing Distance

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

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

Recommeded Brake Cooling Schedule

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

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

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

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

The recommended cooling time is found in the final table by entering with the adjusted brake energy per brake 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. Cruise is continued at level off altitude and Long Range Cruise speed.

To determine fuel required, enter the Ground to Air Miles Conversion table with the desired ground distance and adjust for anticipated winds to obtain air distance to destination. Then enter the Driftdown/Cruise Fuel and Time table with air distance and weight at start of driftdown to determine fuel and time required. If altitudes other than the level off altitude 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.

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.

Maneuvers — Chapter Man
Table of Contents — Section 0

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General

Non-Normal Maneuvers and Flight Patterns are included for training and review purposes.

Non-Normal Maneuvers

Flight crews are expected to do non-normal maneuvers from memory.

Flight Patterns

Flight patterns are found in Ops Manual Part D Flight Crew Training Profiles.

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Approach to Stall Recovery

The following is immediately accomplished at the first indication of stall buffet or stick shaker.

<table>
<tr><th>Pilot Flying</th><th>Pilot Monitoring</th></tr>
<tr><td>• Advance thrust levers to maximum thrust*
• Smoothly adjust pitch attitude** to avoid ground contact or obstacles
• Level the wings (do not change flaps or landing gear configuration)
• Retract the speedbrakes</td><td rowspan="2">• Verify maximum thrust
• Monitor altitude and airspeed
• Call out any trend toward terrain contact
• Verify all required actions have been completed and call out any omissions</td></tr>
<tr><td>When ground contact is no longer a factor:
• Adjust pitch attitude to accelerate while minimizing altitude loss
• Return to a speed appropriate for the configuration</td></tr>
</table>

Note: * If an approach to stall is encountered with the autopilot engaged, apply maximum thrust and allow the airplane to return to the normal airspeed.

Note: **At high altitude, it may be necessary to descend to accelerate.

Note: If autopilot response is not acceptable, it should be disengaged.

Pilot Induced Roll Oscillation

Pilot Induced Oscillations (PIO) are inadvertent, sustained oscillations of the airplane resulting from interactions between the aircraft and control inputs by the pilot. They are often associated with tasks where the pilot is attempting to precisely and quickly accomplish a flight maneuver (such as the final phase of landing). In a fully developed lateral PIO, pilot control wheel inputs will be out of phase with the airplane roll response.

Flight crews should be aware of the potential for pilot induced roll oscillations when using high rate, high magnitude, rapidly reversed control wheel inputs. This potential is increased when in landing configuration with gusty wind conditions. Pilot techniques that utilize abrupt and pulsing control inputs may also contribute to these events.

The following action should be accomplished immediately when either pilot recognizes that a PIO exists:

Pilot Flying	Pilot Monitoring
Announce the situation	
Immediately stop lateral control wheel inputs until the airplane stabilizes	Verify appropriate pilot response
Initiate go-around if oscillations do not diminish or if the aircraft is not in a position from which a safe landing can be made	Recommend go-around if airplane is not stabilized for landing

Rejected Takeoff

The captain has the sole responsibility for the decision to reject the takeoff. The decision must be made in time to start the rejected takeoff maneuver by V1. If the decision is to reject the takeoff, the captain must clearly announce "REJECT," immediately start the rejected takeoff maneuver, and assume control of the airplane. If the first officer is making the takeoff, the first officer must maintain control of the airplane until the captain makes a positive input to the controls.

Prior to 80 knots the takeoff should be rejected for any of the following:

- activation of the master caution
- system failure(s)
- unusual noise or vibration
- tire failure
- abnormally slow acceleration
- takeoff configuration warning
- fire or fire warning
- engine failure
- if a side window opens
- if the airplane is unsafe or unable to fly
- predictive windshear warning

Above 80 knots and prior to V1, the takeoff should be rejected for any of the following:

- fire or fire warning
- engine failure
- if the airplane is unsafe or unable to fly.
- predictive windshear warning

During the takeoff, the crew member observing the non-normal situation will immediately call it out as clearly as possible.

<table>
<tr><th>Captain</th><th>First Officer</th></tr>
<tr><td>Without delay:
Simultaneously close the thrust levers, disengage the autothrottles, and apply maximum manual wheel brakes or verify operation of RTO autobrake.
If RTO autobrake is selected, monitor system performance and apply manual wheel brakes if the autobrake disarm or deceleration is not adequate.
Raise SPEEDBRAKE lever.
Apply the maximum amount of reverse thrust consistent with conditions.
Continue maximum braking until certain the airplane will stop on the runway.</td><td>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 “NO SPEEDBRAKES.”
Reverse thrust applied.
Call out any omitted action items.</td></tr>
<tr><td>Field length permitting:
Initiate movement of the reverse thrust levers to reach the reverse idle detent by taxi speed.
Communicate the reject decision to the cabin crew as soon as practical.</td><td>Call "SIXTY".
Communicate the reject decision to the control tower as soon as practical.</td></tr>
<tr><td colspan="2">When the airplane is stopped, perform procedures as required.
Review Brake Cooling Schedule for brake cooling time and precautions (refer to 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 (aircraft should be stopped as close as possible to the runway centreline)
• Alerting fire equipment
• Not setting the parking brake unless passenger evacuation is necessary
• Advising the ground crew of the hot brake hazard
• Advising passengers of the need to remain seated or evacuate
• Completion of Non–Normal checklist (if appropriate) for conditions which caused the RTO</td></tr>
</table>

Terrain Avoidance

Ground Proximity Caution

Accomplish the following maneuver for any of these aural alerts*:

- CAUTION OBSTACLE
- CAUTION TERRAIN
- TERRAIN
- DON’T SINK
- GLIDESLOPE
- SINK RATE
- TOO LOW FLAPS
- TOO LOW GEAR
- TOO LOW TERRAIN
- BANK ANGLE

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

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

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

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

Note: *As installed, some repeat.

Ground Proximity Warning

Accomplish the following maneuver for any of these conditions:

- activation of the “OBSTACLE OBSTACLE PULL UP” warning
- activation of the “TERRAIN TERRAIN PULL UP” warning
- activation of the “PULL UP” warning
- other situations resulting in unacceptable flight toward terrain.

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

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

Note: Do not use flight director commands.

Note: * Maximum thrust can be obtained by advancing the thrust levers to the takeoff or go-around limit. On airplanes with EEC's operating normally, the pilot may advance the thrust levers full forward. If terrain contact is imminent, advance thrust levers full forward.

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

Traffic Avoidance

The following is accomplished immediately by recall whenever a TCAS traffic advisory (TA) or resolution advisory (RA) occurs.

WARNING: Comply with the RA if there is a conflict between the RA and air traffic control.

WARNING: Once an RA has been issued, safe separation could be compromised if current vertical speed is changed, except as necessary to comply with the RA. This is because TCAS II–to–TCAS II coordination may be in progress with the intruder aircraft, and any change in vertical speed that does not comply with the RA may negate the effectiveness of the other aircraft's compliance with the RA.

Note: If stick shaker or initial buffet occurs during the maneuver, immediately accomplish the APPROACH TO STALL RECOVERY procedure.

Note: If high speed buffet occurs during the maneuver, relax pitch force as necessary to reduce buffet, but continue the maneuver.

G-BYAD through G-OOBJ, G-OOOZ through SE-RFP
Note: Do not use flight director pitch commands until clear of conflict.

G-OOOX
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 1,000 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)

G-CPEU through G-OOBH

PWS Cautions

For predictive windshear caution alert: (“MONITOR RADAR DISPLAY” aural)

Pilot Flying	Pilot Monitoring
• Maneuver as required to avoid the windshear.	

PWS Warnings

Predictive windshear warning during takeoff roll: (“WINDSHEAR AHEAD, WINDSHEAR AHEAD” aural)

- Prior to V1, reject takeoff.
- After V1, perform the Windshear Escape Maneuver.

Predictive windshear warning during approach: (“GO–AROUND, WINDSHEAR AHEAD” aural)

- perform Windshear Escape Maneuver or, at pilot’s discretion, perform a normal go–around.

Windshear Indications

The following are indications the airplane is encountering a windshear:

- Unacceptable flight path deviations; recognized as uncontrolled changes from normal steady state flight conditions below 1,000 feet AGL, in excess of any of the following:
  - 15 knots indicated airspeed
  - 500 FPM vertical speed
  - 5 degrees pitch attitude
  - 1 dot displacement from the glideslope
  - unusual thrust lever position for a significant period of time.
- Windshear Immediate-Alert Warning (two-tone siren followed by “WINDSHEAR,WINDSHEAR,WINDSHEAR”)

Windshear Encounter

Windshear encountered during takeoff roll:

- If windshear is encountered prior to V1, there may not be sufficient runway remaining to stop if an RTO is initiated at V1. At VR, rotate at a normal rate toward a 15 degree pitch attitude. Once airborne, perform the Windshear Escape Maneuver.
- If windshear is encountered near the normal rotation speed and airspeed suddenly decreases, there may not be sufficient runway left to accelerate back to normal takeoff speed. If there is insufficient runway left to stop, initiate a normal rotation at least 2,000 feet before the end of the runway even if airspeed is low. Higher than normal attitudes may be required to lift off in the remaining runway. Ensure maximum thrust is set.

Windshear encountered in flight:

- perform the Windshear Escape Maneuver.

Windshear Escape Maneuver With Flight Director Guidance

Pilot Flying	Pilot Monitoring
MANUAL FLIGHT • Disconnect autopilot. • Push either go–around switch. • Aggressively apply maximum* thrust. • Disconnect autothrottle. • Simultaneously roll wings level and rotate toward an initial pitch attitude of 15°. • Retract speedbrakes. • Follow flight director GA guidance (if available). AUTOMATIC FLIGHT • Press either go–around switch.** • Verify GA mode annunciation. • Verify thrust advances to GA power. • Retract speedbrakes. • Monitor system performance***.	• Verify maximum* thrust. • Verify all required actions have been completed and call out any omissions.
• Do not change gear or flap configuration until windshear is no longer a factor. • Monitor vertical speed and altitude. • Do not attempt to regain lost airspeed until windshear is no longer a factor.	• Monitor vertical speed and altitude. • Call out any trend toward terrain contact, descending flight path, or significant airspeed changes.

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

Note: * Maximum thrust can be obtained by advancing the thrust levers to the takeoff or go-around limit. On airplanes with EEC’s operating normally, the pilot may advance the thrust levers full forward. If terrain contact is imminent, advance thrust levers full forward.

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

WARNING: * Severe windshear may exceed the performance capability of the AFDS. The pilot flying must be prepared to disconnect the autopilot and autothrottle and fly manually.**

Checklist Instructions — Chapter CI

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General

The airplanes listed in the table below are covered in the Quick Reference Handbook. The numbers are used to distinguish data peculiar to one or more, but not all of the airplanes. Where data applies to all airplanes listed, no reference is made to individual airplane numbers.

The table permits flight crew correlation of configuration differences by Registry Number in alpha/numeric order within an operator's fleet for airplanes covered in this manual. Configuration data reflects the airplane as delivered configuration and is updated for service bulletin incorporations in conformance with the policy stated in the introduction section of this chapter.

Registry number is supplied by the national regulatory agency. Serial and tabulation numbers are supplied by Boeing.

Registry Number	Serial Number	Tabulation Number
G-BYAD	26963	NB422
G-BYAH	26966	NB426
G-BYAI	26967	NB427
G-BYAL	25626	NB430
G-BYAO	27235	NB432
G-BYAP	27236	NB433
G-BYAT	27208	NB436
G-BYAU	27220	NB437
G-BYAW	27234	NB438
G-BYAX	28834	NT431
G-BYAY	28836	NT432
G-CPEP	25268	NB322
G-CPEU	29941	NT404
G-CPEV	29943	NT406
G-OOBA	32446	NT245
G-OOBB	32447	NT246
G-OOBC	33098	NJ001
G-OOBD	33099	NJ002
G-OOBE	33100	NJ003
G-OOBF	33101	NJ004
G-OOBG	29942	NT405
G-OOBH	29944	NT407
G-OOBI	27146	NB506
G-OOBJ	27147	NB507
G-OOOX	26158	NB329
G-OOOZ	25593	NA352

Registry Number	Serial Number	Tabulation Number
SE-RFO	25623	NB428
SE-RFP	27219	NB431

Revision Transmittal Letter

To: All holders of Thomson Airways 757 Flight Crew Operations Manual (FCOM), Boeing Document Number D632N001-33BRI(TOM).

Subject: Flight Crew Operations Manual Revision.

CAUTION. Before inserting this FCOM revision check for the presence of the Evacuation Checklist. If the Evacuation Checklist is part of this QRH revision, this QRH has been completely reprinted for customer convenience due to the large number of changed pages.

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

Revision Record

No.	Revision Date	Date Filed	No.	Revision Date	Date Filed
16	September 3, 2002		17	November 15, 2002	
18	May 21, 2003		19	November 19, 2003	
20	May 25, 2004		21	November 22, 2004	
22	May 18, 2005		23	November 23, 2005	
24	May 3, 2006		25	November 21, 2006	
26	May 17, 2007		27	November 20, 2007	
28	May 15, 2008		29	November 18, 2008	
30	May 19, 2009		31	November 13, 2009	

General

The Boeing Company issues flight crew operations manual revisions to provide new or revised procedures and information. Formal revisions also incorporate appropriate information from previously issued flight crew operations manual bulletins.

The revision date is the approximate date the manual is mailed to the customer.

Formal revisions include a Transmittal Letter, a new Revision Record, Revision Highlights, and a current List of Effective Pages. Use the information on the new Revision Record and List of Effective Pages to verify the manual content.

Pages containing revised 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 NC - Normal Checklists

Section 1 - Normal Checklists

NC.1.1 - Removed "Normal Checklists" title.

NC.1.1 - Relocated flight controls step per customer request.

NC.1.1 - Added "Takeoff thrust" step per customer request.

NC.1.1 - Added logical hold dashed line per customer request.

NC.1.1 - Relocated "Flight deck door" step per customer request.

NC.1.1 - Relocated "Flight controls" step per customer request.

NC.1.1 - Added an asterisk to the "Ground equipment" response per customer request.

NC.1.2 - Added "Packs" step per customer request.

NC.1.2 - Added "Flight controls" step per customer request.

NC.1.2 - Added an asterisk to the "Cabin" response per customer request.

NC.1.2 - Removed "and checked" from "Nav aids" response step per customer request.

NC.1.2 - Added an asterisk to the "Flaps" response per customer request.

NC.1.3 - Indented steps related to qualified person not available per customer request.

Chapter NNC - Non-Normal Checklists

Section 0 - Miscellaneous

Bomb Threat

0.1 - Moved Bomb Threat from OP 3 to NNC 0 per customer request.

Ditching Preparation

0.6 - Removed bold font from Minimums.

0.6 - Added "QNH" to the Altimeter response per customer request.

0.6 - Removed "and checked" from "Nav aids" response step per customer request.

0.7 - Added an asterisk to the "Flaps" response per customer request.

Emergency Landing Preparation

0.8 - Moved Emergency landing procedure from Chapter OP, Section 6 to NNC 0 per customer request.

0.8 - Added GPWS inhibit switch information to Deferred Items.

0.8 - Added Look-Ahead GPWS inhibit switch information to Deferred Items.

Landing On A Flat Tyre

0.12 - Relocated Flat Tyre Landing procedure from OP 12 to NNC 0 per customer request.

Pilot Incapacitation

0.14 - moved Pilot Incapacitation procedure from OP 20 to NNC 0 per customer request.

Tail Strike

0.16 - Deleted "on takeoff" from the condition statement to cover the small chance of getting a tail strike on go-around.

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

AUTOMATIC UNLOCK

1.1 - Elevated AUTOMATIC UNLOCK checklist to memory item per customer request.

ACCESS DOOR(S)

1.2 - Elevated AUTOMATIC UNLOCK checklist to memory item per customer request.

Window Damage

1.7 - Deleted duplicate Do not accomplish the following checklist.

Section 2 - Air Systems

CABIN AUTOMATIC INOPERATIVE

2.4 - Added "QNH" to Altimeters response per customer request.

2.4 - Deleted "and checked" from Nav aids response per customer request.

2.5 - Added "*" to Flaps response per customer request.

ENGINE BLEED VALVE

2.6 - Revised format for readability. No technical change.

Section 3 - Anti-Ice, Rain

ADIRU PITOT

3.1 - Corrected statement to more clearly describe the failure.

WING ANTI–ICE

3.4 - Added "QNH" to Altimeters response per customer request.

3.4 - Deleted "and checked" from Nav aids response per customer request.

3.5 - Added "*" to Flaps response per customer request.

Section 6 - Electrical

AC BUS OFF

6.3 - Removed Flap indicator from list of inoperative items for both AC buses off since it is powered by the HMG through the Captain’s instrument transfer bus.

6.4,9 - Added "QNH" to Altimeters response per customer request.

6.4 - Deleted "and checked" from Nav aids response per customer request.

6.4 - Added "*" to Flaps response per customer request.

6.9 - Deleted deferred items normal checklist procedures.

6.9 - Added customer unique normal checklists.

6.9 - Deleted "and checked" from Nav aid response per customer request.

6.9 - Added "*" to Flaps response per customer request.

Section 7 - Engines, APU

Dual Engine Failure

7.2 - Revised Caution text per customer request.

7.2 - Deleted instruction per customer request.

Engine Failure or Shutdown

7.11 - Removed bold font on "Minimums" per customer request.

7.11 - Added "QNH" to the Altimeter response per customer request.

7.11 - Removed "and checked" from "Nav aids" response step per customer request.

7.11 - Added an asterisk to the "Flaps" response per customer request.

Engine In–flight Start

7.18 - Removed bold font on "Minimums" per customer request.

7.18 - Added "QNH" to the Altimeter response per customer request.

7.18 - Removed "and checked" from "Nav aids" response step per customer request.

7.18 - Added an asterisk to the "Flaps" response per customer request.

REVERSER UNLOCKED

7.25 - Removed bold font on "Minimums" per customer request.

7.25 - Added "QNH" to the Altimeter response per customer request.

7.25 - Removed "and checked" from "Nav aids" response step per customer request.

7.25 - Added an asterisk to the "Flaps" response per customer request.

Section 8 - Fire Protection

ENGINE FIRE or Severe Damage or Separation

8.4 - Removed bold font on "Minimums" per customer request.

8.4 - Added "QNH" to the Altimeter response per customer request.

8.4 - Removed "and checked" from "Nav aids" response step per customer request.

8.4 - Added an asterisk to the "Flaps" response per customer request.

CARGO FIRE

8.11 - Added "QNH" to the Altimeter response per customer request.

8.11 - Removed "and checked" from "Nav aids" response step per customer request.

8.11 - Removed Task Divider Symbol for cross-model standardization.

8.11 - Added an asterisk to the "Flaps" response per customer request.

Section 9 - Flight Controls

All Flaps and Slats Up Landing

9.2 - Added "QNH" to the Altimeter response per customer request.

9.2 - Removed "and checked" from "Nav aids" response step per customer request.

9.2 - Added an asterisk to the "Flaps" response per customer request.

AUTO SPEEDBRAKE

9.3 - Added "QNH" to the Altimeter response per customer request.

9.3 - Removed "and checked" from "Nav aids" response step per customer request.

9.3 - Added an asterisk to the "Flaps" response per customer request.

LEADING EDGE SLAT ASYMMETRY

9.8 - Reformatted step for clarity.

9.8 - Added "QNH" to the Altimeter response per customer request.

9.8 - Removed "and checked" from "Nav aids" response step per customer request.

9.8 - Added an asterisk to the "Flaps" response per customer request.

LEADING EDGE SLAT DISAGREE

9.10 - Removed bold font from Minimums.

9.10 - Added "QNH" to the Altimeter response per customer request.

9.10 - Removed "and checked" from "Nav aids" response step per customer request.

9.11 - Added an asterisk to the "Flaps" response per customer request.

RUDDER RATIO

9.11 - Removed the word "attempt" to standardize wording with other procedures that restrict the use of Autoland.

TRAILING EDGE FLAP ASYMMETRY

9.14 - Added "QNH" to the Altimeter response per customer request.

9.14 - Removed "and checked" from "Nav aids" response step per customer request.

9.15 - Added an asterisk to the "Flaps" response per customer request.

TRAILING EDGE FLAP DISAGREE

9.17 - Removed bold font from Minimums.

9.17 - Added "QNH" to the Altimeter response per customer request.

9.17 - Removed "and checked" from "Nav aids" response step per customer request.

9.17 - Added an asterisk to the "Flaps" response per customer request.

Section 10 - Flight Instruments, Displays

ALTITUDE DISAGREE

10.6 - Revised RVSM guidance in the ALTITUDE DISAGREE procedure.

Section 12 - Fuel

Engine Fuel Leak

12.6 - Removed bold font on "Minimums" per customer request.

12.6 - Added "QNH" to the Altimeter response per customer request.

12.6 - Removed "and checked" from "Nav aids" response step per customer request.

12.6 - Added an asterisk to the "Flaps" response per customer request.

Section 13 - Hydraulics

HYDRAULIC SYSTEM PRESSURE (L only)

13.5 - Removed bold font from response.

13.5 - Added "QNH" to the Altimeter response per customer request.

13.5 - Removed "and checked" from "Nav aids" response step per customer request.

13.6 - Added an asterisk to the "Flaps" response per customer request.

HYDRAULIC SYSTEM PRESSURE (R only)

13.9 - Added "QNH" to the Altimeter response per customer request.

13.9 - Removed "and checked" from "Nav aids" response step per customer request.

13.9 - Added an asterisk to the "Flaps" response per customer request.

HYDRAULIC SYSTEM PRESSURE (L and C)

13.11 - Added "QNH" to the Altimeter response per customer request.

13.11 - Removed "and checked" from "Nav aids" response step per customer request.

13.13 - Added an asterisk to the "Flaps" response per customer request.

HYDRAULIC SYSTEM PRESSURE (L and R)

13.14 - Removed E from OVERD to read OVRD.

13.16 - Added "QNH" to the Altimeter response per customer request.

13.16 - Removed "and checked" from "Nav aids" response step per customer request.

13.17 - Added an asterisk to the "Flaps" response per customer request.

HYDRAULIC SYSTEM PRESSURE (R and C)

13.18 - Deleted per customer request.

13.19 - Added per customer request.

13.19 - Added "QNH" to the Altimeter response per customer request.

13.19 - Removed "and checked" from "Nav aids" response step per customer request.

13.19 - Added an asterisk to the "Flaps" response per customer request.

Section 14 - Landing Gear

AIR/GROUND SYSTEM

14.1 - Removed bold font from response.

14.1 - Added "QNH" to the Altimeter response per customer request.

14.1 - Removed "and checked" from "Nav aids" response step per customer request.

14.1 - Added an asterisk to the "Flaps" response per customer request.

ANTISKID

14.2 - Removed bold font from response.

14.2 - Added "QNH" to the Altimeter response per customer request.

14.2 - Removed "and checked" from "Nav aids" response step per customer request.

14.2 - Added an asterisk to the "Flaps" response per customer request.

AUTOBRAKES

14.3 - Added "QNH" to the Altimeter response per customer request.

14.3 - Removed "and checked" from "Nav aids" response step per customer request.

14.3 - Added an asterisk to the "Flaps" response per customer request.

BRAKE SOURCE

14.4 - Added "QNH" to the Altimeter response per customer request.

14.4 - Removed "and checked" from "Nav aids" response step per customer request.

14.4 - Added an asterisk to the "Flaps" response per customer request.

GEAR DISAGREE

14.8 - Removed bold font from Minimums.

14.8 - Added "QNH" to the Altimeter response per customer request.

14.8 - Removed "and checked" from "Nav aids" response step per customer request.

14.8 - Added an asterisk to the "Flaps" response per customer request.

Chapter OP - Operational Procedures

Section OP 0 - Introduction

Operational Procedures Introduction

OP.OP 0.1 - Revised per customer request.

Section OP 1 - APU to Pack Takeoff

APU To Pack Takeoff

OP.OP 1.1 - Revised per customer request.

Section OP 2 - Autoland

Autoland

OP.OP 2.1 - Created new Autoland tables per customer request.

OP.OP 2.1 - Removed reference to Training Captain per customer request.

Section OP 3 - Cold Weather Operations

Cold Weather Ground Operations

OP.OP 3.1 - Created new Cold Weather Ground Operations per customer request.

Section OP 4 - Electrical Power Up

Electrical Power Up

OP.OP 4.1 - Change from a numbered step to condition text per customer request.

Section OP 6 - Flight Navigator Areas

Flight Navigator Areas

OP.OP 6.1 - Added new Operational Procedures Chapter OP, Section 10 per customer request.

Section OP 8 - MNPS Airspace (Not Prescribed Routes)

MNPS Airspace (Not Prescribed Routes)

OP.OP 8.1 - Removed "Minimum equipment required prior to entry into Flight Navigator Area" per customer request.

Section OP 10 - MNPS Diversion

MNPS Diversion

OP.OP 10.1 - Added new Operational Procedures Chapter OP, Section 17 per customer request.

OP.OP 10.1 - Revised content and renumbered from OP 16 to OP 10 per customer request,

OP.OP 10.1 - Revised content per customer request.

Section OP 11 - Navigation Requirements

Navigation Requirements Before Entry Into MNPS Airspace Or Flight Navigator Areas

OP.OP 11.1 - Added new Operational Procedures Chapter OP, Section 18 per customer request.

Section OP 12 - Packs Off Takeoff

Packs Off Takeoff

OP.OP 12.1 - Added Packs Off Takeoff procedure per customer request.

Section OP 13 - RNP10 Airspace

RNP10 Airspace

OP.OP 13.1 - Added new Operational Procedures Chapter OP, Section 22 per customer request.

OP.OP 13.1 - Change reference to 8.14 per customer request.

Section OP 14 - RVSM Airspace

RVSM Airspace

OP.OP 14.1 - Deleted reference to FLCH per customer request.

OP.OP 14.1 - Added Mode S transponder per customer request.

OP.OP 14.1 - Added information when required equipment is not serviceable prior to entry to RVSM airspace per customer request.

OP.OP 14.1 - Removed hourly log requirement per customer request.

Chapter PI-QRH - Performance Inflight - QRH

Section 11 - Advisory Information

Recommended Brake Cooling Schedule

PI-QRH.11.11 - Amended pressure altitude coverage up to 10000 ft.

Section 20 - Table of Contents

PI-QRH.TOC.20.1 - 757-200W 535E4 KG CAA moved from Section 30 to 20.

Section 20 - General

General

PI-QRH.20.1 - 757-200W 535E4 KG CAA moved from Section 30 to 20.

Section 21 - Advisory Information

Recommended Brake Cooling Schedule

PI-QRH.21.11 - Amended pressure altitude coverage up to 10000 ft.

Chapter Man - Maneuvers

Section 1 - Non–Normal Maneuvers

Rejected Takeoff

Man.1.2 - Added "if a side window opens" to rejected takeoff requirement prior to 80 knots.

Man.1.3 - Added Captain procedure to communicate the reject decision with the cabin crew per customer request.

Man.1.3 - Revised and deleted information from the Rejected Takeoff maneuver.

Man.1.3 - Deleted F/O reference to communicate the reject decision with the cabin crew per customer request.

Man.1.3 - Added information related to stopping as close as possible to the runway centerline in case of fire per customer request.

Ground Proximity Caution

Man.1.4 - Removed note related to a terrain caution per customer request.

Chapter CI - Checklist Instructions

Section 1 - Normal Checklists

Normal Checklist Operation

CI.1.1 - Added reference to procedural items being marked with an asterisk per customer request.

CI.1.1 - Revised Normal Checklist Operation per customer request.

Section 2 - Non-Normal Checklists

Non–Normal Checklist Operation

CI.2.2 - Revised information related to MEL per customer request.

CI.2.2 - Added the word "be" that was inadvertently omitted.

CI.2.3 - Removed reference to crossfeed switches per customer request.

CI.2.3 - Removed reference to ground proximity gear override switch per customer request.

CI.2.3 - Removed reference to ground proximity terrain override switch per customer request.

Non-Normal Checklist Use - Amplified

CI.2.5 - Added new section "Non-Normal Checklist Use - Amplified" per customer request.

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Checklist Instructions — Chapter CI
QRH List of Effective Pages — Section LEP

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Normal Checklist 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 that are not marked with an asterisk.

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	Pilot flying	Pilot monitoring	Both	Pilot flying*
BEFORE START	Captain	First officer	Both	Captain*
BEFORE TAXI	Captain	First officer	Both	Captain*
BEFORE TAKEOFF	Captain	First Officer	Both	Captain*
AFTER TAKEOFF	Pilot flying	Pilot monitoring	Both	Pilot monitoring*
DESCENT	Pilot flying	Pilot monitoring	Both	Pilot Monitoring*
APPROACH	Pilot flying	Pilot monitoring	Both	Pilot Monitoring*
LANDING	Pilot flying	Pilot monitoring	Both	Pilot flying
SHUTDOWN	Captain	First officer	Both	Captain*
SECURE	Captain	First officer	Both	Captain

* Some items require response from both pilots.

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."

Where a checklist item requires a response from both pilots the reader of the checklist will respond last.

In the PREFLIGHT checklist the item 'Flight Instruments' is a prompt to check the EHSI heading indication, standby compass heading, and the primary altimeters subscale setting and altitude indication for RVSM compliance. Example response:

"Heading 232, Altimeter 1004, 280 feet"

The BEFORE START checklist may be initiated before the flight deck door is closed and anti-collision light is turned ON by calling "BEFORE START CHECKLIST ABOVE THE LINE". Once all remaining items have been accomplished the checklist should be completed by calling "BEFORE START CHECKLIST BELOW THE LINE". If the checklist is initiated after all items have been accomplished call "BEFORE START CHECKLIST".

Whilst it is acceptable for PF to call "GEAR DOWN, FLAPS___, LANDING CHECKLIST", PM should only begin the LANDING checklist once the gear is down.

Checklists that contain responses marked with an asterisk may be initiated prior to the final checklist item being accomplished. In these cases, when reaching the final checklist item, the reader should announce the final item and the response should be "TO COME", e.g. when accomplishing the landing checklist the PM announces "FLAPS" and the PF will respond "TO COME". The PM will then state "FLAPS___ WILL COMPLETE THE LANDING CHECKLIST". When the flaps have reached the landing position the PM should announce "FLAPS" and the PF will respond accordingly.

Do not stow the checklist until all items are complete.

The 'stick checklist' provided on the control column is not subject to revision and must not be used.

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
- 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 the autobrake), or
- during shutdown and secure, items that could result in injury to personnel or damage to equipment if not done

Checklist Construction

When a checklist challenge does not end with “switch or lever”, then the challenge refers to system status. For example, “Landing Gear...Down”, refers to the status of the landing gear, not just the position of the lever.

When a checklist challenge ends with “switch or lever”, then the challenge refers to the position of the switch or lever. For example, “FUEL CONTROL switches...CUTOFF” refers to the position of the switches.

Non-Normal Checklist Introduction

The non-normal checklists chapter contains checklists used by the flight crew to cope with non–normal situations. The checklists are grouped in sections which match the system description chapters in Volume 2.

Most checklists correspond to an EICAS alert message. The EICAS alert message indicates a non-normal condition and is the cue to select and do the associated checklist.

Checklists without an EICAS alert message (such as Ditching Preparation) are called unannunciated checklists. Most unannunciated checklists are in the associated system section. For example, Engine Fuel Leak is in section 12, Fuel. Unannunciated checklists with no associated system are in section 0, Miscellaneous.

All checklists have condition statements. The condition statement briefly describes the situation that caused the EICAS alert message. Unannunciated checklists also have condition statements to help in understanding the reason for the checklist.

Some checklists have objective statements. The objective statement briefly describes the expected result of doing the checklist or briefly describes the reason for steps in the checklist.

Checklists can have both memory and reference items. Memory items are critical steps that must be done before reading the checklist. The last memory item is followed by a dashed horizontal line. Reference items are actions to be done while reading the checklist.

Some checklists have additional information at the end of the checklist. The additional information provides data the crew may wish to consider. The additional information does not need to be read.

Checklists that need a quick response are listed in the Quick Action Index. In each system section, Quick Action Index checklists are listed first, followed by checklists that are not in the Quick Action Index. The titles of Quick Action Index checklists are printed in **bold** type. Checklist titles in upper case (such as AUTOBRAKES) are annunciated by an EICAS alert message or other indication. Checklist titles in upper and lower case (such as Window Damage) are not annunciated.

Non–Normal Checklist Operation

Non–normal checklists start with steps to correct the situation. If needed, information for planning the rest of the flight is included. When special items are needed to configure the airplane for landing, the items are included in the Deferred Items section of the checklist. Flight patterns for some non–normal situations are located in the Maneuvers chapter and show the sequence of configuration changes.

Do not indicate the side of the failure with the first call. Only after there has been sufficient time to correctly identify the failure, should "Left” or “Right" be stated.

With the aircraft under control and when time permits an emergency should be declared with ATC.

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.

There are some situations where the flight crew must land at the nearest suitable airport. These situations include, but are not limited to, conditions where:

- the non–normal checklist includes the item "Plan to land at the nearest suitable airport."
- fire or smoke continues
- only one AC power source remains (engine or APU generator)
- any other situation determined by the flight crew to have a significant adverse effect on safety if the flight is continued.

It must be stressed that for smoke that continues or a fire that cannot be positively confirmed to be completely extinguished, the earliest possible descent, landing, and evacuation must be done.

If a smoke, fire or fumes situation becomes uncontrollable, the flight crew should consider an immediate landing. Immediate landing implies immediate diversion to a runway. However, in a severe situation, the flight crew should consider an overweight landing, a tailwind landing, an off-airport landing, or a ditching.

Checklists directing an engine shutdown must be evaluated by the captain to determine whether an actual shutdown or operation at reduced thrust is the safest course of action. Consideration must be given to the probable effects of running the engine at reduced thrust.

There are no non–normal checklists for the loss of an engine indication or automatic display of the secondary engine indications. Continue normal engine operation unless an EICAS alert message shows or a limit is exceeded.

Non–normal checklists also assume:

- During engine start and before Dispatch, the MEL must be consulted to determine if dispatch relief is available. After dispatch and before takeoff, the MEL should be consulted to determine if dispatch relief is available for subsequent sectors.
- System controls are in the normal configuration for the phase of flight before the start of the non–normal checklist.
- Aural alerts are silenced and the system is reset by the flight crew as soon as the cause of the alert is recognized.
- The EICAS message list should be 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 needed.
- Indicator lights are tested to verify suspected faults.
- Flight crew reset of a tripped fuel pump circuit breaker is prohibited. In flight, 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 condition is not recommended, unless directed by a non-normal checklist.

Non–Normal Checklist Use

If a checklist or a step in a checklist is not applicable to all airplanes, airplane effectivity information is included in the checklist. Airplane effectivity can be listed by airplane number, registry number, serial number or tabulation number. If a checklist is applicable to some but not all airplanes, airplane effectivity is centered below the checklist title. If a step in a checklist is applicable to some but not all airplanes, airplane effectivity is included above the step. If a checklist or a step in a checklist is applicable to all airplanes, airplane effectivity information is not included.

Non–normal checklist use starts when the airplane flight path and configuration are correctly established. Only a few situations need an immediate response (such as CABIN ALTITUDE or Rapid Depressurization). Usually, time is available to assess the situation before corrective action is started. All actions must then be coordinated under the captain's supervision and done in a deliberate, systematic manner. Flight path control must never be compromised.

When a non–normal situation occurs, at the direction of the pilot flying, both crewmembers do all memory items in their areas of responsibility without delay.

The pilot flying calls for the checklist when:

- the flight path is under control
- the airplane is not in a critical phase of flight (such as takeoff or landing)
- all memory items are complete.

The pilot monitoring reads aloud:

- the checklist title
- messages (if applicable)
- as much of the condition statement as needed to verify that the correct checklist has been selected
- as much of the objective statement (if applicable) as needed to understand the expected result of doing the checklist.

The pilot flying does not need to repeat this information but must acknowledge that the information was heard and understood.

For checklists with memory items, the pilot monitoring first verifies that each memory item has been done. The checklist is normally read aloud during this verification. The pilot flying does not need to respond except for items that are not in agreement with the checklist. The item numbers do not need to be read.

Non-memory items are called reference items. The pilot monitoring reads aloud the reference items, including:

- the precaution (if any)
- the response or action
- any amplifying information.

The pilot flying does not need to repeat this information but must acknowledge that the information was heard and understood. The item numbers do not need to be read.

The word "Confirm" is added to checklist items when both crewmembers must verbally agree before action is taken. During an inflight non-normal situation, verbal confirmation is required for::

- an engine thrust lever
- a fuel control switch
- an engine or APU fire switch, or a cargo fire arm switch
- a generator drive disconnect switch.

This does not apply to the Dual Engine Failure checklist.

With the airplane on the ground:

- the captain as pilot flying and first officer as pilot monitoring take action based on each crewmember's Areas of Responsibility.

With the airplane in flight:

- 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 shown on EICAS. The inoperative items, including the consequences (if any), are read aloud by the pilot monitoring. The pilot flying does not need to repeat this information but must acknowledge that the information was heard and understood.

Consequential EICAS alert messages can show as a result of a primary failure condition (such as RUDDER RATIO as a result of HYDRAULIC SYSTEM PRESSURE (L Only)) or as a result of doing a non–normal checklist (such as L PACK OFF or R PACK OFF as a result of doing the Smoke, Fire or Fumes checklist). The flight crew should do the checklists for consequential EICAS alert messages, unless the statement "Do not accomplish the following checklists:" is included. All consequential EICAS alert messages may not show while doing the primary checklist, depending on operational circumstances.

After completion of the non–normal checklist, normal procedures are used to configure the airplane for each phase of flight.

When there are no deferred items, the DESCENT, APPROACH and LANDING normal checklists are used to verify that the configuration is correct for each phase of flight.

When there are deferred items, the non-normal checklist will include the item "**Checklist Complete Except Deferred Items.**" The pilot flying is to be made aware when there are deferred items. These items are included in the Deferred Items section of the checklist and may be delayed until the usual point during descent, approach or landing.

The deferred items are read aloud by the pilot monitoring. The pilot flying or the pilot monitoring takes action based on each crewmember's area of responsibility. After moving the control, the crewmember taking the action also states the response.

When there are deferred items, the Deferred Items section of the non-normal checklist will include the Descent, Approach and Landing normal checklists. These checklists should be used instead of the usual DESCENT, APPROACH and LANDING normal checklists. If a normal checklist item is changed as a result of the non-normal situation, the changed response is printed in **bold** type. The pilot flying or the pilot monitoring responds to the deferred normal checklist items based on each crewmember's area of responsibility. However, during the deferred Landing normal checklist, the pilot flying responds to all deferred normal checklist items.

Each checklist has a checklist complete symbol at the end. The following symbol indicates that the checklist is complete:

■ ■ ■ ■

The checklist complete symbol can also be in the body of the checklist. This only occurs when a checklist divides into two or more paths. Each path can have a checklist complete symbol at the end. The flight crew does not need to continue reading the checklist after the checklist complete symbol.

After completion of each non–normal checklist, the pilot monitoring states "___ CHECKLIST COMPLETE."

Additional information at the end of the checklist is not required to be read.

The flight crew must be aware that checklists cannot be created for all conceivable situations and are not intended to replace good judgment. In some situations, at the captain's discretion, deviation from a checklist may be needed.

Non-Normal Checklist Use - Amplified

The first pilot to recognise any non-normal condition must call it out clearly and precisely. Review all caution and warning lights, and EICAS messages to positively identify the non-normal condition. The relevant checklist should be accomplished only after the non-normal condition has been positively identified.

On the ground the Captain will call for memory items, as appropriate, and the relevant checklist. The First Officer will accomplish memory items and read and do the checklist.

In the air the pilot flying will call for memory items, as appropriate, and the relevant checklist. The pilot monitoring will accomplish memory items and read and do the checklist.

In the event of an aborted engine start the First Officer must complete the memory item without delay. Subsequently the Captain will call for the relevant NNC which the First Officer will read. In the event of an engine failing to start seek engineering advice and, if appropriate, consult the MEL prior to attempting a subsequent start.

Whenever an emergency exists on the ground that is considered life threatening to persons on board, the EVACUATION checklist should be performed without delay; this may require other checklists to be discontinued at any point. Commanders should use all available sources of information when determining if an evacuation is necessary and be aware that it is likely that one or more persons may be injured in an evacuation. If an Evacuation is needed the Captain will assume the role of pilot flying, stop the aircraft and set the Parking Brake. The Captain will call "EVACUATION CHECKLIST".

The EVACUATION checklist should be read and actioned by the First Officer with the exception of the PARKING BRAKE which will be set by the Captain. The Captain will advise the cabin to evacuate.

Inflight, when a non-normal checklist requires a thrust lever to be moved, either as a memory or reference item, this should normally be accomplished by the pilot flying. The pilot flying must verbally confirm the affected thrust lever with pilot monitoring prior to action being taken. After the pilot monitoring has selected the A/T ARM switch to OFF, the pilot flying should slowly retard the affected engine's thrust lever.

Inflight, when an engine shutdown is required, pilot monitoring places a hand on and verbally identifies the fuel control switch for the engine to be shutdown. The fuel control switch must only be actioned after verbal confirmation from pilot flying.

Inflight, when activation of any fire switch is required, pilot monitoring places a hand on and verbally identifies the affected fire switch. The fire switch must only be actioned after verbal confirmation from pilot flying.

If a decision to reject the take-off is made, a maximum effort stop will be executed until it is certain that the aircraft will stop on the runway. The aircraft should be stopped as close to the runway centre line as possible. The aircraft will only be taxied clear of the runway when it is positively established that it is safe to do so.

In the event of an engine malfunction at or above V1, the take-off should be continued. Pilot monitoring will call the malfunction using the terms "Engine failure" or "Engine fire" as appropriate, without specifying which engine.

If additional climb performance is required on a derated thrust and/or assumed temperature reduced thrust take-off, the thrust lever of the operating engine may be advanced to full rated thrust, provided the aircraft is airborne, the IAS is V2 or greater, and no directional control difficulties are encountered. This guidance will ensure protection against minimum control speed.

Confirmation of which engine has failed and the nature of the failure will be completed at a safe height (minimum 400' agl), followed by memory items as appropriate. When flaps have been retracted the appropriate non-normal checklist will be completed, followed by the after takeoff checklist.

An engine failure procedure is produced for every runway and requires either climbing straight ahead or an Emergency Turn. When an engine failure procedure involves a deviation from the SID, ATC must be informed.

When an emergency turn is required the flaps should be retracted when:

- All close in and radius limited turns are completed, and
- At or above single engine minimum flap retraction altitude.

When actioning the CABIN ALTITUDE or RAPID DEPRESSURISATION checklist:

- Each pilot will immediately don his oxygen mask and establish crew communications
- The pilot monitoring will action all memory items on the overhead panel.

If cabin altitude is uncontrollable, the pilot flying will announce "Emergency Descent" and the pilot monitoring will:

- Set code 7700 on the transponder
- Advise ATC
- Obtain the area altimeter setting and check MFA
- Ensure that all other memory items are complete.

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

2 Cabin altitude MODE SELECT . . . . .MAN

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

4 FUEL CONTROL switches (both) . . . . CUTOFF

5 Advise the cabin to evacuate.

6 Advise the tower.

7 Engine and APU
fire switches (all) . . . . .Override and pull

8 **If** an engine or APU fire warning occurs:

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

■ ■ ■ ■