737
Quick Reference Handbook

Quick Action Index

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PREFLIGHT

Oxygen. . . . . Tested, 100%
Navigation transfer
and display switches. . . . . NORMAL, AUTO
Window heat. . . . . ON
Pressurization mode
selector. . . . . AUTO
Flight instruments. . . . . Heading ___, Altimeter ___
Parking brake. . . . . Set
Engine start levers. . . . . CUTOFF

BEFORE START

Flight deck door . . . . Closed and locked

Fuel . . . . ___ KGS, Pumps ON

Passenger signs . . . . ___

Windows . . . . Locked

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

Gross weight. . . . . CDU___, OFP___

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

CDU preflight. . . . . Completed

Rudder and aileron trim . . . . Free and 0

Taxi and takeoff briefing . . . . Completed

Anti collision light. . . . . ON

BEFORE TAXI

Generators. . . . . On

Probe heat . . . . ON

Anti-ice. . . . . ___

Isolation valve . . . . AUTO

Engine start switches. . . . . CONT

Recall . . . . Checked

Autobrake . . . . RTO

Flaps . . . . __, Green Light

Engine start levers . . . . IDLE detent

Flight controls. . . . . Checked

Ground equipment . . . . Clear

BEFORE TAKEOFF

Flaps . . . . ___, Green light

Stabilizer trim . . . . ___ Units

AFTER TAKEOFF

Engine bleeds . . . . ON

Packs . . . . AUTO

Landing gear . . . . UP and OFF

Flaps . . . . UP, No lights

DESCENT

Pressurization . . . . LAND ALT ___

Recall . . . . Checked

Autobrake . . . . ___

Landing data . . . . VREF ___, Minimums ___

Approach briefing . . . . Completed

APPROACH

Altimeters . . . . ___

LANDING

Engine start switches . . . . CONT

Speedbrake . . . . ARMED

Landing gear . . . . Down

Flaps . . . . ___, Green light

SHUTDOWN

Fuel pumps . . . . OFF

YF804 - YT197
(SB Changes YB521 - YF803)
Probe heat . . . . AUTO

(SB Changes YB521 - YF803)
Probe heat . . . . OFF

Hydraulic panel . . . . Set

Flaps . . . . UP

Parking brake . . . . ___

Engine start levers . . . . CUTOFF

Weather radar . . . . Off

SECURE

IRSs . . . . .OFF

Emergency exit lights. . . . . .OFF

Window heat . . . . .OFF

Packs . . . . .OFF

EFB. . . . . .OFF

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Emergency Descent

Condition: One or more of these occur:
- Cabin altitude cannot be controlled
- A rapid descent is needed.

1 Announce the emergency descent. The pilot flying will advise the cabin crew, on the PA system, of impending rapid descent. The pilot monitoring will advise ATC and obtain the area altimeter setting.

2 Passenger signs . . . . ON

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

4 ENGINE START switches (both) . . . . CONT

5 Thrust levers (both) . . . . Reduce thrust to minimum or as needed for anti-ice

6 Speedbrake . . . . .FLIGHT DETENT

If structural integrity is in doubt, limit speed as much as possible and avoid high maneuvering loads.

7 Set target speed to Mmo/Vmo.

YC074 - YC080

Caution! When gross weight is greater than 70,308 kgs, speed brake will autostow to the 50% flight detent if airspeed exceeds 320 knots. Do not override autostow function unless airspeed is less than 320 knots.

YB521 - YB544

Caution! When gross weight is greater than 64,864 kgs, speed brake will autostow to the 50% flight detent if airspeed exceeds 320 knots. Do not override autostow function unless airspeed is less than 320 knots.

▼ Continued on next page ▼

▼Emergency Descent continued▼

8 **When** approaching the level off altitude:

Smoothly lower the SPEED BRAKE lever to the DOWN detent and level off. Add thrust and stabilize on altitude and airspeed.

9 Crew oxygen regulators. . . . . Normal

Flight crew must use oxygen when cabin altitude is above 10,000 feet. To conserve oxygen, move the regulator to Normal.

10 ENGINE START switches (both) . . . . . .As needed

11 The new course of action is based on weather, oxygen, fuel remaining and available airports. Use of long range cruise may be needed.

■ ■ ■ ■

Ditching

Condition: Airplane ditching and evacuation are needed.

1 Send distress signals. Determine position, course, speed, altitude, situation, intention, time and position of intended touchdown and transmit mayday. Report type of aircraft and request intercept.

2 Alert the cabin crew to prepare for ditching and seat passengers as far forward as possible.

3 Burn off fuel to reduce touchdown speed and increase buoyancy.

4 Plan to touch down on the windward side and parallel to waves and swells.

5 Plan a flaps 40 landing unless another configuration is needed.

6 Set VREF 40.

7 Do **not** arm the autobrake.

8 Do **not** accomplish the normal landing checklist.

9 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization. . . . . LAND ALT ___

Recall . . . . Checked

Autobrake . . . . **OFF**

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

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ___

▼ Continued on next page ▼

▼Ditching continued▼

Below 5000 feet

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

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

The flight deck chime for an incoming call from the cabin crew is unavailable.

Passenger signs . . . . .ON

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

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

Pressurization mode selector . . . . .MAN

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

This prevents water from entering the airplane.

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

APU switch . . . . OFF

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

GROUND PROXIMITY TERR INHIBIT switch . . . . TERR INHIBIT

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

Confirm that passenger cabin preparations are complete.

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

Transmit all pertinent information regarding final ditching position.

▼ Continued on next page ▼

After Impact Procedure Review

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

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

Start the evacuation.

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

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

Ditching Final

LANDING GEAR lever. . . . . UP and OFF

Flaps . . . . ___, Green light

At **500 feet**, advise the cabin crew that ditching is imminent.

At **50 feet**, advise the cabin crew to brace for impact.

Maintain airspeed at VREF. Flare the airplane to achieve the minimum rate of descent at touchdown. Maintain 200-300 fpm rate of descent until the start of the flare.

At flare, rotate smoothly to a touchdown attitude of 10-12°. Maintain airspeed and rate of descent with thrust.

At touchdown, reduce thrust to idle.

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AUTO
UNLK

AUTOMATIC UNLOCK

Condition: The correct emergency access code is entered.

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

1 FLT DK DOOR lock selector . . . . . Rotate to DENY and hold for 1 second

■ ■ ■ ■

CARGO DOOR

FWD CARGO | AFT CARGO

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

1 Choose one:

◆Pressurization is **normal**:

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

■ ■ ■ ■

◆Pressurization is **not** normal:

►►**Go to step 2**

2 Don oxygen masks.

3 Establish crew communications.

4 Passenger signs . . . . .ON

5 Choose one:

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

►►**Go to step 6**

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

Do **not** continue the climb.

Reset the FLT ALT indicator to the actual airplane altitude.

►►**Go to step 6**

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

▼ **Continued on next page** ▼

▼CARGO DOOR continued▼

7 Choose one:

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

►►**Go to step 8**

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

►►**Go to step 10**

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

►►**Go to step 12**

8 Descend to 9000 feet.

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

►►**Go to step 15**

10 Descend to the minimum safe altitude.

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

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

►►**Go to step 15**

12 Descend to the minimum safe altitude.

13 Pressurization mode selector . . . . MAN

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

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

15 Plan to land at the nearest suitable airport.

▼ Continued on next page ▼

▼CARGO DOOR continued▼

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

Oxygen masks may be removed.

■ ■ ■ ■

ELT

ELT

Condition: The emergency locator transmitter is on.

■ ■ ■ ■

NOT ARMED

EMERGENCY EXIT LIGHTS NOT ARMED

Condition: The emergency exit lights switch is not ARMED.

1 Choose one:

◆EMER EXIT LIGHTS switch is **ON**:

Individual emergency exit light batteries supply a minimum of 10 minutes of lighting.

■ ■ ■ ■

◆EMER EXIT LIGHTS switch is **OFF**:

Emergency lighting is not available.

■ ■ ■ ■

ENTRY DOOR

FWD ENTRY	AFT ENTRY

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

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

2 Choose one:

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

►►**Go to step 3**

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

Plan to land at the nearest suitable airport.

■ ■ ■ ■

3 Choose one:

◆Pressurization is **normal**:

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

■ ■ ■ ■

◆Pressurization is **not** normal:

Plan to land at the nearest suitable airport.

■ ■ ■ ■

EQUIP

EQUIPMENT DOOR

Condition: The equipment door is not closed and secure.

1 Choose one:

◆Pressurization is **normal**:

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

■ ■ ■ ■

◆Pressurization is **not** normal:

►►**Go to step 2**

2 Don oxygen masks.

3 Establish crew communications.

4 Passenger signs . . . . .ON

5 Choose one:

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

►►**Go to step 6**

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

Do **not** continue the climb.

Reset the FLT ALT indicator to the actual airplane altitude.

►►**Go to step 6**

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

7 Choose one:

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

►►**Go to step 8**

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

►►**Go to step 10**

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

►►**Go to step 12**

▼ Continued on next page ▼

▼EQUIPMENT DOOR continued▼

8 Descend to 9000 feet.

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

►►**Go to step 15**

10 Descend to the minimum safe altitude.

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

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

►►**Go to step 15**

12 Descend to the minimum safe altitude.

13 Pressurization mode selector . . . . MAN

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

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

15 Plan to land at the nearest suitable airport.

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

Oxygen masks may be removed.

■ ■ ■ ■

LOCK FAIL

LOCK FAIL

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

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

Do **if** conditions allow a crew member to leave the seat.

1 FLIGHT DECK ACCESS SYSTEM switch . . . . OFF

Note: The door can be locked with the dead bolt.

■ ■ ■ ■

OVERWING DOOR

YB521 - YB544

LEFT OVERWING | RIGHT OVERWING

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

1 Choose one:

◆ Pressurization is **normal**:

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

■ ■ ■ ■

◆ Pressurization is **not** normal:

Plan to land at the nearest suitable airport.

■ ■ ■ ■

OVERWING DOOR

YC074 - YT197

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

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

1 Choose one:

◆Pressurization is **normal**:

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

■ ■ ■ ■

◆Pressurization is **not** normal:

Plan to land at the nearest suitable airport.

■ ■ ■ ■

PASS OXY ON

PASSENGER OXYGEN ON

Condition: The passenger oxygen system is on.

■ ■ ■ ■

SERVICE DOOR

FWD SERVICE	AFT SERVICE

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

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

2 Choose one:

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

►►**Go to step 3**

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

Plan to land at the nearest suitable airport.

■ ■ ■ ■

3 Choose one:

◆Pressurization is **normal**:

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

■ ■ ■ ■

◆Pressurization is **not** normal:

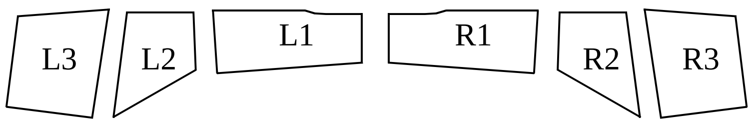
Plan to land at the nearest suitable airport.

■ ■ ■ ■

Window Damage - Forward (L1, L2, R1, R2)

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

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



1 Choose one:

◆Window is **delaminated** only:

Continue normal operation.

■ ■ ■ ■

◆Window is **arcing**:

►►**Go to step 2**

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

►►**Go to step 5**

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

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

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

4 Continue normal operation.

■ ■ ■ ■

5 Don seat belts and shoulder harnesses.

▼ Continued on next page ▼

▼Window Damage - Forward (L1, L2, R1, R2) continued▼

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

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

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

8 Choose one:

◆Damage is on the **outer** pane:

►►**Go to step 9**

◆Damage is on the **inner** pane:

►►**Go to step 11**

9 Continue normal operation.

10 Shoulder harnesses may be removed.

■ ■ ■ ■

11 Don oxygen masks.

12 Establish crew communications.

13 Passenger signs . . . . .ON

14 Choose one:

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

►►**Go to step 15**

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

Do **not** continue the climb.

Reset the FLT ALT indicator to the actual airplane altitude.

►►**Go to step 15**

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

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

17 Plan to land at the nearest suitable airport.

▼ Continued on next page ▼

▼Window Damage - Forward (L1, L2, R1, R2) continued▼

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

Oxygen masks and shoulder harnesses may be removed.

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

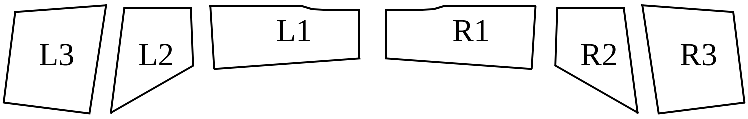
■ ■ ■ ■

Window Damage - Heated Side (L3, R3)

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

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

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



1 Choose one:

◆Window is **delaminated** only:

Continue normal operation.

■ ■ ■ ■

◆Window is **arcing**:

►►**Go to step 2**

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

►►**Go to step 5**

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

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

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

4 Continue normal operation.

■ ■ ■ ■

5 Don seat belts and shoulder harnesses.

▼ Continued on next page ▼

▼Window Damage - Heated Side (L3, R3) continued▼

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

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

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

8 Choose one:

◆Damage is on the **outer** pane:

►►**Go to step 9**

◆Damage is on the **inner** pane:

►►**Go to step 11**

9 Continue normal operation.

10 Shoulder harnesses may be removed.

■ ■ ■ ■

11 Don oxygen masks.

12 Establish crew communications.

13 Passenger signs . . . . ON

14 Choose one:

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

►►**Go to step 15**

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

Do **not** continue the climb.

Reset the FLT ALT indicator to the actual airplane altitude.

►►**Go to step 15**

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

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

17 Plan to land at the nearest suitable airport.

▼ Continued on next page ▼

▼**Window Damage - Heated Side (L3, R3) continued**▼

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

Oxygen masks and shoulder harnesses may be removed.

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

■ ■ ■ ■

Window Open

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

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

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

3 Close and lock the window.

4 Choose one:

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

Continue normal operation.

■ ■ ■ ■

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

Level off at the lowest safe altitude.

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

■ ■ ■ ■

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CABIN ALTITUDE WARNING or Rapid Depressurization

CABIN ALTITUDE **(If installed and operative)**

Condition: One or more of these occur:
- A cabin altitude exceedance
- In flight, the intermittent cabin altitude/configuration warning horn sounds or a CABIN ALTITUDE light (if installed and operative) illuminates.

1 Don oxygen masks and set regulators to 100%.

2 Establish crew communications.

3 Pressurization mode selector . . . . MAN

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

5 **If** cabin altitude is **uncontrollable**:

Passenger signs . . . . ON

PASS OXYGEN switch . . . . ON

►►**Go to the Emergency Descent checklist on page 0.1**

■ ■ ■ ■

6 **If** cabin altitude is **controllable**:

Continue manual operation to maintain correct cabin altitude.

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

Oxygen masks may be removed.

■ ■ ■ ■

AUTO FAIL or Unscheduled Pressurization Change

AUTO FAIL **May or may not be illuminated**

Condition: One or more of these occur:
- Automatic pressurization mode has failed
- The cabin altitude is uncontrollable.

Objective: To maintain control of cabin altitude.

1 Increasing thrust may ensure sufficient air supply to control cabin altitude.

2 Pressurization mode selector . . . . ALTN

3 Choose one:

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

Continue normal operation.

■ ■ ■ ■

◆AUTO FAIL light is **illuminated or** cabin altitude is **uncontrollable**:

►►**Go to step 4**

4 Pressurization mode selector . . . . .MAN

5 Outflow VALVE switch . . . Move to OPEN or CLOSE as needed to control cabin altitude and rate

6 Choose one:

◆Cabin altitude is **controllable**:

►►**Go to step 11**

◆Cabin altitude is **uncontrollable**:

►►**Go to step 7**

7 Don oxygen masks and set regulators to 100%.

8 Establish crew communications.

9 Passenger signs . . . . .ON

10 PASS OXYGEN switch .ON

▼ **Continued on next page** ▼

▼AUTO FAIL or Unscheduled Pressurization Change continued▼

►►Go to the Emergency Descent checklist on page 0.1

■ ■ ■ ■

11 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

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

Recall . . . . Checked

Autobrake . . . . ___

Landing data . . . . VREF ___, Minimums ___

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ___

At Pattern Altitude

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

Landing Checklist

ENGINE START switches . . . . CONT

Speedbrake . . . . ARMED

Landing gear . . . . Down

Flaps . . . . ___, Green light

■ ■ ■ ■

BLEED TRIP OFF

BLEED TRIP OFF

Condition: One or more of these occur:
- An engine bleed air overheat
- An engine bleed air overpressure.

1 WING ANTI-ICE switch . . . . OFF

2 TRIP RESET switch . . . . Push

The BLEED TRIP OFF light extinguishes if the bleed air temperature has cooled below limits.

3 Choose one:

◆BLEED TRIP OFF light **stays illuminated**:

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

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

Avoid icing conditions where wing anti-ice is needed.

■ ■ ■ ■

◆BLEED TRIP OFF light **extinguishes**:

►►**Go to step 4**

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

Caution! Use of wing anti-ice above approximately FL350 may cause bleed trip off and possible loss of cabin pressure.

■ ■ ■ ■

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Cabin Temperature Hot

Condition: Flight deck or passenger cabin temperature is excessively hot. The temperature can cause incapacitation.

Objective: To regain temperature control. If unable to regain control, to descend and configure to provide alternate ventilation.

YB521 - YB544

1 Choose one:

◆**Flight deck** temperature is too high:

►►**Go to step 3**

◆**Passenger cabin** temperature is too high:

►►**Go to step 11**

YC074 - YT197

2 Choose one:

◆**Flight deck** temperature is too high:

►►**Go to step 5**

◆**Passenger cabin** temperature is too high:

►►**Go to step 13**

YB521 - YB544

3 CONT CABIN temperature selector . . . . MANUAL

YB521 - YB544

4 CONT CABIN temperature selector . . . . Hold in COLD until the AIR MIX VALVE indication shows full COLD

YC074 - YT197

5 TRIM AIR switch . . . . OFF

6 **Wait** 1 minute.

▼ **Continued on next page** ▼

▼Cabin Temperature Hot continued▼

7 Choose one:

◆Air from the flight deck outlets is still too **warm**:

►►**Go to step 8**

◆Air from the flight deck outlets is **cool**:

The flight deck temperature gradually cools.

■ ■ ■ ■

8 L PACK switch . . . . OFF

9 **Wait** 1 minute.

10 Choose one:

◆Air from the flight deck outlets is still too **warm**:

►►**Go to step 19**

◆Air from the flight deck outlets is **cool**:

The flight deck temperature gradually cools.

■ ■ ■ ■

YB521 - YB544

11 PASS CABIN temperature selector. . . . . MANUAL

YB521 - YB544

12 PASS CABIN temperature selector. . . . . Hold in COLD until the AIR MIX VALVE indication shows full COLD

YC074 - YT197

13 TRIM AIR switch. . . . . OFF

14 **Wait** 1 minute.

▼ Continued on next page ▼

▼Cabin Temperature Hot continued▼

15 Choose one:

◆Air from the passenger cabin outlets is still too **warm**:

►►**Go to step 16**

◆Air from the passenger cabin outlets is **cool**:

The passenger cabin temperature gradually cools.

■ ■ ■ ■

16 R PACK switch . . . . OFF

17 **Wait** 1 minute.

18 Choose one:

◆Air from the passenger cabin outlets is still too **warm**:

►►**Go to step 19**

◆Air from the passenger cabin outlets is **cool**:

The passenger cabin temperature gradually cools.

■ ■ ■ ■

19 Start a descent to the lowest safe altitude, or 10,000 feet, whichever is higher. Use the speedbrakes to increase the rate of descent, if needed. Monitor cabin altitude and rate.

YC074 - YT197
20 R RECIRC FAN switch . . . . AUTO

YC074 - YT197
21 L RECIRC FAN switch . . . . OFF

22 Minimize the flight deck lighting intensity.

23 Open the flight deck door.

24 **During** daylight:

Use flight deck window shades, as needed.

Instruct the cabin crew to close cabin window shades.

▼ Continued on next page ▼

▼Cabin Temperature Hot continued▼

YB521 - YF805

25 Instruct the cabin crew to dim cabin lighting.

YR931 - YT197

26 Advise the cabin crew that the cabin lighting will be extinguished, but passenger reading lights will continue to work.

27 CAB/UTIL switch . . . . OFF

28 IFE/PASS SEAT switch. . . . . OFF

29 **When** at level off:

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

30 Choose one:

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

►►**Go to step 31**

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

Don oxygen masks.

Establish crew communications.

►►**Go to step 31**

31 PACK switch (operating pack) . . . . OFF

32 Pressurization mode selector . . . . MAN

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

This increases airplane ventilation.

34 Plan to land at the nearest suitable airport.

■ ■ ■ ■

DUAL BLEED

DUAL BLEED

Condition: The APU bleed valve is open and one of these occurs:
- BLEED 1 air switch is on
- BLEED 2 air switch is on and the ISOLATION VALVE is open.

Objective: To prevent possible backpressure of the APU.

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

2 **After** engine start:

APU BLEED air switch . . . . OFF

■ ■ ■ ■

DUCT OVERHEAT

DUCT OVERHEAT

YB521 - YB544

Condition: A duct overheat occurs.

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

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

2 TRIP RESET switch . . . . Push

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

3 Monitor duct temperature.

If the duct temperature increases rapidly or the air mix valve indicator moves toward full hot, set the temperature selector to MANUAL. Adjust the air mix valve position as needed.

■ ■ ■ ■

OFF

EQUIPMENT COOLING OFF

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

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

Note: Illumination of the EQUIP COOLING SUPPLY or EXHAUST OFF light may be an indication of a pressurization problem. Ensure the pressurization system is operating normally.

2 No further action is necessary in flight if the equipment cooling OFF light does not extinguish.

■ ■ ■ ■

OFF SCHED DESCENT

OFF SCHEDULE DESCENT

Condition: A descent is started before reaching the planned cruise altitude set in the FLT ALT indicator.

1 Choose one:

◆**Landing** at airport of departure:

Continue normal operation.

■ ■ ■ ■

◆**Not** landing at airport of departure:

FLT ALT indicator . . . . Reset to actual airplane altitude

■ ■ ■ ■

PACK

PACK

YC074 - YT197

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

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

This reduces the workload on the affected air conditioning pack.

2 TRIP RESET switch . . . . Push

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

3 Choose one:

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

Continue normal operation.

■ ■ ■ ■

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

ISOLATION VALVE switch . . . . CLOSE

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

■ ■ ■ ■

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

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

►►**Go to step 4**

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

5 **When** at level off:

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

▼ Continued on next page ▼

▼PACK continued▼

6 Choose one:

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

►►**Go to step 7**

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

Don oxygen masks.

Establish crew communications.

►►**Go to step 7**

7 Pressurization mode selector . . . . MAN

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

This increases airplane ventilation.

9 R RECIRC FAN switch . . . . AUTO

10 L RECIRC FAN switch . . . . OFF

11 Minimize the flight deck lighting intensity.

12 Open the flight deck door.

13 **During** daylight:

Use flight deck window shades, as needed.

Instruct the cabin crew to close cabin window shades.

YC074 - YF805

14 Instruct the cabin crew to dim cabin lighting.

YR931 - YT197

15 Advise the cabin crew that the cabin lighting will be extinguished, but passenger reading lights will continue to work.

16 CAB/UTIL switch . . . . OFF

17 IFE/PASS SEAT switch. . . . . OFF

18 Plan to land at the nearest suitable airport.

■ ■ ■ ■

PACK TRIP OFF

PACK TRIP OFF

YB521 - YB544

Condition: A pack overheat occurs.

1 Temperature selectors (affected side) . . . . Select warmer temperature

This reduces the workload on the affected air conditioning pack.

2 TRIP RESET switch . . . . Push

The PACK TRIP OFF light extinguishes if the pack temperature has cooled below limits.

3 Choose one:

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

Continue normal operation.

■ ■ ■ ■

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

Continue normal operation.

■ ■ ■ ■

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

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

►►**Go to step 4**

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

5 **When** at level off:

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

▼ Continued on next page ▼

▼PACK TRIP OFF continued▼

6 Choose one:

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

►►**Go to step 7**

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

Don oxygen masks.

Establish crew communications.

►►**Go to step 7**

7 Pressurization mode selector . . . . MAN

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

This increases airplane ventilation.

9 Minimize the flight deck lighting intensity.

10 Open the flight deck door.

11 **During** daylight:

Use flight deck window shades, as needed.

Instruct the cabin crew to close cabin window shades.

12 Instruct the cabin crew to dim cabin lighting.

13 CAB/UTIL switch . . . . OFF

14 IFE/PASS SEAT switch . . . . OFF

15 Plan to land at the nearest suitable airport.

■ ■ ■ ■

WING-BODY OVERHEAT

WING-BODY OVERHEAT

YB521 - YB544

Condition: An overheat from a bleed duct leak occurs.

Objective: To isolate the bleed duct leak.

1 ISOLATION VALVE switch. . . . . CLOSE

2 Choose one:

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

►►**Go to step 3**

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

►►**Go to step 7**

3 R PACK switch . . . . OFF

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

4 BLEED 2 air switch . . . . OFF

5 WING ANTI-ICE switch . . . . OFF

This prevents possible asymmetrical ice buildup on the wings.

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

■ ■ ■ ■

7 L PACK switch . . . . OFF

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

8 BLEED 1 air switch . . . . OFF

9 WING ANTI-ICE switch . . . . OFF

This prevents possible asymmetrical ice buildup on the wings.

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

▼ **Continued on next page** ▼

▼WING-BODY OVERHEAT continued▼

11 Choose one:

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

■ ■ ■ ■

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

►►**Go to step 12**

12 Choose one:

◆APU is **running**:

►►**Go to step 13**

◆APU is **not** running:

■ ■ ■ ■

13 Choose one:

◆**APU BLEED** air switch is **ON**:

APU BLEED air switch . . . . OFF

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

►►**Go to step 14**

◆**APU BLEED** air switch is **OFF**:

APU switch . . . . OFF

►►**Go to step 15**

14 Choose one:

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

►►**Go to step 16**

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

APU switch . . . . OFF

►►**Go to step 15**

▼ Continued on next page ▼

▼WING-BODY OVERHEAT continued▼

15 Choose one:

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

►►**Go to step 16**

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

■ ■ ■ ■

16 ISOLATION VALVE switch. . . . . AUTO

17 BLEED 1 air switch . . . . .ON

18 L PACK switch . . . . AUTO

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

20 Choose one:

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

►►**Go to step 21**

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

►►**Go to step 22**

21 Choose one:

◆APU switch is **ON**:

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

■ ■ ■ ■

◆APU switch is **OFF**:

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

■ ■ ■ ■

22 ISOLATION VALVE switch. . . . . CLOSE

23 L PACK switch . . . . OFF

24 BLEED 1 air switch . . . . OFF

25 WING ANTI-ICE switch . . . . OFF

▼ Continued on next page ▼

▼WING-BODY OVERHEAT continued▼

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

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

■ ■ ■ ■

WING-BODY OVERHEAT

WING-BODY OVERHEAT

YC074 - YT197

Condition:	An overheat from a bleed duct leak occurs.
Objective:	To isolate the bleed duct leak.

1 ISOLATION VALVE switch. . . . . CLOSE

2 Choose one:

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

TRIM AIR switch . . . . OFF

Note: Passenger cabin temperature control may be less accurate.

■ ■ ■ ■

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

►►**Go to step 3**

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

►►**Go to step 8**

3 R PACK switch . . . . OFF

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

4 BLEED 2 air switch . . . . OFF

5 WING ANTI-ICE switch . . . . OFF

This prevents possible asymmetrical ice buildup on the wings.

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

▼ Continued on next page ▼

7 Choose one:

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

■ ■ ■ ■

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

TRIM AIR switch . . . . OFF

Note: Passenger cabin temperature control may be less accurate.

■ ■ ■ ■

8 L PACK switch . . . . OFF

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

9 BLEED 1 air switch . . . . OFF

10 WING ANTI-ICE switch . . . . OFF

This prevents possible asymmetrical ice buildup on the wings.

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

12 Choose one:

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

■ ■ ■ ■

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

►►**Go to step 13**

13 Choose one:

◆APU is **running**:

►►**Go to step 14**

◆APU is **not** running:

TRIM AIR switch . . . . OFF

Note: Passenger cabin temperature control may be less accurate.

■ ■ ■ ■

▼ Continued on next page ▼

▼WING-BODY OVERHEAT continued▼

14 Choose one:

◆**APU BLEED** air switch is **ON**:

APU BLEED air switch . . . . OFF

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

►►**Go to step 15**

◆**APU BLEED** air switch is **OFF**:

APU switch . . . . OFF

►►**Go to step 16**

15 Choose one:

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

►►**Go to step 17**

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

APU switch . . . . OFF

►►**Go to step 16**

16 Choose one:

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

►►**Go to step 17**

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

TRIM AIR switch . . . . OFF

Note: Passenger cabin temperature control may be less accurate.

■ ■ ■ ■

17 ISOLATION VALVE switch. . . . . AUTO

18 BLEED 1 air switch . . . . .ON

19 L PACK switch . . . . AUTO

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

▼ Continued on next page ▼

▼WING-BODY OVERHEAT continued▼

21 Choose one:

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

►►**Go to step 22**

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

►►**Go to step 23**

22 Choose one:

◆APU switch is **ON**:

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

■ ■ ■ ■

◆APU switch is **OFF**:

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

■ ■ ■ ■

23 ISOLATION VALVE switch . . . . CLOSE

24 L PACK switch . . . . OFF

25 BLEED 1 air switch . . . . OFF

26 WING ANTI-ICE switch . . . . OFF

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

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

■ ■ ■ ■

ZONE TEMP

ZONE TEMP

YC074 - YT197

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

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

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

2 TRIP RESET switch . . . . Push

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

3 Monitor duct temperature.

If the duct temperature increases rapidly, set the TRIM AIR switch to OFF.

4 Choose one:

◆ Affected cabin temperature is excessively high:

►►**Go to the Cabin Temperature Hot checklist on page 2.6**

◆ Affected cabin temperature is normal:

■ ■ ■ ■

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COWL ANTI-ICE

ENGINE COWL ANTI-ICE

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

Objective: To reduce cowl duct pressure by reducing thrust.

1 Reduce thrust only when flight conditions allow.

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

Thrust lever (affected engine) . . . . Retard until the COWL ANTI-ICE light extinguishes

■ ■ ■ ■

COWL VALVE OPEN

ENGINE COWL VALVE OPEN OR TAI INDICATION

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

1 Choose one:

◆ENG ANTI-ICE switch is **ON**:

The cowl anti-ice valve is failed closed.

Avoid icing conditions.

■ ■ ■ ■

◆ENG ANTI-ICE switch is **OFF**:

The cowl anti-ice valve is failed open.

If TAT is **above 10°C**, limit thrust on the affected engine to 80% N1 if possible.

■ ■ ■ ■

Ice Crystal Icing

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

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

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

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

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

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

1 ENGINE START switches . . . . CONT

2 ENG ANTI-ICE switches (both) . . . . .ON

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

4 Choose one:

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

►►**Go to step 7**

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

►►**Go to step 5**

5 Autothrottle (if engaged) . . . . .Disengage

▼ Continued on next page ▼

▼Ice Crystal Icing continued▼

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

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

Reference N1 indicators and reference N1

TAS, TAT, SAT, ECON SPD, and LRC

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

Use engine anti-ice normally.

The autothrottle can be re-engaged, if needed.

■ ■ ■ ■

Additional Information

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

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

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

PROBE HEAT

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

Condition: One or more probe heats are failed.

1 Avoid icing conditions.

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

■ ■ ■ ■

OVERHEAT

WINDOW OVERHEAT

Condition: A window overheat occurs.

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

2 **Wait** 2 - 5 minutes.

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

4 Choose one:

◆Window OVERHEAT light **stays extinguished**:

Continue normal operation.

■ ■ ■ ■

◆Window OVERHEAT light **illuminates again**:

►►**Go to step 5**

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

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

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

■ ■ ■ ■

WING ANTI-ICE VALVE OPEN

L VALVE OPEN	R VALVE OPEN

Condition: A wing anti-ice L VALVE OPEN or R VALVE OPEN light stays illuminated bright blue. The wing anti-ice valve is not in the commanded position.

1 Choose one:

◆WING ANTI-ICE switch is **ON**:

The wing anti-ice valve is failed closed.

WING ANTI-ICE switch . . . . OFF

Avoid icing conditions where wing anti-ice is needed.

■ ■ ■ ■

◆WING ANTI-ICE switch is **OFF**:

The wing anti-ice valve is failed open.

►►**Go to step 2**

2 **When** icing conditions no longer exist:

ISOLATION VALVE switch . . . . CLOSE

PACK switch (affected side) . . . . OFF

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

Engine BLEED air switch (affected side) . . OFF

Wing anti-ice is not available on the affected side with the ISOLATION VALVE switch closed.

■ ■ ■ ■

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AUTOPILOT DISENGAGE

A/P
P/RST

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

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

■ ■ ■ ■

AUTOTHROTTLE DISENGAGE

A/T
P/RST

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

1 Control thrust manually or re–engage the autothrottle.

■ ■ ■ ■

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ACARS Electrical Power Loss

Condition: ACARS AC power is lost.

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

■ ■ ■ ■

ACARS MU Fail or DU Fail

Condition: The ACARS system is failed.

1 Use normal voice procedures for reporting.

■ ■ ■ ■

Radio Transmit Continuous (Stuck Microphone Switch)

Condition: A radio transmits continuously without crew input.

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

This deselects radios and stops radio transmissions.

Note: The microphone/interphone with the stuck switch continuously transmits on flight interphone.

2 The associated audio selector panel should stay on flight interphone. All other audio selector panels may be used normally.

■ ■ ■ ■

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BAT DISCHARGE

BATTERY DISCHARGE

Condition: A battery discharge exceedance occurs.

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

■ ■ ■ ■

DRIVE

DRIVE

Condition: A generator drive malfunction occurs.

Action is irreversible.

1 ⚠ Generator drive DISCONNECT switch (affected side) . . . . . Confirm . . . . Hold in the DISCONNECT position momentarily

This prevents generator drive damage.

2 Choose one:

◆APU is **available** for start:

APU . . . . START

When APU is running:

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

■ ■ ■ ■

◆APU is **not** available:

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

■ ■ ■ ■

ELEC

ELEC

Condition: A standby power or DC system fault occurs.

Note: The ELEC light illuminates on the ground only.

1 Do **not** takeoff.

■ ■ ■ ■

LOSS OF BOTH ENGINE DRIVEN GENERATORS

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

Condition: Both engine driven generators are off.

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

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

2 Choose one:

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

►►**Go to step 3**

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

►►**Go to step 5**

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

YAW DAMPER switch . . . . .ON

►►**Go to step 17**

A single SOURCE OFF light stays illuminated

3 YAW DAMPER switch . . . . .ON

4 Choose one:

◆APU is **available** for start:

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

APU . . . . START

When APU is running:

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

►►**Go to step 17**

◆APU is **not** available:

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

►►**Go to step 17**

▼ Continued on next page ▼

Both SOURCE OFF lights stay illuminated

5 Choose one:

◆APU is **available** for start:

BUS TRANSFER switch . . . . OFF

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

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

APU . . . . START

►►**Go to step 6**

◆APU is **not** available:

►►**Go to step 14**

6 **When** APU is running:

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

7 Check the REMOTE CONTROL circuit breaker (RCCB REMOTE) (STANDBY POWER CONTROL UNIT, P6:A4).

8 Choose one:

◆RCCB REMOTE circuit breaker **is** tripped:

Reset circuit breaker. Only one reset is allowed.

►►**Go to step 9**

◆RCCB REMOTE circuit breaker is **not** tripped:

►►**Go to step 9**

▼ Continued on next page ▼

▼LOSS OF BOTH ENGINE DRIVEN GENERATORS continued▼

9 Choose one:

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

►►**Go to step 10**

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

►►**Go to step 14**

10 BUS TRANSFER switch . . . . AUTO

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

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

12 YAW DAMPER switch . . . . ON

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

►►**Go to step 17**

Both SOURCE OFF lights stay illuminated

14 Avoid icing conditions.

YB521 - YB544, YC095 - YT197

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

YC074 - YC094

Note: Flight in icing conditions can result in erroneous flight instrument indications. Also, the stall protection system can be unreliable and the windshields can be obscured with ice.

15 Plan to land at the nearest suitable airport.

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

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

▼ Continued on next page ▼

▼LOSS OF BOTH ENGINE DRIVEN GENERATORS continued▼

17 Choose one:

◆**Both** the captain's and first officer's primary attitude displays are **operative and** ATT flags are **not** shown:

■ ■ ■ ■

◆**Both** the captain's and first officer's primary attitude displays are **failed**:

►►**Go to step 19**

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

IRS TRANSFER switch . . . . . . BOTH ON L

Do **not** engage either autopilot.

►►**Go to step 18**

18 Choose one:

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

■ ■ ■ ■

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

■ ■ ■ ■

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

The left IRS will operate as long as battery power remains.

Plan to land at the nearest suitable airport.

■ ■ ■ ■

Action is irreversible. Do this step only if **both** the captain's and first officer's primary attitude displays are **failed**.

19 ⚠ IRS MODE selectors (both) . . . . .ATT

Maintain straight and level, constant airspeed flight until attitude displays recover (approximately 30 seconds).

▼ Continued on next page ▼

▼LOSS OF BOTH ENGINE DRIVEN GENERATORS continued▼

The primary attitude displays stay failed and the SET IRS HDG prompt on the POS INIT page is blank until the attitude mode alignment is complete.

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

21 The MAP display is not available.

Note: Periodically enter updated heading on the POS INIT page or on the overhead IRS display unit by selecting HDG/STS.

22 Do **not** engage either autopilot.

■ ■ ■ ■

SOURCE OFF

SOURCE OFF

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

1 Choose one:

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

►►**Go to the LOSS OF BOTH ENGINE DRIVEN GENERATORS checklist on page 6.2**

■ ■ ■ ■

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

►►**Go to step 2**

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

3 Choose one:

◆SOURCE OFF light **extinguishes**:

■ ■ ■ ■

◆SOURCE OFF light **stays illuminated**:

►►**Go to step 4**

▼ Continued on next page ▼

▼SOURCE OFF continued▼

4 Choose one:

◆APU is **available** for start:

APU . . . . START

When APU is running:

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

►►**Go to step 5**

◆APU is **not** available:

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

■ ■ ■ ■

5 Choose one:

◆SOURCE OFF light **extinguishes**:

■ ■ ■ ■

◆SOURCE OFF light **stays illuminated**:

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

■ ■ ■ ■

STANDBY PWR OFF

STANDBY POWER OFF

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

1 STANDBY POWER switch . . . . BAT

■ ■ ■ ■

TR UNIT

TR UNIT

Condition: One or more transformer rectifiers are failed.

YC095 - YT197

1 Do not use the AFDS approach mode during an ILS or GLS approach.

YB521 - YC094

2 Do not use the AFDS approach mode during an ILS approach.

Note: Autoland is not available.

YC095 - YT197

Note: The AFDS approach mode can be used during an IAN approach.

■ ■ ■ ■

TRANSFER BUS OFF

TRANSFER BUS OFF

Condition: The transfer bus is not energized.

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

2 Choose one:

◆TRANSFER BUS OFF light **extinguishes**:

■ ■ ■ ■

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

►►**Go to step 3**

3 Choose one:

◆APU is **available** for start:

APU . . . . START

When APU is running:

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

■ ■ ■ ■

◆APU is **not** available:

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

■ ■ ■ ■

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Aborted Engine Start

Condition:	On the ground, an aborted engine start is needed.
Objective:	To shut down the engine and motor it.

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

2 Choose one:

◆ENGINE START switch is in **GRD**:

Motor the engine for 60 seconds.

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

■ ■ ■ ■

◆ENGINE START switch is in **OFF**:

►►**Go to step 3**

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

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

Motor the engine for 60 seconds.

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

■ ■ ■ ■

Engine Limit or Surge or Stall

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

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

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

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

---

3 Choose one:

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

►►**Go to step 4**

◆Engine indications are **abnormal or** EGT continues to **increase**:

►►**Go to step 6**

Check that RPM and EGT follow thrust lever movement.

4 ⚠ Thrust lever (affected engine). . . . . Advance slowly

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

■ ■ ■ ■

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

▼ Continued on next page ▼

▼Engine Limit or Surge or Stall continued▼

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

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

8 Choose one:

◆APU is **available** for start:

APU . . . . START

When APU is running:

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

►►Go to step 9

◆APU is **not** available:

►►Go to step 9

9 Balance fuel as needed.

10 Transponder mode selector . . . . TA ONLY

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

11 ISOLATION VALVE switch . . . . .Verify AUTO

This ensures bleed air is available to both wings if wing anti-ice is needed.

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

13 Choose one:

◆Restart **will** be attempted:

►►Go to the Engine In-Flight Start checklist on page 7.16

■ ■ ■ ■

◆Restart will **not** be attempted:

►►Go to step 14

14 Plan to land at the nearest suitable airport.

Note: Do not use FMC fuel predictions.

►►Go to the One Engine Inoperative Landing checklist on page 7.20

■ ■ ■ ■

Loss Of Thrust On Both Engines

Condition: Both of these occur:
- Both engines have a loss of thrust
- Both ENG FAIL alerts show.

Objective: To restart at least one engine.

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

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

3 **When** EGT decreases:

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

4 **If** EGT reaches 950°C or there is no increase in EGT within 30 seconds:

Engine start lever (affected engine) . . . . Confirm . . . . . CUTOFF, then IDLE detent

If EGT again reaches 950°C or there is no increase in EGT within 30 seconds, repeat as needed.

---

5 At or above FL270, set airspeed to 275 knots. Below FL270, set airspeed to 300 knots.

6 Engines can accelerate to idle very slowly, especially at high altitudes or in heavy precipitation. If N2 is steadily increasing and EGT stays within limits, do not interrupt the start.

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

8 Choose one:

◆APU is **available** for start:

APU . . . . START

►►**Go to step 9**

◆APU is **not** available:

►►**Go to step 10**

9 **When** APU is running:

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

▼ Continued on next page ▼

▼Loss Of Thrust On Both Engines continued▼

10 Choose one:

◆**One or both** engines **start**:

►►**Go to step 15**

◆**Neither** engine starts:

►►**Go to step 11**

11 Choose one:

◆**N2** is **at or above 11%**:

Attempt a windmill start.

►►**Go to step 13**

◆**N2** is **below 11%**:

►►**Go to step 12**

12 Choose one:

◆APU bleed air is **available**:

Attempt a starter assist start.

►►**Go to step 16**

◆APU bleed air is **not** available:

Attempt a windmill start.

►►**Go to step 13**

13 Thrust levers (both) . . . . Close

14 Engine start lever (**either**) . . . . . . Confirm. . . . . . . CUTOFF, then IDLE detent

The engine can accelerate to idle very slowly especially at high altitudes or in heavy precipitation. If N2 is steadily increasing and EGT stays within limits, do not interrupt the start.

15 **When** engine parameters have stabilized:

ENGINE START switch (operating engine) . . . . .As needed

Thrust lever (operating engine) . . . . Advance slowly

▼ Continued on next page ▼

▼Loss Of Thrust On Both Engines continued▼

Engine GEN switch
(operating engine side) . . . . .ON

►►Go to step 25

16 Thrust levers (both) . . . . Close

17 WING ANTI–ICE switch . . . . OFF

18 PACK switches (both) . . . . OFF

19 APU BLEED air switch . . . . .ON

20 Ignition select switch . . . . BOTH

21 Engine start
lever (**either**) . . . . . . Confirm. . . . . . . CUTOFF

22 ENGINE START switch . . . . .GRD

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

Engine start lever . . . . IDLE detent

The engine can accelerate to idle very slowly especially at high altitudes or in heavy precipitation. If N2 is steadily increasing and EGT stays within limits, do not interrupt the start.

24 **When** engine parameters have stabilized:

APU BLEED air switch . . . . OFF

ENGINE START switch
(operating engine) . . . . .As needed

Thrust lever
(operating engine) . . . . Advance slowly

Engine GEN switch
(operating engine side) . . . . .ON

PACK switch
(operating engine side) . . . . AUTO

▼ Continued on next page ▼

▼Loss Of Thrust On Both Engines continued▼

25 Choose one:

◆**Both** the captain's and first officer's primary attitude displays are **operative and** ATT flags are **not** shown:

►►**Go to step 30**

◆**Both** the captain's and first officer's primary attitude displays are **failed**:

►►**Go to step 26**

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

IRS TRANSFER switch . . . . . . BOTH ON L

Do **not** engage either autopilot.

►►**Go to step 30**

Action is irreversible. Do this step only if **both** the captain's and first officer's primary attitude displays are **failed**.

26 ⚠ IRS MODE selectors (both) . . . . .ATT

Maintain straight and level, constant airspeed flight until attitude displays recover (approximately 30 seconds).

The primary attitude displays stay failed and the SET IRS HDG prompt on the POS INIT page is blank until the attitude mode alignment is complete.

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

28 The MAP display is not available.

Note: Periodically enter updated heading on the POS INIT page or on the overhead IRS display unit by selecting HDG/STS.

29 Do **not** engage either autopilot.

▼ Continued on next page ▼

▼Loss Of Thrust On Both Engines continued▼

30 Choose one:

◆**Both** engines are **running**:

Run the APU as needed.

■ ■ ■ ■

◆**One** engine stays **failed**:

►►**Go to the Engine In-Flight Start checklist on page 7.16**

■ ■ ■ ■

FAULT

APU FAULT

Condition: An APU malfunction occurs.

Note: The APU shuts down automatically.

1 APU switch. . . . . OFF

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

■ ■ ■ ■

LOW OIL PRESSURE

APU LOW OIL PRESSURE

Condition: The APU oil pressure is low.

Note: The APU shuts down automatically.

1 APU switch. . . . . OFF

The LOW OIL PRESSURE light extinguishes in 5 minutes.

■ ■ ■ ■

OVER SPEED

APU OVERSPEED

Condition: One of these occurs:
- An APU RPM limit exceedance causes automatic shutdown
- During a normal APU shutdown the overspeed shutdown protection logic fails a self-test.

1 APU switch . . . . OFF

The APU OVERSPEED light extinguishes in 5 minutes.

■ ■ ■ ■

ALTN

EEC ALTERNATE MODE

Condition: An EEC operates in the alternate control mode.

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

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

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

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

This ensures both engines operate in alternate mode.

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

Note: Maximum thrust limiting is available with autothrottle engaged.

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

6 Choose one:

◆**DSPLY SOURCE** annunciation is **shown**:

►►**Go to step 7**

◆**DSPLY SOURCE** annunciation is **not** shown:

■ ■ ■ ■

7 Choose one:

◆**DISPLAY SOURCE** checklist **has** been completed:

■ ■ ■ ■

◆**DISPLAY SOURCE** checklist has **not** been completed:

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

■ ■ ■ ■

ENGINE CONTROL

ENGINE CONTROL

Condition: An engine control system fault occurs.

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

1 Do **not** takeoff.

■ ■ ■ ■

Engine Failure or Shutdown

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

1 Do an engine shutdown only when flight conditions allow.

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

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

4 **When** the affected engine is at idle thrust:

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

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

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

6 Choose one:

◆APU is **available** for start:

APU . . . . START

When APU is running:

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

►►**Go to step 7**

◆APU is **not** available:

►►**Go to step 7**

7 Balance fuel as needed.

8 Transponder mode selector . . . . TA ONLY

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

9 ISOLATION VALVE switch. . . . . Verify AUTO

This ensures bleed air is available to both wings if wing anti-ice is needed.

▼ Continued on next page ▼

▼Engine Failure or Shutdown continued▼

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

11 Choose one:

◆A restart will be **attempted**:

►►**Go to the Engine In-Flight Start checklist on page 7.16**

■ ■ ■ ■

◆A restart will **not** be attempted:

►►**Go to step 12**

12 Plan to land at the nearest suitable airport.

Note: Do not use FMC fuel predictions.

►►**Go to the One Engine Inoperative Landing checklist on page 7.20**

■ ■ ■ ■

Engine High Oil Temperature

Condition: The engine oil temperature is high.

1 Choose one:

◆Temperature is **at or above** the **redline**:

►►**Go to the Engine Failure or Shutdown checklist on page 7.12**

■ ■ ■ ■

◆Temperature is in the **amber band**:

►►**Go to step 2**

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

3 Thrust lever (affected engine) . . . . . . Confirm . . . . . . Retard slowly until the engine oil temperature is within the normal operating range or the thrust lever is closed

4 Choose one:

◆Oil temperature is in the **amber** band for **45 minutes or less**:

Note: Run the affected engine at a thrust setting that keeps the engine oil temperature within the normal operating range.

■ ■ ■ ■

◆Oil temperature is in the **amber** band for **more than 45 minutes**:

►►**Go to the Engine Failure or Shutdown checklist on page 7.12**

■ ■ ■ ■

Engine High Vibration

Condition: The vibration level is more than 4.0 units. Airframe vibration may or may not be felt.

1 Choose one:

◆In **icing** conditions:

►►**Go to step 2**

◆**Not** in icing conditions:

►►**Go to step 6**

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

3 Autothrottle (if engaged). . . . . .Disengage

Do the following on one engine at a time.

4 ⚠ Thrust lever
(affected engine) . . . . Retard to 45% N1
for five seconds,
then slowly advance
to a minimum of 80% N1
while monitoring engine vibration

5 Choose one:

◆Vibration **decreases**:

Continue normal operation.

■ ■ ■ ■

◆Vibration does **not** decrease:

►►**Go to step 7**

6 Autothrottle (if engaged). . . . . .Disengage

7 Thrust lever
(affected engine) . . . . Confirm. . . . . . . Retard to
maintain vibration
levels below 4 units or
until the thrust lever is closed

Note: If the VIB indication does not decrease when the thrust lever is retarded, check other engine indications on the affected engine. If other engine indications are normal, run the engine at reduced thrust.

■ ■ ■ ■

Engine In-Flight Start

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

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

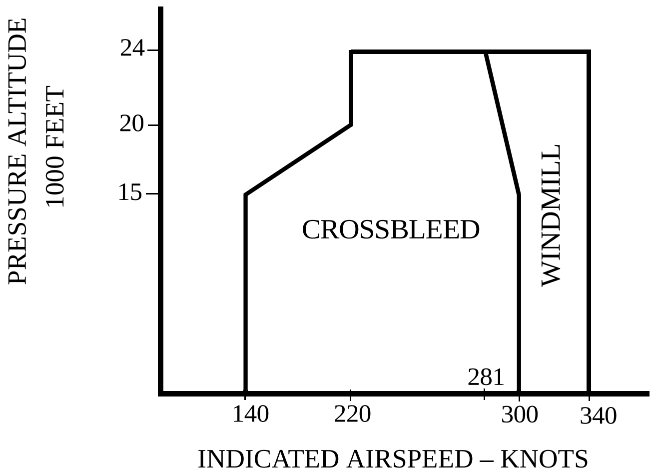
1 Do this checklist **only** after completion of the Engine Failure or Shutdown checklist or as directed by the Engine Limit or Surge or Stall checklist or by the Loss of Thrust on Both Engines checklist.

2 Check the In-Flight Start Envelope. X-BLD or XB indication may not match the envelope. Starts are not assured outside of the In-flight Start Envelope.

Note: For engines shut down one hour or more, or if EGT is less than 30°C, attempt a restart:
- At an altitude at or below 20,000 feet
- With airspeed at or above 220 knots
- Using a crossbleed start.

If the N2 is less than 8%, ENGINE START switch must be in CONT to display the EGT.

IN-FLIGHT START ENVELOPE



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

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

▼ Continued on next page ▼

▼Engine In-Flight Start continued▼

5 Engines can accelerate to idle very slowly, especially at high altitudes or in heavy precipitation. If N2 is steadily increasing and EGT stays within limits, do not interrupt the start.

6 Choose one:

◆**Windmill** start:

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

►►**Go to step 7**

◆**Crossbleed** start:

PACK switch (affected side) . . . . OFF

DUCT PRESSURE . . . . . . Minimum 30 PSI

Advance the thrust lever to increase duct pressure if needed.

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

►►**Go to step 7**

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

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

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

▼ Continued on next page ▼

▼**Engine In-Flight Start continued**▼

8 Choose one:

◆EGT **increases** within 30 seconds **and** a normal start occurs:

►►**Go to step 10**

◆EGT does **not** increase within 30 seconds **or** another abort start condition as listed in the Normal Procedures occurs:

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

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

Note: If the engine has been shutdown for more than one hour, multiple start attempts can be needed.

►►**Go to step 9**

9 Plan to land at the nearest suitable airport.

Note: Do not use FMC fuel predictions.

►►**Go to the One Engine Inoperative Landing checklist on page 7.20**

■ ■ ■ ■

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

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

12 ENGINE START switch . . . . As needed

13 APU . . . . As needed

14 Transponder mode selector . . . . TA/RA

■ ■ ■ ■

ENGINE LOW OIL PRESSURE

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

1 Choose one:

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

Do **not** takeoff.

■ ■ ■ ■

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

►►**Go to the Engine Failure or Shutdown checklist on page 7.12**

■ ■ ■ ■

ENGINE OIL FILTER BYPASS

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

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

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

3 Choose one:

◆OIL FILTER BYPASS alert **extinguishes**:

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

■ ■ ■ ■

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

►►**Go to the Engine Failure or Shutdown checklist on page 7.12**

■ ■ ■ ■

One Engine Inoperative Landing

Condition: Landing must be made with one engine inoperative.

1 Plan a flaps 15 landing.

2 Set VREF 15 or VREF ICE.

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

- Engine anti–ice will be used during landing
- Wing anti–ice has been used any time during the flight
- Icing conditions were encountered during the flight and the landing temperature is below 10° C.

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

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

4 Maintain VREF 15 + wind additive or VREF ICE + wind additive on final approach to assure sufficient maneuver margin and speed for go-around. The minimum wind additive is 5 knots.

5 When engine anti-ice is needed, use on the operating engine only.

6 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization . . . . LAND ALT ___

Recall . . . . Checked

Autobrake . . . . ___

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

Approach briefing . . . . Completed

▼ Continued on next page ▼

▼One Engine Inoperative Landing continued▼

Additional Go-Around Thrust

Choose one:

◆Additional go-around thrust is **needed**:

►►**Go to No Engine Bleed Landing below**

◆Additional go-around thrust is **not** needed:

►►**Go to Go-Around Procedure Review below**

No Engine Bleed Landing

When below 10,000 feet:

WING ANTI-ICE switch . . . . OFF

ISOLATION VALVE switch . . . . CLOSE

BLEED 1 air switch . . . . OFF

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

APU BLEED air switch . . . . ON

Left PACK switch . . . . AUTO

BLEED 2 air switch . . . . OFF

Go-Around Procedure Review

Do the normal go–around procedure except:

Use flaps 1.

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

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

Accelerate to flaps 1 maneuvering speed before flap retraction.

▼ Continued on next page ▼

Approach Checklist

Altimeters . . . . ____

Additional Deferred Item

GROUND PROXIMITY
FLAP INHIBIT switch . . . . FLAP INHIBIT

Landing Checklist

ENGINE START switch
(operating engine) . . . . CONT

Speedbrake . . . . ARMED

Landing gear . . . . Down

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

■ ■ ■ ■

REVERSER

REVERSER

Condition: A fault occurs in the thrust reverser system.

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

1 Expect normal reverser operation after landing.

■ ■ ■ ■

REVERSER UNLOCKED (IN FLIGHT)

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

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

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

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

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

Warning! Do not actuate the reverse thrust lever.

2 Choose one:

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

Continue normal operation.

■ ■ ■ ■

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

►►**Go to the Engine Failure or Shutdown checklist on page 7.12**

■ ■ ■ ■

START VALVE OPEN

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

1 ENGINE START switch . . . . OFF

2 Choose one:

◆START VALVE OPEN alert **extinguishes**:

■ ■ ■ ■

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

►►**Go to step 3**

3 ISOLATION VALVE switch. . . . . CLOSE

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

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

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

6 Choose one:

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

APU BLEED air switch . . . . OFF

►►**Go to step 7**

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

►►**Go to step 7**

▼ Continued on next page ▼

▼START VALVE OPEN continued▼

7 Choose one:

◆**In flight**:

WING ANTI-ICE switch . . . . OFF

This prevents possible asymmetrical ice buildup on the wings.

Avoid icing conditions where wing anti-ice is needed.

■ ■ ■ ■

◆On the **ground**:

Ground air source (if in use) . . . . Disconnect

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

■ ■ ■ ■

Volcanic Ash

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

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

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

1 Don oxygen masks and smoke goggles, as needed.

2 Establish crew communications, as needed.

3 Autothrottle (if engaged) . . . . .Disengage

If conditions allow, run the engines at idle thrust.

4 Thrust levers (both) . . . . Close

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

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

6 PACK switches . . . . HIGH

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

8 WING ANTI–ICE switch . . . . .ON

9 APU switch
(if APU available) . . . . START

This supplies backup electrical and pneumatic sources, if needed.

Note: Volcanic ash can cause non-normal system reactions such as:
- Engine malfunctions, increasing EGT, engine stall or flameout
- Decrease in indicated airspeed or loss of airspeed indications
- Equipment cooling OFF light.

▼ Continued on next page ▼

▼**Volcanic Ash continued**▼

10 If failed, engines can accelerate to idle very slowly, especially at high altitudes. If N2 is steadily increasing and EGT stays within limits, the start is progressing normally.

11 Plan to land at the nearest suitable airport.

12 Choose one:

◆Engines run **normally**:

■ ■ ■ ■

◆Engines do **not** run normally:

►►**Go to the Loss Of Thrust On Both Engines checklist on page 7.4**

■ ■ ■ ■

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APU FIRE

Condition: Fire is detected in the APU.

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

2 APU switch . . . . OFF

---

3 Choose one:

◆ APU fire switch **extinguishes**:

■ ■ ■ ■

◆ APU fire switch **stays illuminated**:

►►**Go to step 4**

4 Plan to land at the nearest suitable airport.

■ ■ ■ ■

ENGINE FIRE or Engine Severe Damage or Separation

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

1 Autothrottle (if engaged) . . . . Disengage

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

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

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

To manually unlock the engine fire switch, press the override and pull.

5 **If** the engine fire switch or ENG OVERHEAT light is illuminated:

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

If after 30 seconds the engine fire switch or ENG OVERHEAT light stays illuminated:

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

▼ Continued on next page ▼

▼ENGINE FIRE or Engine Severe Damage or Separation continued▼

6 Choose one:

◆High airframe vibration **occurs** and **continues** after the engine is shut down:

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

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

►►**Go to step 7**

◆High airframe vibration does **not** occur or does **not** continue after the engine is shut down:

►►**Go to step 7**

7 ISOLATION VALVE switch . . . . CLOSE

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

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

9 APU BLEED air switch . . . . OFF

10 Choose one:

◆APU is **available** for start:

APU . . . . START

When APU is running:

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

►►**Go to step 11**

◆APU is **not** available:

►►**Go to step 11**

11 Balance fuel as needed.

12 Transponder mode selector . . . . TA ONLY

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

▼ Continued on next page ▼

▼ENGINE FIRE or Engine Severe Damage or Separation continued▼

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

This ensures bleed air is available to both wings if wing anti-ice is needed.

14 Plan to land at the nearest suitable airport.

Note: Do not use FMC fuel predictions.

►►Go to the One Engine Inoperative Landing checklist on page 7.20

■ ■ ■ ■

ENGINE OVERHEAT

ENG 1 OVERHEAT	ENG 2 OVERHEAT

Condition: An overheat is detected in the engine.

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

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

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

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

■ ■ ■ ■

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

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

■ ■ ■ ■

Intentionally
Blank

Engine Tailpipe Fire

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

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

2 Advise the cabin.

3 Choose one:

◆Bleed air is **available**:

►►**Go to step 4**

◆Bleed air is **not** available:

Advise the tower.

■ ■ ■ ■

4 PACK switches (both) . . . . OFF

5 ISOLATION VALVE switch. . . . . AUTO

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

7 Choose one:

◆APU is **running**:

APU BLEED air switch . . . . .ON

►►**Go to step 8**

◆APU is **not** running:

►►**Go to step 8**

8 Choose one:

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

►►**Go to step 9**

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

Allow the affected N2 to decrease below 20%.

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

►►**Go to step 9**

9 Advise the tower.

▼ Continued on next page ▼

▼**Engine Tailpipe Fire continued**▼

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

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

■ ■ ■ ■

Smoke, Fire or Fumes

Condition: Smoke, fire or fumes occur.

1 Diversion may be needed.

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

3 Don smoke goggles, as needed.

4 Establish crew and cabin communications.

5 BUS TRANSFER switch . . . . OFF

YR931 - YT197

6 Advise the cabin crew that the cabin lighting will be extinguished, but passenger reading lights will continue to work.

7 CAB/UTIL switch. . . . . OFF

8 IFE/PASS SEAT switch . . . . OFF

YB521 - YB544

9 RECIRC FAN switch . . . . OFF

YC074 - YT197

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

11 APU BLEED air switch . . . . OFF

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

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

13 Choose one:

◆Source of the smoke, fire or fumes is **obvious and** can be **extinguished quickly**:

Isolate and extinguish the source.

If possible, remove power from the affected equipment by switch or circuit breaker in the flight deck or cabin.

►►**Go to step 14**

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

►►**Go to step 15**

▼ Continued on next page ▼

▼Smoke, Fire or Fumes continued▼

14 Choose one:

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

Continue the flight at the captain's discretion.

Restore unpowered items at the captain's discretion.

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

■ ■ ■ ■

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

►►**Go to step 15**

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

16 Instruct the cabin crew to:

Turn on cabin reading lights.

Turn on galley attendants work lights.

YB521 - YF805
Turn off cabin fluorescent light switches.

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

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

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

20 ISOLATION VALVE switch . . . . CLOSE

21 R PACK switch . . . . OFF

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

▼ Continued on next page ▼

▼Smoke, Fire or Fumes continued▼

23 Choose one:

◆Smoke or fumes are **decreasing**:

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

■ ■ ■ ■

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

R PACK switch . . . . AUTO

L PACK switch . . . . OFF

►►**Go to step 24**

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

25 Choose one:

◆Smoke or fumes are **decreasing**:

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

■ ■ ■ ■

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

L PACK switch . . . . AUTO

Consider an immediate landing.

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

■ ■ ■ ■

APU DET INOP

APU DETECTION INOPERATIVE

Condition: APU fire detection is inoperative.

1 APU switch. . . . . OFF

Caution! Do not run the APU. An APU fire would not be detected and the APU would continue to run.

■ ■ ■ ■

CARGO FIRE

FWD	AFT

Condition: Fire is detected in the related cargo compartment.

1 CARGO FIRE ARM switch (affected compartment) . . . Confirm . . . . . Push, Verify ARMED

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

Note: DISCH light may need up to 30 seconds to illuminate.

YB521 - YB544

3 Choose one:

◆On the **ground**:

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

■ ■ ■ ■

◆**In flight**:

►►**Go to step 5**

▼ Continued on next page ▼

▼CARGO FIRE continued▼

YC074 - YT197

4 Choose one:

◆On the **ground**:

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

■ ■ ■ ■

◆**In flight**:

►►**Go to step 6**

YB521 - YB544

5 RECIRC FAN switch . . . . OFF

YC074 - YT197

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

7 PACK switches (both) . . . . HIGH

YB521 - YB544, YC095 - YT197

8 Plan to land at the nearest suitable airport.

YC074 - YC094

9 Regardless of the duration of the cargo fire extinguishing system, following fire suppression and/or smoke evacuation procedures, land at the nearest suitable airport.

10 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization . . . . LAND ALT ___

Recall . . . . Checked

Autobrake . . . . ___

Landing data . . . . VREF ___, Minimums ___

Approach briefing . . . . Completed

▼ Continued on next page ▼

▼CARGO FIRE continued▼

Approach Checklist

Altimeters . . . . ___

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

Landing Checklist

ENGINE START switches . . . . CONT

Speedbrake . . . . ARMED

Landing gear . . . . Down

Flaps . . . . ___, Green light

■ ■ ■ ■

DETECTOR FAULT

CARGO FIRE DETECTOR FAULT

Condition: Fire detection is inoperative in one or both cargo compartments.

1 The fire detection system in one or both cargo compartments is inoperative.

■ ■ ■ ■

FAULT

ENGINE FIRE/OVERHEAT DETECTOR FAULT

Condition: Engine fire and overheat detection is inoperative.

1 The fire detection system in one or both engines is inoperative.

■ ■ ■ ■

SMOKE

LAVATORY SMOKE

YB526, YB544, YC083, YC084, YC095 - YT197

Condition: Smoke is detected in one or more lavatories.

1 Verify that the lavatory fire is contained.

■ ■ ■ ■

Smoke or Fumes Removal

Condition: Smoke or fumes removal is needed.

1 Do this checklist **only** when directed by the Smoke, Fire or Fumes checklist.

2 Do **not** delay landing in an attempt to complete the following steps.

3 Close the flight deck door.

4 Choose one:

◆**Both** PACK switches are **OFF**:

►►**Go to step 5**

◆**A single or both** PACK switch(es) are in **AUTO**:

►►**Go to step 6**

5 Choose one:

◆Smoke or fumes source is confirmed to be **outside** the flight deck:

■ ■ ■ ■

◆Smoke or fumes source is confirmed to be **on** the flight deck:

Caution! Window should not be opened unless the source is confirmed to be on the flight deck.

Establish normal holding speed. High airspeed may prevent opening the window.

Open the first officer’s sliding window.

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

■ ■ ■ ■

Do **not** turn on any PACK switch that was turned off by the Smoke, Fire or Fumes checklist.

6 Operating PACK switch(es) . . . . HIGH

7 LAND ALT indicator . . . . .10,000 feet

▼ Continued on next page ▼

▼Smoke or Fumes Removal continued▼

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

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

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

10 Open flight deck air conditioning and gasper outlets.

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

11 Choose one:

◆Smoke or fumes are **controllable**:

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

■ ■ ■ ■

◆Smoke or fumes are **uncontrollable**:

►►**Go to step 12**

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

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

Pressurization mode selector . . . . MAN

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

This causes the cabin airflow to carry smoke or fumes aft.

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

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

■ ■ ■ ■

WHEEL WELL

WHEEL WELL FIRE

Condition: Fire is detected in the main wheel well.

270K/.82M maximum.

1 LANDING GEAR lever . . . . DN

This attempts to remove and extinguish the fire source.

2 Plan to land at the nearest suitable airport.

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

3 Choose one:

◆Gear **must be retracted** for airplane performance:

►►**Go to step 4**

◆Gear does **not** need to be retracted for airplane performance:

■ ■ ■ ■

4 **When** the WHEEL WELL light extinguishes:

Wait 20 minutes.

235K maximum

5 LANDING GEAR lever . . . . UP

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

LANDING GEAR lever . . . . OFF

■ ■ ■ ■

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Table of Contents

Intentionally
Blank

Runaway Stabilizer

Condition: Uncommanded stabilizer trim movement occurs continuously.

1 Control column. . . . . Hold firmly

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

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

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

3 Autothrottle (if engaged). . . . . .Disengage

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

4 **If** the runaway **stops** after the autopilot is disengaged:

■ ■ ■ ■

5 **If** the runaway **continues** after the autopilot is disengaged:

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

If the runaway **continues**:

Stabilizer
trim wheel . . . . Grasp and hold

---

6 Stabilizer. . . . . Trim manually

7 Anticipate trim requirements.

8 **Checklist Complete Except Deferred Items**

▼ Continued on next page ▼

▼Runaway Stabilizer continued▼

Deferred Items

Descent Checklist

Pressurization . . . . LAND ALT ___

Recall . . . . Checked

Autobrake . . . . ___

Landing data . . . . VREF ___, Minimums ___

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ___

Airspeed and Trim

Establish correct airspeed and in-trim condition early on final approach.

Landing Checklist

ENGINE START switches. . . . . CONT

Speedbrake . . . . ARMED

Landing gear . . . . Down

Flaps . . . . ___, Green light

■ ■ ■ ■

Intentionally
Blank

All Flaps Up Landing

Condition: The leading edge devices fail to extend and trailing edge flaps are less than 1.

Objective: To configure for a landing with leading edge devices retracted and trailing edge flaps less than 1.

1 Do this checklist **only** when directed by the Trailing Edge Flaps Up Landing checklist.

2 Burn off fuel to reduce touchdown speed.

3 Set VREF 40 + 55 knots.

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

5 Maintain flaps up maneuvering speed until established on final approach.

6 Limit bank angle to 15° when airspeed is less than the flaps up maneuvering speed.

7 **Checklist Complete Except Deferred Items**

▼ **Continued on next page** ▼

▼All Flaps Up Landing continued▼

Deferred Items

Descent Checklist

Pressurization. . . . . LAND ALT ___

Recall . . . . Checked

Autobrake . . . . ___

Landing data . . . . **VREF 40 + 55 knots ___,**
Minimums ___

Approach briefing . . . . Completed

Go-Around Procedure Review

Do the normal go-around procedure except:

Limit bank angle to 15° when the airspeed is less than the flaps up maneuvering speed.

Accelerate to flaps up maneuvering speed.

Approach Checklist

Altimeters . . . . ___

Additional Deferred Items

FASTEN BELTS switch . . . . ON

GROUND PROXIMITY
FLAP INHIBIT switch . . . . FLAP INHIBIT

Landing Checklist

ENGINE START switches . . . . CONT

Speedbrake . . . . ARMED

Landing gear . . . . Down

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

■ ■ ■ ■

AUTO SLAT FAIL

AUTO SLAT FAIL

Condition: The auto slat system is failed.

1 Continue normal operation.

■ ■ ■ ■

Elevator Tab Vibration

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

1 Passenger signs . . . . .ON

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

2 Smoothly reduce airspeed until the vibration stops.

3 Consider landing at the nearest suitable airport.

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

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

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

The speedbrakes can be armed for landing.

■ ■ ■ ■

FEEL DIFF PRESS

FEEL DIFFERENTIAL PRESSURE

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

1 Continue normal operation.

■ ■ ■ ■

LOW PRESSURE

FLIGHT CONTROL LOW PRESSURE

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

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

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

■ ■ ■ ■

Jammed or Restricted Flight Controls

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

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

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

3 Verify that the thrust is symmetrical.

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

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

6 Choose one:

◆The failure could be **due** to freezing water **and** conditions **allow**:

Consider a descent to a warmer temperature and attempt to overpower the jammed or restricted system again.

►►**Go to step 7**

◆The failure could **not** be due to freezing water **or** conditions do **not** allow:

►►**Go to step 7**

7 Choose one:

◆Controls are **normal**:

■ ■ ■ ■

◆Controls are **not** normal:

►►**Go to step 8**

8 Use stabilizer or rudder trim to offload control forces. If electric stabilizer trim is needed, move the Stabilizer Trim Override switch to OVERRIDE.

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

10 Limit bank angle to 15°.

11 Plan to land at the nearest suitable airport.

▼ Continued on next page ▼

▼Jammed or Restricted Flight Controls continued▼

12 Plan a flaps 15 landing.

13 Set VREF 15 or VREF ICE.

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

- Engine anti–ice will be used during landing
- Wing anti–ice has been used any time during the flight
- Icing conditions were encountered during the flight and the landing temperature is below 10° C.

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

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

15 **Checklist Complete Except Deferred Items**

▼ Continued on next page ▼

▼Jammed or Restricted Flight Controls continued▼

Deferred Items

Descent Checklist

Pressurization . . . . LAND ALT ___

Recall . . . . Checked

Autobrake . . . . ___

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

Approach briefing . . . . Completed

Go-Around Procedure Review

Do the normal go-around procedure.

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

Approach Checklist

Altimeters . . . . ___

Additional Deferred Item

GROUND PROXIMITY
FLAP INHIBIT switch . . . . FLAP INHIBIT

Landing Checklist

ENGINE START switches. . . . . CONT

Speedbrake . . . . ARMED

Landing gear . . . . Down

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

■ ■ ■ ■

LE FLAPS TRANSIT

LEADING EDGE FLAPS TRANSIT

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

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

1 Choose one:

◆ **Trailing** edge flaps are **extended** and the trailing edge flap position indication **disagrees** with the flap handle position:

► ► **Go to the Trailing Edge Flap Disagree checklist on page 9.25**

■ ■ ■ ■

◆ **Trailing** edge flaps are **extended** and the trailing edge flap position indication **agrees** with the flap handle position:

► ► **Go to step 7**

◆ **Trailing** edge flaps are **up**:

Limit airspeed to 230 knots maximum.

► ► **Go to step 2**

2 Choose one:

◆ Roll is **encountered**:

► ► **Go to step 7**

◆ Roll is **not** encountered:

Note: Roll may be difficult to identify with the autopilot engaged.

► ► **Go to step 3**

Maximum flap extension altitude 20,000 feet.

3 ⚠ Flaps . . . . .Extend to flaps 1, then retract to flaps up

▼ Continued on next page ▼

▼LEADING EDGE FLAPS TRANSIT continued▼

4 Choose one:

◆LE FLAPS TRANSIT light **extinguishes** after the flaps are up:

Continue normal operation.

■ ■ ■ ■

◆LE FLAPS TRANSIT light **stays illuminated** after the flaps are up:

►►**Go to step 5**

5 Check LE DEVICES annunciator panel.

6 Choose one:

◆Light(s) for **only one** leading edge device is illuminated:

Limit airspeed to 300 knots (280 knots for turbulent air penetration) or 0.65 Mach, whichever is lower.

►►**Go to step 7**

◆Light(s) for **more than one** leading edge device is illuminated:

Limit airspeed to 230 knots maximum.

►►**Go to step 7**

7 Plan a flaps 15 landing.

8 Set VREF 15 + 15 knots.

9 Limit bank angle to 15° when airspeed is less than the flaps up maneuvering speed.

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

11 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization. . . . . LAND ALT ___

Recall . . . . Checked

Autobrake . . . . ___

▼ Continued on next page ▼

▼LEADING EDGE FLAPS TRANSIT continued▼

Landing data . . . . **VREF 15 + 15 knots ____, Minimums ____**

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ____

Additional Deferred Item

GROUND PROXIMITY FLAP INHIBIT switch . . . . FLAP INHIBIT

Note: The amber LE FLAPS TRANSIT light may be illuminated. Operation within the lower amber airspeed band for landing is normal for this condition.

YB521, YC074 - YC081, YC092, YC093

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

Landing Checklist

ENGINE START switches . . . . CONT

Speedbrake . . . . ARMED

Landing gear . . . . Down

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

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

■ ■ ■ ■

MACH TRIM FAIL

MACH TRIM FAIL

Condition: The mach trim system is failed.

1 Limit airspeed to 280 knots/0.82 Mach.

■ ■ ■ ■

SPEED BRAKE DO NOT ARM

SPEED BRAKE DO NOT ARM

YB521 - YC080

Condition: An automatic speedbrake fault occurs.

Note: Speedbrakes may be used in flight.

1 Choose one:

◆SPEED BRAKE DO NOT ARM light illuminates **before** the flaps are retracted:

Retract the flaps on schedule.

►►**Go to step 2**

◆SPEED BRAKE DO NOT ARM light illuminates with the flaps **up**:

Limit airspeed to 320 knots maximum.

►►**Go to step 3**

◆SPEED BRAKE DO NOT ARM light is illuminated **after** flap extension for landing:

►►**Go to step 3**

2 Choose one:

◆SPEED BRAKE DO NOT ARM light **stays illuminated** after the flaps are retracted:

Limit airspeed to 320 knots maximum.

►►**Go to step 3**

◆SPEED BRAKE DO NOT ARM light **extinguishes** after the flaps are retracted:

►►**Go to step 3**

3 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization . . . . LAND ALT ____

Recall . . . . Checked

Autobrake . . . . ____

Landing data . . . . VREF ____, Minimums ____

▼ Continued on next page ▼

▼SPEED BRAKE DO NOT ARM continued▼

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ___

Additional Deferred Item

Choose one:

◆SPEED BRAKE DO NOT ARM light **is extinguished** after flap extension for landing:

■ ■ ■ ■

◆SPEED BRAKE DO NOT ARM light **is illuminated** after flap extension for landing:

Do **not** arm the speedbrakes for landing. Manually deploy the speedbrakes immediately upon landing. Increased force may be needed to move the SPEED BRAKE lever to the UP position.

►►Go to Landing Checklist below

Landing Checklist

ENGINE START switches . . . . CONT

Speedbrake . . . . **DOWN detent**

Landing gear . . . . Down

Flaps . . . . ___, Green light

■ ■ ■ ■

SPEED BRAKE DO NOT ARM

SPEED BRAKE DO NOT ARM

YC081 - YT197

Condition: An automatic speedbrake fault occurs.

Note: Speedbrakes may be used in flight.

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

2 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization . . . . LAND ALT ____

Recall . . . . Checked

Autobrake . . . . ____

Landing data . . . . VREF ____, Minimums ____

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ____

Landing Checklist

ENGINE START switches . . . . CONT

Speedbrake **. DOWN detent**

Landing gear . . . . Down

Flaps . . . . ____, Green light

■ ■ ■ ■

SPEED TRIM FAIL

SPEED TRIM FAIL

Condition: The speed trim system is failed.

1 Continue normal operation.

■ ■ ■ ■

SPEEDBRAKES EXTENDED

SPEEDBRAKES EXTENDED

Condition: In flight, the speedbrakes are extended beyond the ARMED position and one or more of these occur:

- The radio altitude is below 800 feet
- The flap lever setting is more than flaps 10.

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

1 Choose one:

◆**In flight**:

SPEED BRAKE lever . . . . ARMED

■ ■ ■ ■

◆On the **ground**:

SPEED BRAKE lever . . . . DOWN detent

Note: If the light stays illuminated, do **not** takeoff.

■ ■ ■ ■

STABILIZER OUT OF TRIM

STAB OUT OF TRIM

Condition: The autopilot does not set the stabilizer trim correctly.

Note: Momentary illumination of the STAB OUT OF TRIM light during large changes in trim requirements is normal.

1 Choose one:

◆ Stabilizer is **trimming**:

Continue normal operation.

■ ■ ■ ■

◆ Stabilizer is **not** trimming:

►► **Go to step 2**

2 Control column. . . . . Hold firmly

3 Autopilot . . . . .Disengage

4 Autothrottle (if engaged) . . . . .Disengage

5 Stabilizer trim .As needed

6 Choose one:

◆ Stabilizer **responds** to electric trim inputs:

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

■ ■ ■ ■

◆ Stabilizer does **not** respond to electric trim inputs:

►► **Go to the Stabilizer Trim Inoperative checklist on page 9.19**

■ ■ ■ ■

Stabilizer Trim Inoperative

Condition: Both of these occur:
- Loss of electric trim through the autopilot
- Loss of electric trim through the control wheel switches.

Objective: To land the airplane using manual trim or, if manual trim is not available, to land the airplane using elevator control only.

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

The autopilot is not available.

2 Apply steady pressure on the manual trim handles until the needed trim is attained.

Use sufficient force to disengage the disconnect clutch. Approximately 1/2 turn of the stabilizer trim wheel may be needed.

Note: A maximum two-pilot effort on the trim wheels will not cause a cable or system failure.

The handle(s) should be folded inside the stabilizer trim wheel when manual trim is no longer needed.

If the failure could be due to ice accumulation, descend to a warmer temperature and attempt again.

3 Choose one:

◆Stabilizer **can** be trimmed manually:

►►**Go to step 4**

◆Stabilizer can **not** be trimmed manually:

►►**Go to step 8**

4 Maintain in-trim airspeed until the start of the approach.

5 Use an airspeed which results in an in-trim condition. This will reduce the force that is needed to move the stabilizer.

6 Continue to trim manually for the rest of the flight.

7 Establish the landing configuration early.

►►**Go to step 10**

▼ Continued on next page ▼

▼Stabilizer Trim Inoperative continued▼

8 Anticipate higher than normal elevator forces during approach and landing.

9 The thrust reduction at flare will cause a nose down pitch.

Note: Elevator control is sufficient to safely land the airplane regardless of stabilizer position.

10 Plan a flaps 15 landing.

11 Set VREF 15 or VREF ICE.

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

- Engine anti–ice will be used during landing
- Wing anti–ice has been used any time during the flight
- Icing conditions were encountered during the flight and the landing temperature is below 10° C.

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

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

13 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization . . . . LAND ALT ___

Recall . . . . Checked

Autobrake . . . . ___

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

Approach briefing . . . . Completed

Go-Around Procedure Review

Do the normal go-around procedure.

▼ Continued on next page ▼

▼Stabilizer Trim Inoperative continued▼

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

Approach Checklist

Altimeters . . . . ____

Additional Deferred Item

GROUND PROXIMITY
FLAP INHIBIT switch . . . . FLAP INHIBIT

Landing Checklist

ENGINE START switches . . . . CONT

Speedbrake . . . . ARMED

Landing gear . . . . Down

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

■ ■ ■ ■

STBY RUD ON

STANDBY RUDDER ON

Condition: The standby rudder hydraulic system is commanded on.

1 Choose one:

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

Avoid large or abrupt rudder pedal inputs.

■ ■ ■ ■

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

■ ■ ■ ■

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

■ ■ ■ ■

Trailing Edge Flap Asymmetry

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

Objective: To configure the airplane for landing.

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

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

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

2 Choose one:

◆ Flap **lever** is set to **30**:

Set VREF 30.

Note: VREF + wind additive must not exceed the flap placard speed for the next larger flap setting.

►►**Go to step 4**

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

►►**Go to step 3**

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

Set VREF 40 + 30 knots.

►►**Go to step 4**

◆ Flap **lever** is set to **UP**:

►►**Go to the Trailing Edge Flaps Up Landing checklist on page 9.30**

■ ■ ■ ■

▼ Continued on next page ▼

▼Trailing Edge Flap Asymmetry continued▼

3 Set VREF 15 or VREF ICE.

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

- Engine anti–ice will be used during landing
- Wing anti–ice has been used any time during the flight
- Icing conditions were encountered during the flight and the landing temperature is below 10° C.

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

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

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

5 **Checklist Complete Except Deferred Items**

▼ Continued on next page ▼

▼Trailing Edge Flap Asymmetry continued▼

Deferred Items

Descent Checklist

Pressurization . . . . LAND ALT ___

Recall . . . . Checked

Autobrake . . . . ___

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

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ___

Additional Deferred Item

Choose one:

◆Flap **lever** is set to **30**:

►►Go to Landing Checklist below

◆Flap **lever** is set to **less than 30**:

GROUND PROXIMITY FLAP INHIBIT switch . . . . FLAP INHIBIT

►►Go to Landing Checklist below

Landing Checklist

ENGINE START switches. . . . . CONT

Speedbrake . . . . ARMED

Landing gear . . . . Down

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

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

■ ■ ■ ■

Trailing Edge Flap Disagree

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

Objective: To configure the airplane for landing.

1 Choose one:

◆Trailing edge flap asymmetry **exists**:

►►**Go to the Trailing Edge Flap Asymmetry checklist on page 9.22**

■ ■ ■ ■

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

►►**Go to step 2**

2 Choose one:

◆Indicated flap position is **30 or greater and less than 40**:

Land using existing flaps.

►►**Go to step 3**

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

Land using existing flaps.

►►**Go to step 5**

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

►►**Go to step 4**

3 Set VREF 30.

Note: VREF 30 + wind additive must not exceed the flap placard speed for flaps 40.

►►**Go to step 6**

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

Note: Alternate flap extension time to flaps 15 is approximately 2 minutes.

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

▼ Continued on next page ▼

▼Trailing Edge Flap Disagree continued▼

5 Set VREF 15 or VREF ICE.

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

- Engine anti–ice will be used during landing
- Wing anti–ice has been used any time during the flight
- Icing conditions were encountered during the flight and the landing temperature is below 10° C.

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

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

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

7 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization. . . . . LAND ALT ___

Recall . . . . Checked

Autobrake . . . . ___

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

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ___

▼ Continued on next page ▼

▼Trailing Edge Flap Disagree continued▼

Additional Deferred Item

Choose one:

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

►►Go to Landing Checklist below

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

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

►►Go to Landing Checklist below

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

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

►►Go to Alternate Flap Extension below

▼ Continued on next page ▼

▼Trailing Edge Flap Disagree continued▼

Alternate Flap Extension

During flap extension, set the flap lever to the desired flap position.

230K maximum during alternate flap extension.

ALTERNATE FLAPS master switch . . . . ARM

Note: The landing gear configuration warning may sound if the flaps are between 10 and 15 and the landing gear are retracted.

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

Note: Operation within the lower amber airspeed band may be needed until the LE FLAPS TRANSIT light extinguishes.

If flap asymmetry occurs, release the switch immediately. There is no asymmetry protection.

ALTERNATE FLAPS
position switch . . . . .Hold DOWN
to extend flaps
to 15 on schedule

As flaps are extending, slow to respective maneuvering speed.

▼ Continued on next page ▼

Choose one:

◆Trailing edge flaps **asymmetry** occurs:

►►**Go to the Trailing Edge Flap Asymmetry checklist on page 9.22**

■ ■ ■ ■

◆Trailing edge flaps extend to **15**:

►►**Go to Landing Checklist below**

◆Indicated flap position is **less than 1** after attempting alternate flap extension:

►►**Go to the Trailing Edge Flaps Up Landing checklist on page 9.30**

■ ■ ■ ■

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

Land using existing flaps.

Set VREF 40 + 30 knots.

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

►►**Go to Landing Checklist below**

Landing Checklist

ENGINE START switches . . . . CONT

Speedbrake . . . . ARMED

Landing gear . . . . Down

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

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

■ ■ ■ ■

Trailing Edge Flaps Up Landing

Condition: The trailing edge flaps are less than 1.

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

1 Choose one:

◆Trailing edge flap asymmetry **exists**:

►►**Go to step 2**

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

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

►►**Go to step 4**

230K maximum.

2 ⚠ALTERNATE FLAPS master switch . . . . ARM

Note: This procedure extends the leading edge devices only.

3 ALTERNATE FLAPS position switch . . . . Momentary DOWN

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

Note: The LE FLAPS TRANSIT light may stay illuminated after the LE devices are fully extended.

4 Choose one:

◆LE DEVICES annunciator **shows** FULL EXT:

►►**Go to step 5**

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

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

■ ■ ■ ■

5 Burn off fuel to reduce touchdown speed.

6 Set VREF 40 + 40 knots.

▼ Continued on next page ▼

▼Trailing Edge Flaps Up Landing continued▼

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

8 Maintain flaps up maneuvering speed until on final.

9 Limit bank angle to 15° when airspeed is less than the flaps up maneuvering speed.

10 **Checklist Complete Except Deferred Items**

▼ Continued on next page ▼

▼Trailing Edge Flaps Up Landing continued▼

Deferred Items

Descent Checklist

Pressurization . . . . LAND ALT ___

Recall . . . . Checked

Autobrake . . . . ___

Landing data . . . . **VREF 40 + 40 knots ___,**
Minimums ___

Approach briefing . . . . Completed

Go-Around Procedure Review

Do the normal go-around procedure except:

Limit bank angle to 15° when the airspeed is less than the flaps up maneuvering speed.

Accelerate to flaps up maneuvering speed.

Do not exceed 230 knots with leading edge devices extended.

Approach Checklist

Altimeters . . . . ___

Additional Deferred Items

FASTEN BELTS switch . . . . ON

GROUND PROXIMITY
FLAP INHIBIT switch . . . . FLAP INHIBIT

Note: A nuisance stick shaker may occur when slowing to VREF 40 + 40 knots at high gross weights and/or bank angles greater than 15°.

Operation within the lower amber airspeed band for landing is normal for this condition.

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

Landing Checklist

ENGINE START switches. . . . . CONT

▼ Continued on next page ▼

▼Trailing Edge Flaps Up Landing continued▼

Speedbrake . . . . ARMED

Landing gear . . . . Down

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

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

■ ■ ■ ■

YAW DAMPER

YAW DAMPER

Condition: The yaw damper is disengaged.

1 YAW DAMPER switch . . . . OFF then ON

2 Choose one:

◆YAW DAMPER light **extinguishes**:

■ ■ ■ ■

◆YAW DAMPER light **stays illuminated**:

YAW DAMPER switch . . . . OFF

►►**Go to step 3**

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

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

■ ■ ■ ■

Intentionally
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Intentionally
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Airspeed Unreliable

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

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

1 Autopilot (if engaged) . . . . Disengage

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

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

4 Set the following gear up pitch attitude and thrust:

Flaps extended . . . . 10° and 80% N1

Flaps up . . . . 4° and 75% N1

---

5 PROBE HEAT switches . . . . Check ON

6 The following are **reliable**:

Attitude

N1

Ground speed

Radio altitude

Note: Stick shaker, overspeed warning and AIRSPEED LOW (as installed) alerts may sound erroneously or simultaneously.

Note: The Flight Path Vector and Pitch Limit Indicator may be unreliable.

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

▼ Continued on next page ▼

▼Airspeed Unreliable continued▼

8 When in trim and stabilized, cross check the captain, first officer and standby airspeed indicators. An airspeed indication that differs by more than 20 knots or 0.03 Mach from the airspeed shown in the table should be considered **unreliable**.

9 Choose one:

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

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

►►**Go to step 10**

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

►►**Go to step 12**

10 Flight director switch (reliable side) . . . . ON

11 Autopilot (reliable side) . . . . Engage

Note: Do not re-engage the autothrottle.

■ ■ ■ ■

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

Note: Maintain visual conditions if possible.

Establish landing configuration early.

Radio altitude reference is available below 2,500 feet.

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

■ ■ ■ ■

▼ Continued on next page ▼

▼Airspeed Unreliable continued▼

Additional Information

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

- Speed/altitude information not consistent with pitch attitude and thrust setting
- SPD failure flag
- SPD LIM failure flag
- IAS DISAGREE alert
- Blank or fluctuating airspeed display
- Variation between captain and first officer airspeed displays
- Radome damage or loss
- Overspeed warning
- Simultaneous overspeed and stall warnings.

ALT DISAGREE

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

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

2 Choose one:

◆ALT DISAGREE alert **extinguishes**:

Continue normal operation.

■ ■ ■ ■

◆ALT DISAGREE alert **stays illuminated**:

►►**Go to step 3**

3 Airplane does not meet RVSM airspace requirements.

4 Standby altimeter is available.

5 Transponder altitude received by ATC may be unreliable.

6 Do **not** use the flight path vector.

7 Maintain visual conditions if possible.

8 **Checklist Complete Except Deferred Items**

Deferred Items

Review before descent:

Establish landing configuration early

Radio altitude reference is available below 2,500 feet

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

■ ■ ■ ■

AOA DISAGREE

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

1 Airspeed errors and the IAS DISAGREE alert may occur.

2 Altimeter errors and the ALT DISAGREE alert may occur.

■ ■ ■ ■

CDS FAULT

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

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

1 Do **not** takeoff.

■ ■ ■ ■

Display Failure

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

1 Choose one:

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

Continue normal operation.

■ ■ ■ ■

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

►►**Go to step 2**

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

3 LOWER DU selector . . . . .As needed

■ ■ ■ ■

DISPLAYS CONTROL PANEL

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

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

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

Select the operating control panel.

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

■ ■ ■ ■

DISPLAY SOURCE

Condition: The DSPLY SOURCE annunciation indicates only one DEU is supplying display information. Indications may include:

- No hydraulic pressure indication on the failed side
- Speed limit flag shown on the failed side
- Minimum maneuver speed and stick shaker band removed on the failed side
- Both EEC ALTN lights illuminated.

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

Dual autopilot approach is not available.

▼ Continued on next page ▼

▼**DISPLAY SOURCE continued**▼

1 Choose one:

◆DEU fails on the **same** side as the engaged autopilot:

Select the opposite autopilot.

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

►►**Go to step 2**

◆DEU fails on the **opposite** side as the engaged autopilot:

►►**Go to step 2**

2 Choose one:

◆**EEC ALTN** lights are **illuminated**:

►►**Go to step 3**

◆**EEC ALTN** lights are **not** illuminated:

■ ■ ■ ■

3 Choose one:

◆**EEC ALTERNATE MODE** checklist has been **completed**:

■ ■ ■ ■

◆**EEC ALTERNATE MODE** checklist has **not** been completed:

►►**Go to the EEC ALTERNATE MODE checklist on page 7.10**

■ ■ ■ ■

OFF

FLIGHT RECORDER OFF

Condition: The flight recorder is off.

1 Continue normal operation.

■ ■ ■ ■

IAS DISAGREE

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

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

■ ■ ■ ■

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ADS-B Out Failure

Condition: One or more of these occur:
- ATC reports ADS-B Out is lost or degraded
- GPS-L or GPS-R INVALID message is in the FMC scratchpad and the transponder is selected to the related side.

1 Transponder selector. . . . . Select opposite transponder

■ ■ ■ ■

MSG

FMC DISAGREE

YB521 - YB544, YC083, YC084, YC094 - YT197 (SB Changes YC074)

FMC
P/RST

Condition: Data needed for dual FMC operation disagree.

1 Choose one:

◆Flying an approach with an **RNP alerting requirement**:

Go-around unless suitable visual references can be established and maintained.

■ ■ ■ ■

◆Flying an approach **without** an RNP alerting requirement:

Verify position.

■ ■ ■ ■

MSG

FMC DISAGREE - VERTICAL

YB521 - YB544, YC083, YC084, YC094 - YR934
(SB Changes YC074)

FMC
P/RST

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

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

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

2 Monitor crossing altitudes to ensure compliance.

■ ■ ■ ■

Additional Information

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

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

FMC
P/RST

FMC FAIL

YC075 - YC081, YC092, YC093
(SB Changes YC074)

Condition: One or more of these occur:
- Loss of FMC data on a CDU
- Loss of FMC data on a navigation display map mode
- Illumination of the FMC alert light.

1 Resume conventional navigation. Without an operating FMC, LNAV and VNAV are not available.

2 **When** preparing for approach:

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

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

Use the N1 SET selector to set the N1 bugs.

■ ■ ■ ■

FMC P/RST

FMC FAIL

YB521 - YB544, YC083, YC084, YC094 - YT197 (SB Changes YC074)

Condition: Display of VTK followed by MAP failure flags on one or both navigation displays.

Objective: To restore dual FMC operation, configure for single FMC operation or resume conventional navigation.

Note: LNAV/VNAV may disengage.

1 Check both navigation display MAP modes and FMC CDUs.

2 Choose one:

◆No FMC data on the captain's and first officer's navigation display MAP modes **and** no FMC data on both CDUs:

Both FMCs are failed.

►►**Go to step 7**

◆No FMC data on the captain's navigation display MAP mode **and** no FMC data on both CDUs:

Left FMC is failed.

►►**Go to step 3**

◆No FMC data on the first officer's navigation display MAP mode, MSG light is illuminated **and** SINGLE FMC OPERATION scratchpad message is shown:

Right FMC is failed.

►►**Go to step 3**

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

Select the operating FMC.

4 **Wait** 1 minute.

5 Check for FMC-L and FMC-R bearing/distance information on POS SHIFT page 3/3.

▼ Continued on next page ▼

▼FMC FAIL continued▼

6 Choose one:

◆Bearing/distance information for **both** FMCs are displayed:

FMC source select switch . . . . . . NORMAL

■ ■ ■ ■

◆Bearing/distance information for only a **single** FMC is displayed:

Continue with single FMC operation.

■ ■ ■ ■

7 Resume conventional navigation. Without an operating FMC, LNAV and VNAV are not available.

YC095 - YT197

8 Verify position relative to terrain using conventional navigation.

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

9 **When** preparing for the approach:

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

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

Use the N1 SET selector to set the N1 bugs.

■ ■ ■ ■

MSG

FMC/CDU ALERTING MESSAGE

FMC P/RST

Condition: An alert message is in the FMC scratchpad.

1 Take action as needed by the message.

■ ■ ■ ■

GLS

GLS

YC095 - YT197

Condition: A GLS failure occurs.

1 Do not fly a GLS approach.

2 ILS and non-ILS approaches may be flown.

■ ■ ■ ■

GPS

GPS

Condition: Both GPS receivers are failed.

Note: The FMC uses only IRS or radio inputs.

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

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

■ ■ ■ ■

ILS

ILS

YC095 - YT197

Condition: An ILS failure occurs.

1 Do not fly an ILS approach.

2 GLS and non-ILS approaches may be flown.

■ ■ ■ ■

DC FAIL

IRS DC FAIL

Condition: IRS backup DC power is failed.

1 Choose one:

◆**One** IRS DC FAIL light is illuminated **and** all other IRS lights are **extinguished**:

Continue normal operation. The IRS is operating normally on AC power.

■ ■ ■ ■

◆**Both** IRS DC FAIL lights are illuminated:

The IRS is operating normally on AC power.

The battery is nearly discharged or the switched hot battery bus is not powered. The following systems may be inoperative:

Engine and APU fire extinguishing

APU start.

■ ■ ■ ■

FAULT

IRS FAULT

Condition: One or more of these occur:
- An IRS fault occurs
- On the ground, if the ALIGN light is also illuminated, the present position entry is possibly incorrect.

1 Choose one:

◆On the **ground**:

►►**Go to step 2**

◆**In flight**:

►►**Go to step 6**

On the ground

2 Choose one:

◆**ALIGN** light is **extinguished**:

Do not takeoff.

■ ■ ■ ■

◆**ALIGN** light is also **illuminated**:

IRS mode selector . . . . OFF

The FAULT light extinguishes immediately and the ALIGN light extinguishes after approximately 30 seconds.

►►**Go to step 3**

3 **After** the ALIGN light extinguishes:

IRS mode selector . . . . NAV

Enter present position.

▼ Continued on next page ▼

▼IRS FAULT continued▼

4 Choose one:

◆**ALIGN** light **is** flashing:

Re-enter present position.

►►**Go to step 5**

◆**ALIGN** light is **not** flashing:

►►**Go to step 5**

5 Choose one:

◆**FAULT** light **illuminates** again:

Do not takeoff.

■ ■ ■ ■

◆**FAULT** light does **not** illuminate again:

■ ■ ■ ■

In flight

6 The IRS ATT and/or NAV mode(s) can be inoperative.

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

8 Choose one:

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

►►**Go to step 9**

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

►►**Go to step 12**

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

▼ Continued on next page ▼

▼IRS FAULT continued▼

Action is irreversible.

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

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

The primary attitude display stays failed and the SET IRS HDG prompt on the POS INIT page is blank until the attitude mode alignment is complete.

11 Choose one:

◆FAULT light **extinguishes**:

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

The MAP display on the failed side is not available.

Note: Periodically enter updated heading on the POS INIT page or on the overhead IRS display unit by selecting HDG/STS.

Do **not** engage either autopilot.

■ ■ ■ ■

◆FAULT light **stays illuminated**:

►►**Go to step 12**

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

Note: Autopilot(s) cannot be engaged.

■ ■ ■ ■

ON DC

IRS ON DC

Condition: IRS AC power is failed.

1 Choose one:

◆**Left** IRS ON DC light is illuminated:

The left IRS continues to operate as long as DC power is available.

■ ■ ■ ■

◆**Right** IRS ON DC light is illuminated:

Power to the right IRS is removed after 5 minutes.

■ ■ ■ ■

RUNWAY DISAGREE

YT196, YT197

Condition: Airplane is not on the FMC origin runway when takeoff is attempted.

■ ■ ■ ■

UNABLE REQD NAV PERF - RNP

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

1 Choose one:

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

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

■ ■ ■ ■

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

Verify position.

■ ■ ■ ■

Intentionally
Blank

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Intentionally
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CONFIG

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

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

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

Verify that the LOW PRESSURE lights extinguish.

3 Resume normal fuel management.

■ ■ ■ ■

CROSSFEED SELECTOR INOPERATIVE

VALVE OPEN **May or may not be illuminated**

Condition: One of the following occurs:
- The crossfeed VALVE OPEN light stays illuminated bright blue
- The CROSSFEED selector is in the open position and the crossfeed VALVE OPEN light is extinguished
- When the CROSSFEED selector is rotated to a new position, the crossfeed VALVE OPEN light does not illuminate bright blue.

1 Check the FUEL CROSSFEED VALVE circuit breaker (P6-3:B7).

2 Choose one:

◆FUEL CROSSFEED VALVE circuit breaker is **tripped**:

It is not possible to determine the position of the fuel crossfeed valve.

Note: Verify that sufficient fuel is available to both engines to complete the flight.

Do **not** accomplish the following checklist:

IMBAL

■ ■ ■ ■

◆FUEL CROSSFEED VALVE circuit breaker is **not** tripped:

►►**Go to step 3**

▼ **Continued on next page** ▼

▼CROSSFEED SELECTOR INOPERATIVE continued▼

3 Choose one:

◆CROSSFEED selector is **closed**:

Crossfeed **valve** is failed open.

Note: Maintain fuel balance with selective use of fuel pumps.

■ ■ ■ ■

◆CROSSFEED selector is **open**:

Crossfeed **valve** is failed closed.

Note: As conditions allow, vary engine thrust as needed to maintain fuel balance.

Verify that sufficient fuel is available to both engines to complete the flight.

■ ■ ■ ■

FILTER BYPASS

FUEL FILTER BYPASS

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

1 Choose one:

◆Only **one** FILTER BYPASS light, ENG 1 or ENG 2, has illuminated during the flight:

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

■ ■ ■ ■

◆FILTER BYPASS lights for **both** engines illuminate or have illuminated at any time during the flight (either separately or at the same time):

►►**Go to step 2**

2 Plan to land at the nearest suitable airport.

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

■ ■ ■ ■

Fuel Leak Engine

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

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

1 A diversion may be needed.

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

3 CROSSFEED selector . . . . Close

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

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

The following steps check for an engine fuel leak

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

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

Fuel spray is observed from an engine or strut

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

7 Choose one:

◆Engine fuel leak is **confirmed**:

►►**Go to step 11**

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

►►**Go to step 8**

8 Choose one:

◆The center tank **contains** usable fuel:

►►**Go to step 9**

◆The center tank does **not** contain usable fuel:

►►**Go to step 10**

▼ Continued on next page ▼

▼Fuel Leak Engine continued▼

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

10 Resume normal fuel management.

■ ■ ■ ■

An engine fuel leak is confirmed

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

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

13 Autothrottle . . . . .Disengage

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

15 **When** the affected engine is at idle thrust:

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

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

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

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

17 Choose one:

◆APU is **available** for start:

APU . . . . START

When APU is running:

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

►►**Go to step 18**

◆APU is **not** available:

►►**Go to step 18**

18 Transponder mode selector . . . . TA ONLY

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

▼ Continued on next page ▼

▼Fuel Leak Engine continued▼

19 ISOLATION VALVE switch. . . . . Verify AUTO

This ensures bleed air is available to both wings if wing anti-ice is needed.

20 Choose one:

◆Fuel LOW alert is **shown**:

►►**Go to step 21**

◆Fuel LOW alert is **not** shown:

►►**Go to step 23**

21 CROSSFEED selector. . . . . Open

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

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

This ensures that all fuel is available for use.

23 Plan to land at the nearest suitable airport.

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

Note: Do not use FMC fuel predictions.

►►**Go to the One Engine Inoperative Landing checklist on page 7.20**

■ ■ ■ ■

Additional Information

Reasons that an engine fuel leak should be suspected:

- A visual observation of fuel spray
- The total fuel quantity is decreasing at an abnormal rate
- An engine has excessive fuel flow
- The fuel IMBAL alert shows
- The fuel LOW alert shows
- The USING RSV FUEL message shows on the FMC CDU
- The INSUFFICIENT FUEL message shows on the FMC CDU
- The CHECK FMC FUEL QUANTITY message shows on the FMC CDU.

Intentionally
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LOW PRESSURE

FUEL PUMP LOW PRESSURE

Condition: The fuel pump pressure is low.

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

1 Choose one:

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

Main tank FUEL PUMP switch (affected pump). . . . . OFF

Sufficient fuel pressure is available for normal operation.

■ ■ ■ ■

◆**Both main** tank fuel pump LOW PRESSURE lights are illuminated:

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

■ ■ ■ ■

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

►►**Go to step 2**

◆**Both CTR** tank fuel pump LOW PRESSURE lights are illuminated:

►►**Go to step 5**

2 CROSSFEED selector . . . . Open

This prevents fuel imbalance.

3 CTR FUEL PUMP switch (affected side) . . . . . . OFF

4 **When** the other CTR tank fuel pump LOW PRESSURE light illuminates:

CROSSFEED selector. . . . . Close

▼ Continued on next page ▼

▼FUEL PUMP LOW PRESSURE continued▼

Remaining CTR FUEL PUMP switch . . . . . . OFF

■ ■ ■ ■

Both CTR tank fuel pump LOW PRESSURE lights are illuminated

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

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

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

■ ■ ■ ■

Fuel Quantity Indication Inoperative

Condition: The fuel quantity indication is blank.

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

■ ■ ■ ■

Fuel Temperature Low

Condition: Fuel temperature is near the minimum.

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

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

TAT will increase approximately 0.5 to 0.7° C for each 0.01 Mach increase in speed. In extreme conditions, it may be necessary to descend as low as FL250.

■ ■ ■ ■

IMBAL

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

Objective: To decide if a fuel leak is suspected. To balance fuel if a fuel leak is not suspected.

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

2 The IMBAL alert may be caused by a fuel leak, an inoperative crossfeed valve or a fuel imbalance.

3 A fuel leak should be suspected if one or more of the following are true:

The total fuel remaining is less than the planned fuel remaining

An engine has excessive fuel flow.

4 Choose one:

◆A fuel leak is **suspected**:

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

■ ■ ■ ■

◆A fuel leak is **not** suspected:

►►**Go to step 5**

5 CROSSFEED selector . . . . Open

Verify that the VALVE OPEN light illuminates bright, then dim. This indicates that the crossfeed valve is operating correctly.

6 Choose one:

◆Crossfeed valve is operating **correctly**:

►►**Go to step 7**

◆Crossfeed valve is **not** operating correctly:

►►**Go to the CROSSFEED SELECTOR INOPERATIVE checklist on page 12.2**

■ ■ ■ ■

▼ Continued on next page ▼

▼IMBAL continued▼

7 Choose one:

◆**Main tank 1** quantity is low:

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

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

►►**Go to step 8**

◆**Main tank 2** quantity is low:

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

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

►►**Go to step 8**

8 **When** fuel balancing is complete:

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

CROSSFEED selector . . . . Close

■ ■ ■ ■

LOW

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

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

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

1 The fuel LOW alert may be caused by a fuel leak or low fuel.

2 A fuel leak should be suspected if one or more of the following are true:

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

An engine has excessive fuel flow.

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

3 Choose one:

◆A fuel leak is **suspected**:

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

■ ■ ■ ■

◆A fuel leak is **not** suspected:

►►**Go to step 4**

4 CROSSFEED selector. . . . . Open

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

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

This ensures that all fuel is available for use.

6 Plan to land at the nearest suitable airport.

■ ■ ■ ■

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LOW PRESSURE

HYDRAULIC PUMP LOW PRESSURE

Condition: The hydraulic pump pressure is low.

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

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

■ ■ ■ ■

OVERHEAT

HYDRAULIC PUMP OVERHEAT

Condition: The hydraulic pump temperature is high.

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

Note: One pump supplies sufficient pressure for normal system operation.

■ ■ ■ ■

LOSS OF SYSTEM A

FLT CONTROL	A HYD PUMPS	
A	ENG 1	ELEC 2
LOW PRESSURE	LOW PRESSURE	LOW PRESSURE

Condition: Hydraulic system A pressure is low.

1 System A
FLT CONTROL switch. . . . Confirm . . . .STBY RUD

2 System A
HYD PUMP switches (both). . . . . OFF

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

4 NOSE WHEEL STEERING switch . . . . ALT

5 Plan for manual gear extension.

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

Note: Inoperative Items

Autopilot A inop
Autopilot B is available.

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

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

Ground spoilers inop
Landing distance will be increased.

Alternate brakes inop
Normal brakes are available.

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

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

6 **Checklist Complete Except Deferred Items**

▼ Continued on next page ▼

Deferred Items

Descent Checklist

Pressurization . . . . LAND ALT ___

Recall . . . . Checked

Autobrake . . . . ___

Landing data . . . . VREF ___, Minimums ___

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ___

Manual Gear Extension

LANDING GEAR lever. OFF

Manual gear extension handles. . . . . Pull

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

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

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

LANDING GEAR lever . . . . DN

Landing Checklist

ENGINE START switches . . . . CONT

Speedbrake . . . . ARMED

Landing gear . . . . Down

Flaps . . . . ___, Green light

■ ■ ■ ■

LOSS OF SYSTEM B

FLT CONTROL	B HYD PUMPS	
B	ELEC 1	ENG 2
LOW PRESSURE	LOW PRESSURE	LOW PRESSURE

Condition: Hydraulic system B pressure is low.

1 System B
FLT CONTROL switch. . . . Confirm . . . .STBY RUD

2 System B
HYD PUMP switches (both). . . . . OFF

3 Plan a flaps 15 landing.

4 Set VREF 15 or VREF ICE.

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

- Engine anti–ice will be used during landing
- Wing anti–ice has been used any time during the flight
- Icing conditions were encountered during the flight and the landing temperature is below 10° C.

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

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

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

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

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

▼ Continued on next page ▼

▼LOSS OF SYSTEM B continued▼

Note: Inoperative Items

Autopilot B inop
Autopilot A is available.

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

Yaw damper inop

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

Leading edge flaps and slats normal hydraulic system inop
The leading edge flaps and slats can be extended with standby pressure. Once extended, they can not be retracted.

Autobrake inop
Use manual braking.

Normal brakes inop
Alternate brakes are available.

Engine 2 thrust reverser normal hydraulic pressure inop
Thrust reverser will deploy and retract at a slower rate and some thrust asymmetry can be anticipated during thrust reverser deployment.

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

8 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization. . . . . LAND ALT ___

Recall . . . . Checked

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

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

Approach briefing . . . . Completed

▼ Continued on next page ▼

▼LOSS OF SYSTEM B continued▼

Approach Checklist

Altimeters . . . . ___

Alternate Flap Extension

During flap extension, set the flap lever to the desired flap position.

230K maximum during alternate flap extension.

ALTERNATE FLAPS master switch . . . . ARM

Note: The landing gear configuration warning may sound if the flaps are between 10 and 15 and the landing gear are retracted.

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

Note: Operation within the lower amber airspeed band may be needed until the LE FLAPS TRANSIT light extinguishes.

If flap asymmetry occurs, release the switch immediately. There is no asymmetry protection.

ALTERNATE FLAPS
position switch . . . . Hold DOWN
to extend flaps
to 15 on schedule

As flaps are extending, slow to respective maneuvering speed.

Additional Deferred Item

GROUND PROXIMITY FLAP
INHIBIT switch . . . . FLAP INHIBIT

Landing Checklist

ENGINE START switches. . . . . CONT

Speedbrake . . . . ARMED

Landing gear . . . . Down

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

■ ■ ■ ■

MANUAL REVERSION or LOSS OF SYSTEM A AND SYSTEM B

FLT CONTROL A	FLT CONTROL B	HYD PUMPS ENG 1	HYD PUMPS ELEC 2	HYD PUMPS ELEC 1	HYD PUMPS ENG 2
LOW PRESSURE	LOW PRESSURE			LOW PRESSURE	LOW PRESSURE

Condition: Hydraulic system A and B pressures are low.

1 System A and B FLT CONTROL switches (both) . . . . . Confirm. . . . . . STBY RUD

2 YAW DAMPER switch . . . . ON

3 System A and B HYD PUMPS switches (all) . . . . OFF

4 Plan to land at the nearest suitable airport.

5 Plan a flaps 15 landing.

6 Set VREF 15 or VREF ICE.

> **Note:** If any of the following conditions apply, set VREF ICE = VREF 15 + 10 knots:
>
> - Engine anti–ice will be used during landing
> - Wing anti–ice has been used any time during the flight
> - Icing conditions were encountered during the flight and the landing temperature is below 10° C.

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

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

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

8 Plan for manual gear extension.

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

▼ Continued on next page ▼

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

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

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

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

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

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

13 Do not attempt to taxi the airplane after stopping.

Note: Inoperative Items

Autopilots A and B inop

All flight spoilers inop

Roll rate will be reduced and speedbrakes will not be available in flight.

Trailing edge flaps normal hydraulic system inop

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

Leading edge flaps and slats normal hydraulic system inop

The leading edge flaps and slats can be extended with standby hydraulic pressure. Once extended, they can not be retracted.

Normal landing gear extension and retraction inop

Manual gear extension is needed.

Autobrake inop

Ground spoilers inop

Landing distance will be increased.

Normal and alternate brakes inop

Inboard and outboard brakes have accumulator pressure only. On landing, apply steady brake pressure without modulating the brakes.

Both thrust reversers normal pressure inop

Thrust reversers will deploy and retract at a slower rate.

Nose wheel steering inop

Do not attempt to taxi the airplane after stopping.

▼ Continued on next page ▼

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

14 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization. . . . . LAND ALT ___

Recall . . . . Checked

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

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

Approach briefing . . . . Completed

Go-Around Procedure Review

Do the normal go-around procedure except:

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

Be prepared to trim.

Limit bank angle to 15° when airspeed is less than the minimum maneuver speed.

Approach Checklist

Altimeters . . . . ___

▼ Continued on next page ▼

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

Alternate Flap Extension

During flap extension, set the flap lever to the desired flap position.

230K maximum during alternate flap extension.

ALTERNATE FLAPS master switch . . . . ARM

Note: The landing gear configuration warning may sound if the flaps are between 10 and 15 and the landing gear are retracted.

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

Note: Operation within the lower amber airspeed band may be needed until the LE FLAPS TRANSIT light extinguishes.

If flap asymmetry occurs, release the switch immediately. There is no asymmetry protection.

ALTERNATE FLAPS position switch . . . . Hold DOWN to extend flaps to 15 on schedule

As flaps are extending, slow to respective maneuvering speed.

Manual Gear Extension

LANDING GEAR lever. . . . . OFF

Manual gear extension handles . . . . Pull

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

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

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

LANDING GEAR lever . . . . DN

▼ Continued on next page ▼

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

Additional Deferred Item

GROUND PROXIMITY FLAP
INHIBIT switch . . . . FLAP INHIBIT

Landing Checklist

ENGINE START switches . . . . CONT

Speedbrake . . . . **DOWN detent**

Landing gear . . . . Down

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

■ ■ ■ ■

LOW PRESSURE

STANDBY HYDRAULIC LOW PRESSURE

Condition: The standby hydraulic pump pressure is low.

Note: With a loss of hydraulic system A and B, the rudder is inoperative.

■ ■ ■ ■

LOW QUANTITY

STANDBY HYDRAULIC LOW QUANTITY

Condition: The standby hydraulic quantity is low.

1 Continue normal operation.

■ ■ ■ ■

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ANTISKID INOP

ANTISKID INOPERATIVE

Condition: An antiskid system fault occurs.

Caution! Locked wheel protection is not available.

1 AUTO BRAKE select switch. . . . . OFF

The autobrake system is inoperative.

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

Automatic speedbrake extension may be inoperative.

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

4 **Checklist Complete Except Deferred Items**

▼ Continued on next page ▼

Deferred Items

Landing Procedure Review

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

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

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

Descent Checklist

Pressurization . . . . LAND ALT ___

Recall . . . . Checked

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

Landing data . . . . VREF ___, Minimums ___

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ___

Landing Checklist

ENGINE START switches . . . . CONT

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

Landing gear . . . . Down

Flaps . . . . ___, Green light

■ ■ ■ ■

Intentionally
Blank

AUTO BRAKE DISARM

AUTO BRAKE DISARM

Condition: The autobrake system disarms after being set.

1 Choose one:

◆On the **ground**:

AUTO BRAKE select switch . . . . OFF

►►**Go to step 2**

◆**In flight**:

►►**Go to step 3**

2 Choose one:

◆AUTO BRAKE DISARM light **extinguishes**:

■ ■ ■ ■

◆AUTO BRAKE DISARM light **stays illuminated**:

Do not takeoff.

■ ■ ■ ■

3 AUTO BRAKE select switch. . . . OFF, then reselect

4 Choose one:

◆AUTO BRAKE DISARM light **stays extinguished**:

■ ■ ■ ■

◆AUTO BRAKE DISARM light **illuminates again**:

AUTO BRAKE select switch . . . . OFF

Use manual brakes for landing.

►►**Go to step 5**

5 **Checklist Complete Except Deferred Items**

▼ **Continued on next page** ▼

▼AUTO BRAKE DISARM continued▼

Deferred Items

Descent Checklist

Pressurization. . . . . LAND ALT ___
Recall . . . . Checked
Autobrake **. . . . . .OFF**
Landing data . . . . .VREF ___, Minimums ___
Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ___

Landing Checklist

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

■ ■ ■ ■

Brake Pressure Indicator Zero PSI

Condition: The brake accumulator has no nitrogen precharge.

1 Accumulator braking is not available.

Note: If hydraulic systems indications are normal, brake operation is unaffected.

■ ■ ■ ■

GEAR DISAGREE

LEFT GEAR	NOSE GEAR	RIGHT GEAR

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

Note: Do not exceed the gear EXTEND limit speed (270K/.82M).

Do not use FMC fuel predictions with gear extended.

1 Choose one:

◆LANDING GEAR lever is **UP**:

►►**Go to step 5**

◆LANDING GEAR lever is **OFF**:

►►**Go to step 2**

◆LANDING GEAR lever is **DN**:

►►**Go to step 9**

2 Choose one:

◆LANDING GEAR lever **moved** to the UP position after takeoff:

►►**Go to step 3**

◆LANDING GEAR lever did **not** move to the UP position after takeoff:

►►**Go to the Landing Gear Lever Will Not Move Up After Takeoff checklist on page 14.12**

■ ■ ■ ■

235K maximum

3 ⚠LANDING GEAR lever . . . . UP

▼ Continued on next page ▼

▼GEAR DISAGREE continued▼

4 Choose one:

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

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

■ ■ ■ ■

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

►►**Go to step 8**

5 Choose one:

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

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

►►**Go to step 6**

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

►►**Go to step 8**

235K maximum

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

7 Choose one:

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

LANDING GEAR lever . . . . OFF

■ ■ ■ ■

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

►►**Go to step 8**

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

■ ■ ■ ■

▼ Continued on next page ▼

9 Check landing gear indicator lights.

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

10 Choose one:

◆**All** landing gear indicate **down and locked** and one or more **red** landing gear indicator lights are also **illuminated**:

►►**Go to step 11**

◆**Any** landing gear is **not** down and locked:

►►**Go to the Manual Gear Extension checklist on page 14.16**

■ ■ ■ ■

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

12 Choose one:

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

■ ■ ■ ■

◆**One or more red** landing gear indicator lights stay **illuminated**:

GROUND PROXIMITY GEAR INHIBIT switch . . . . GEAR INHIBIT

Land normally.

■ ■ ■ ■

Landing Gear Lever Jammed in the Up Position

Condition: The LANDING GEAR lever will not move from the UP position.

Note: Start this checklist **only** when ready to extend the gear for landing.

Once the gear is extended, do **not** retract.

270K/.82M maximum.

1 LANDING GEAR override trigger . . . . Pull

2 LANDING GEAR lever . . . . DN

3 Choose one:

◆LANDING GEAR **lever** moves to the **DN** position:

►►**Go to step 4**

◆LANDING GEAR **lever** does **not** move to the DN position:

►►**Go to step 6**

4 Check landing gear indicator lights.

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

5 Choose one:

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

Plan to land at the nearest suitable airport.

■ ■ ■ ■

◆**One or more** landing gear do **not** indicate down and locked:

►►**Go to the Manual Gear Extension checklist on page 14.16**

■ ■ ■ ■

6 NOSE WHEEL STEERING switch . . . . Verify NORM

Nose wheel steering is not available.

▼ Continued on next page ▼

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

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

270K/.82M maximum.

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

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

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

8 Check landing gear indicator lights.

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

9 Choose one:

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

►►**Go to step 10**

◆**One or more** landing gear do **not** indicate down and locked:

►►**Go to the Partial or All Gear Up Landing checklist on page 14.18**

■ ■ ■ ■

10 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization . . . . LAND ALT ___

Recall . . . . Checked

Autobrake . . . . ___

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

Approach briefing . . . . Completed

▼ Continued on next page ▼

▼Landing Gear Lever Jammed in the Up Position continued▼

Approach Checklist

Altimeters . . . . ___

Additional Deferred Item

GROUND PROXIMITY GEAR
INHIBIT switch . . . . GEAR INHIBIT

Landing Checklist

ENGINE START switches . . . . CONT

Speedbrake . . . . ARMED

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

Flaps . . . . ___, Green light

Note: Nose wheel steering is not available.

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

■ ■ ■ ■

Landing Gear Lever Will Not Move Up After Takeoff

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

Note: Do not use FMC fuel predictions.

1 LANDING GEAR lever . . . . DN

2 Retract the flaps on schedule.

3 Choose one:

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

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

►►**Go to step 4**

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

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

Do **not** retract the gear.

►►**Go to step 8**

235K maximum.

4 ⚠ LANDING GEAR override trigger . . . . Pull

5 LANDING GEAR lever . . . . UP

▼ Continued on next page ▼

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

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

LANDING GEAR lever . . . . OFF

7 Continue normal operation.

■ ■ ■ ■

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

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

Caution! Do not use the speedbrakes in flight.

9 Plan to land at the nearest suitable airport.

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

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

12 **Checklist Complete Except Deferred Items**

▼ Continued on next page ▼

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

Deferred Items

Descent Checklist

Pressurization . . . . LAND ALT ___

Recall . . . . Checked

Autobrake . . . . **OFF**

Landing data . . . . VREF ___, Minimums ___

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ___

Gear Down Verification

LANDING GEAR lever. . . . . Verify DN

Landing Checklist

ENGINE START switches. . . . . CONT

Speedbrake . . . . **DOWN detent**

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

Flaps . . . . ___, Green light

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

■ ■ ■ ■

Intentionally
Blank

Manual Gear Extension

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

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

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

270K/.82M maximum.

2 Manual gear extension handles (affected gear) . . . . Pull

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

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

LANDING GEAR lever . . . . DN (if possible)

4 Check landing gear indicator lights.

Note: If the LANDING GEAR lever is in the OFF position, the red landing gear indicator lights will also be illuminated.

5 Choose one:

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

►►**Go to step 6**

◆ **One or more** landing gear do **not** indicate down and locked:

►►**Go to the Partial or All Gear Up Landing checklist on page 14.18**

■ ■ ■ ■

▼ Continued on next page ▼

▼Manual Gear Extension continued▼

6 Choose one:

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

Land normally.

■ ■ ■ ■

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

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

Land normally.

Note: Nose wheel steering is not available.

■ ■ ■ ■

Partial or All Gear Up Landing

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

1 Choose one:

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

►►**Go to step 2**

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

►►**Go to the Manual Gear Extension checklist on page 14.16**

■ ■ ■ ■

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

3 Burn off fuel to reduce touchdown speed.

4 Plan a flaps 40 landing.

5 Set VREF 40.

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

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

The flight deck chime for an incoming call from the cabin crew is unavailable.

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

This prevents inadvertent deployment of ground spoilers after landing.

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

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

10 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization. . . . . LAND ALT ___

Recall . . . . Checked

▼ Continued on next page ▼

▼Partial or All Gear Up Landing continued▼

Autobrake . . . . **OFF**

Landing data . . . . . **VREF 40___, Minimums ___**

Approach briefing . . . . Completed

Approach Checklist

Altimeters . . . . ___

Landing Procedure Review

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

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

Turn all fuel pump switches OFF just before the flare.

After stopping, do the Evacuation checklist, if needed.

Additional Deferred Items

APU switch. . . . . OFF

GROUND PROXIMITY GEAR
INHIBIT switch . . . . GEAR INHIBIT

When on approach:

Engine BLEED air switches . . . . OFF

This ensures the airplane is depressurized at touchdown.

Landing Checklist

ENGINE START switches . . . . CONT

Speedbrake . . . . **DOWN detent**

Landing gear . . . . ___ **Down**

Flaps. . . . . **40, Green light**

■ ■ ■ ■

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LANDING CONFIGURATION

Condition: In flight, the steady warning horn sounds.

1 Assure correct airplane landing configuration.

■ ■ ■ ■

TAKEOFF CONFIGURATION

TAKEOFF CONFIG **(If installed and operative)**

Condition: On the ground, the intermittent cabin altitude/configuration warning horn sounds or a TAKEOFF CONFIG light (if installed and operative) illuminates when advancing the thrust levers to takeoff thrust.

1 Assure correct airplane takeoff configuration.

■ ■ ■ ■

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

(If installed and operative)

Left Forward Panel

TAKEOFF CONFIG	CABIN ALTITUDE

Right Forward Panel

CABIN ALTITUDE	TAKEOFF CONFIG

Condition: One of these occurs:

- In flight, at an airplane flight altitude above 10,000 feet MSL, the intermittent warning horn sounds or a CABIN ALTITUDE light (if installed and operative) illuminates
- On the ground, the intermittent warning horn sounds or a TAKEOFF CONFIG light (if installed and operative) illuminates when advancing the thrust levers to takeoff thrust.

1 **If** the intermittent warning horn sounds or a CABIN ALTITUDE light (if installed and operative) illuminates **in flight** at an airplane flight altitude above 10,000 feet MSL:

Don the oxygen masks and set the regulators to 100%.

Establish crew communications.

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

■ ■ ■ ■

2 **If** the intermittent warning horn sounds or a TAKEOFF CONFIG light (if installed and operative) illuminates **on the ground** when advancing the thrust levers to takeoff thrust:

Assure correct airplane takeoff configuration.

■ ■ ■ ■

INOP

GROUND PROXIMITY INOPERATIVE

Condition: A ground proximity warning system fault occurs.

Note: Some or all GPWS alerts are not available. GPWS alerts which occur are valid.

■ ■ ■ ■

Overspeed

Condition: Airspeed is more than Vmo/Mmo.

■ ■ ■ ■

PSEU

PSEU

Condition: A proximity switch electronics unit fault occurs.

Note: The PSEU light illuminates on the ground only.

1 Choose one:

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

►►**Go to step 2**

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

■ ■ ■ ■

2 Choose one:

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

Do **not** takeoff.

■ ■ ■ ■

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

■ ■ ■ ■

Tail Strike

Condition: The tail hits the runway.

Caution! Do not pressurize the airplane. Pressurizing the airplane may cause further structural damage.

1 Pressurization mode selector . . . . MAN

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

3 Plan to land at the nearest suitable airport.

■ ■ ■ ■

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EFB Failure

Condition: A fault is observed in one or more of the EFB units.

Objective: To restore dual EFB operation, configure for single EFB operation or resume per approved operational procedures.

1 Green START/STOP switch . . . . .Push

2 Choose one:

◆The unit powers down,
green START/STOP light **extinguishes**:

►►**Go to step 4**

◆The unit does **not** power down,
green START/STOP light **stays illuminated**:

►►**Go to step 3**

3 Green START/STOP switch . . . . Push and hold for min. 4 seconds until EFB powers down

4 Green START/STOP switch . . . . . . Push and hold until it illuminates

Note: The EFB unit restarts.

5 Choose one:

◆**Both** EFB's are **operative**:

Continue normal operation.

■ ■ ■ ■

◆**One** or **both** EFB's are **inoperative**:

Multiple levels of failure can be possible. Flight crews are authorized to use any mode of the EFB that is operational.

■ ■ ■ ■

EFB POWER FAULT

Condition: Aircraft power to the EFB is lost. One or more of these occur:
- Amber POWER FAULT light on the EFB control panel illuminates
- POWER FAULT alert shows on the EFB display.

Note: The internal EFB battery will be available for at least 35 minutes from the time aircraft power is lost.

1 Choose one:

◆**Both** EFB's are **operative**:

►►**Go to step 2**

◆**One** or **both** EFB's are **inoperative**:

Operate per approved operational procedures.

■ ■ ■ ■

Do this step only at the discretion of the commander.

2 ⚠ Consider switching off at least one EFB unit.

Note: Both EFB units are equipped with an internal battery power source. Switching off one or both EFB unit(s) temporarily provides EFB functionality when needed.

EFB NON-NORMAL SHUTDOWN

Condition:	If an abnormal condition such as smoke is detected.
Objective:	To perform a hard shutdown and switch off aircraft power to the related EFB.

1 Green START/STOP switch . . . . Push and hold for min. 4 seconds until EFB powers down

2 EFB disconnect switch (affected side) . . . . . OFF

Use the EFB-1 or EFB-2 disconnect switch on the aft overhead panel to switch off aircraft power to the related EFB.

■ ■ ■ ■

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Operational Information — Chapter OI

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Operators Information — Chapter OI
Electronic Flight Bag — Section 1

General

EFB Operators information and EFB Non-Norrmal Checlists shows EFB non-normal procedures from the AFM supplement for the dual Navaero EFB.

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Performance Inflight - QRH Chapter PI-QRH

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737-800W CFM56-7B27 KG M JAA CATC/N TALPA

Performance Inflight - QRH — Chapter PI-QRH
General — Section 60

Flight With Unreliable Airspeed/ Turbulent Air Penetration

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

Climb (280/.76)

Flaps Up, Set Max Climb Thrust

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

Cruise (.76/280)

Flaps Up, %N1 for Level Flight

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

Descent (.76/280)

Flaps Up, Set Idle Thrust

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

Holding (VREF40 + 70)

Flaps Up, %N1 for Level Flight

PRESSURE ALTITUDE (FT)		WEIGHT (1000 KG) 40	50	60	70	80
10000	**PITCH ATT**	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
	%N1	53	58	62	66	69
5000	**PITCH ATT**	**5.0**	**5.5**	**5.0**	**5.0**	**5.0**
	%N1	49	54	58	62	66

Terminal Area (5000 FT)

%N1 for Level Flight

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG) 40	50	60	70	80
FLAPS 1 (GEAR UP)	**PITCH ATT**	**5.0**	**5.0**	**5.5**	**6.0**	**6.0**
(VREF40 + 50)	%N1	51	56	60	65	68
FLAPS 5 (GEAR UP)	**PITCH ATT**	**5.5**	**6.0**	**6.0**	**6.5**	**6.5**
(VREF40 + 30)	%N1	51	56	61	65	69
FLAPS 15 (GEAR DOWN)	**PITCH ATT**	**5.5**	**6.0**	**6.0**	**6.0**	**6.5**
(VREF40 + 20)	%N1	60	66	71	75	79

Flight With Unreliable Airspeed/ Turbulent Air Penetration

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

Final Approach (1500 FT)

Gear Down, %N1 for 3° Glideslope

FLAP POSITION (VREF + INCREMENT)		WEIGHT (1000 KG)				
		40	50	60	70	80
FLAPS 15 (VREF15 + 10)	**PITCH ATT**	**2.0**	**2.5**	**2.5**	**2.5**	**2.5**
	%N1	43	47	51	55	58
FLAPS 30 (VREF30 + 10)	**PITCH ATT**	**0.5**	**1.0**	**1.0**	**1.0**	**1.0**
	%N1	47	52	57	60	64
FLAPS 40 (VREF40 + 10)	**PITCH ATT**	**-0.5**	**0.0**	**0.0**	**0.0**	**0.0**
	%N1	53	58	63	67	70

Max Climb %N1

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

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

%N1 Adjustments for Engine Bleeds

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

***Dual bleed sources**

Go-around %N1

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

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

%N1 Adjustments for Engine Bleeds

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

VREF

WEIGHT (1000 KG)	FLAPS		
	40	30	15
85	160	168	177
80	155	163	172
75	151	158	167
70	146	153	161
65	141	148	156
60	135	142	149
55	128	136	143
50	122	129	136
45	115	122	128
40	108	115	121

Intentionally
Blank

Performance Inflight - QRH — Chapter PI-QRH
Advisory Information — Section 61

ADVISORY INFORMATION

Runway Condition

REPORTED BRAKING ACTION	RUNWAY DESCRIPTION
Dry	Dry
Good	Wet (Smooth, Grooved or PFC) or Frost 3 mm (0.12 inches) or less of: Water, Slush, Dry Snow or Wet Snow
Good to Medium	Compacted Snow at or below -15°C OAT
Medium	Wet (Slippery), Dry Snow or Wet Snow (any depth) over Compacted Snow Greater than 3 mm (0.12 inches) of : Dry Snow or Wet Snow Compacted Snow at OAT warmer than -15°C
Medium to Poor	Greater than 3 mm (0.12 inches) of: Water or Slush
Poor	Ice
Nil	Wet Ice, Water on top of Compacted Snow, Dry Snow or Wet Snow over Ice

ADVISORY INFORMATION

Normal Configuration Landing Distance

Flaps 30

	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF30	ONE REV	NO REV

Dry Runway

MAX MANUAL	1280	65/-65	25/35	-40/140	10/-10	25/-25	40	25	45
AUTOBRAKE MAX	1575	70/-75	35/40	-50/175	0/0	35/-35	65	0	5
AUTOBRAKE 3	2160	110/-125	50/70	-85/290	0/0	60/-60	110	0	0
AUTOBRAKE 2	2695	160/-175	75/105	-115/395	35/-45	75/-75	110	70	70
AUTOBRAKE 1	2955	190/-205	90/120	-140/465	75/-85	80/-80	100	225	335

Good Reported Braking Action

MAX MANUAL	1705	85/-90	40/50	-70/235	40/-35	40/-40	60	80	180
AUTOBRAKE MAX	1805	90/-100	45/60	-70/240	35/-30	40/-40	70	85	195
AUTOBRAKE 3	2160	110/-125	50/70	-85/290	5/0	60/-60	110	5	15
AUTOBRAKE 2	2695	160/-175	75/105	-115/395	35/-45	75/-75	110	70	70
AUTOBRAKE 1	2955	190/-205	90/120	-140/465	75/-85	80/-80	100	225	335

Good To Medium Reported Braking Action

MAX MANUAL	1985	110/-115	50/70	-90/310	70/-55	50/-50	65	150	350
AUTOBRAKE MAX	2055	115/-120	55/70	-90/315	65/-50	50/-50	80	150	360
AUTOBRAKE 3	2275	125/-135	60/80	-100/340	40/-25	60/-60	110	85	245
AUTOBRAKE 2	2725	160/-175	80/105	-120/425	55/-60	75/-75	110	95	165
AUTOBRAKE 1	2960	190/-205	90/120	-140/475	85/-90	80/-85	100	235	370

Medium Reported Braking Action

MAX MANUAL	2265	130/-140	65/85	-110/385	100/-75	60/-60	75	220	520
AUTOBRAKE MAX	2305	140/-145	65/85	-110/390	90/-70	60/-60	85	220	525
AUTOBRAKE 3	2390	140/-145	65/85	-110/395	75/-50	65/-65	110	160	470
AUTOBRAKE 2	2755	160/-180	80/105	-125/450	75/-70	75/-75	110	120	260
AUTOBRAKE 1	2970	190/-205	90/120	-140/485	100/-90	80/-85	100	240	405

Medium To Poor Reported Braking Action

MAX MANUAL	2580	160/-165	80/105	-135/495	165/-115	65/-70	80	340	860
AUTOBRAKE MAX	2600	165/-170	80/105	-135/500	165/-110	65/-70	90	340	865
AUTOBRAKE 3	2655	165/-170	80/105	-135/505	150/-100	70/-70	105	310	840
AUTOBRAKE 2	2920	180/-195	90/120	-145/540	145/-105	80/-80	105	255	660
AUTOBRAKE 1	3085	200/-215	95/130	-155/565	160/-125	85/-90	100	340	735

Poor Reported Braking Action

MAX MANUAL	2895	190/-195	90/125	-160/610	235/-155	75/-80	85	460	1200
AUTOBRAKE MAX	2900	190/-195	90/125	-160/610	235/-155	75/-80	90	460	1210
AUTOBRAKE 3	2920	195/-195	90/125	-160/615	230/-145	75/-80	100	460	1215
AUTOBRAKE 2	3080	200/-205	100/130	-165/635	220/-145	80/-85	105	385	1065
AUTOBRAKE 1	3200	215/-220	100/140	-175/650	225/-155	85/-90	100	435	1070

Reference distance is based on sea level, standard day, no wind or slope, VREF30 approach speed, two-engine detent No. 2 reverse thrust, and auto speedbrakes.
For max manual braking and manual speedbrakes, increase reference landing distance by 70 m.
For autobrake and manual speedbrakes, increase reference landing distance by 65 m.
Reference Distance includes an air distance allowance of 455 m from threshold to touchdown.
All reference distances and adjustments shown have been increased by 15%.

***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 40

	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF40	ONE REV	NO REV

Dry Runway

MAX MANUAL	1230	65/-60	25/30	-40/130	10/-10	25/-25	40	15	40
AUTOBRAKE MAX	1480	65/-70	30/40	-45/160	0/0	30/-30	65	0	0
AUTOBRAKE 3	2005	100/-115	45/65	-80/270	0/0	50/-50	105	0	0
AUTOBRAKE 2	2510	145/-160	70/90	-110/380	25/-40	70/-70	110	40	40
AUTOBRAKE 1	2775	175/-190	85/110	-130/450	65/-75	75/-75	100	180	255

Good Reported Braking Action

MAX MANUAL	1635	80/-85	40/50	-65/230	40/-35	35/-35	60	75	160
AUTOBRAKE MAX	1730	85/-90	40/50	-70/235	35/-30	40/-40	70	80	175
AUTOBRAKE 3	2015	100/-115	45/65	-80/275	10/-5	50/-50	110	5	15
AUTOBRAKE 2	2510	145/-160	70/90	-110/380	25/-40	70/-70	110	40	40
AUTOBRAKE 1	2775	175/-190	85/110	-130/450	65/-75	75/-75	100	180	255

Good To Medium Reported Braking Action

MAX MANUAL	1900	100/-110	50/65	-85/305	70/-55	45/-45	65	135	315
AUTOBRAKE MAX	1960	105/-115	50/65	-85/310	60/-50	45/-50	80	140	320
AUTOBRAKE 3	2130	110/-125	55/70	-95/335	45/-30	55/-55	105	90	235
AUTOBRAKE 2	2545	145/-165	70/95	-115/405	45/-50	70/-70	110	65	130
AUTOBRAKE 1	2785	175/-190	85/110	-130/455	80/-80	75/-75	100	185	285

Medium Reported Braking Action

MAX MANUAL	2165	120/-130	60/80	-105/380	100/-75	50/-50	75	195	465
AUTOBRAKE MAX	2190	125/-140	65/80	-105/385	85/-70	50/-60	85	195	465
AUTOBRAKE 3	2245	125/-140	65/80	-110/390	80/-50	60/-60	105	175	450
AUTOBRAKE 2	2580	150/-165	70/100	-120/430	65/-65	70/-70	110	85	220
AUTOBRAKE 1	2790	175/-190	85/110	-130/465	90/-85	75/-75	100	195	315

Medium To Poor Reported Braking Action

MAX MANUAL	2460	150/-160	70/100	-130/490	165/-110	60/-65	80	305	770
AUTOBRAKE MAX	2475	150/-160	75/100	-130/490	160/-110	60/-65	85	305	770
AUTOBRAKE 3	2510	150/-165	75/100	-135/495	150/-100	65/-65	100	295	760
AUTOBRAKE 2	2740	165/-180	80/110	-140/525	140/-100	70/-75	105	210	585
AUTOBRAKE 1	2905	185/-200	90/120	-150/550	155/-120	80/-80	100	290	625

Poor Reported Braking Action

MAX MANUAL	2755	180/-185	85/115	-160/600	230/-150	70/-75	85	415	1070
AUTOBRAKE MAX	2765	180/-185	85/120	-160/600	230/-150	70/-75	85	415	1070
AUTOBRAKE 3	2775	180/-190	85/120	-160/605	225/-145	70/-75	100	415	1075
AUTOBRAKE 2	2900	185/-190	85/120	-160/615	215/-140	75/-80	105	335	955
AUTOBRAKE 1	3015	195/-205	90/125	-165/635	220/-150	80/-85	100	385	935

Reference distance is based on sea level, standard day, no wind or slope, VREF40 approach speed, two-engine detent No. 2 reverse thrust, and auto speedbrakes.
For max manual braking and manual speedbrakes, increase reference landing distance by 65 m.
For autobrake and manual speedbrakes, increase reference landing distance by 50 m.
Reference Distance includes an air distance allowance of 455 m from threshold to touchdown.
All reference distances and adjustments shown have been increased by 15%.

***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

All Flaps Up Landing

VREF40 + 55

BRAKING CONFIGURATION	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF	ONE REV	NO REV
Dry Runway									
MAX MANUAL	1480	185/-85	50/105	-45/205	20/-15	35/-35	45	45	95
AUTOBRAKE MAX	2005	85/-90	45/70	-60/195	5/-5	50/-50	75	5	20
AUTOBRAKE 2	3510	195/-225	115/150	-130/430	75/-85	105/-105	100	280	330
Good Reported Braking Action									
MAX MANUAL	1905	85/-95	50/65	-65/230	40/-35	45/-50	45	110	255
AUTOBRAKE MAX	2150	90/-100	55/75	-75/245	30/-25	55/-55	70	85	225
AUTOBRAKE 2	3510	195/-225	115/150	-130/430	75/-85	105/-105	100	280	330
Good To Medium Reported Braking Action									
MAX MANUAL	2275	115/-125	65/90	-90/310	75/-60	60/-65	55	215	515
AUTOBRAKE MAX	2440	120/-130	70/95	-95/320	65/-55	65/-65	75	205	515
AUTOBRAKE 2	3540	200/-225	115/150	-135/455	90/-95	105/-105	100	305	435
Medium Reported Braking Action									
MAX MANUAL	2645	145/-155	80/110	-110/385	105/-85	70/-75	65	315	775
AUTOBRAKE MAX	2730	150/-160	85/115	-110/390	100/-80	75/-75	75	325	800
AUTOBRAKE 3	3100	145/-170	90/120	-120/420	65/-60	90/-90	110	165	510
Medium To Poor Reported Braking Action									
MAX MANUAL	3060	185/-190	100/140	-140/495	180/-130	85/-90	75	505	1345
AUTOBRAKE MAX	3105	185/-195	105/140	-140/500	175/-120	90/-90	85	505	1355
AUTOBRAKE 3	3350	180/-200	105/145	-145/520	145/-105	95/-100	110	385	1175
Poor Reported Braking Action									
MAX MANUAL	3470	220/-225	120/165	-165/605	250/-170	95/-100	80	690	1915
AUTOBRAKE MAX	3475	215/-225	120/165	-165/605	245/-160	100/-100	90	685	1905
AUTOBRAKE 3	3595	210/-225	120/165	-170/615	220/-150	100/-105	110	600	1840

Reference distance is based on sea level, standard day, no wind or slope, and maximum available reverse thrust.
MAX MANUAL assumes maximum achievable manual braking.
Reference Distance includes an air distance allowance of 455 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***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
ANTISKID INOPERATIVE (Flaps 15)
VREF15

	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF	ONE REV	NO REV
Dry Runway									
MAX MANUAL	1945	105/-110	50/65	-80/290	55/-45	45/-45	60	145	345
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 2	Autobrake Inoperative								
Good Reported Braking Action									
MAX MANUAL	2165	125/-130	60/80	-100/350	85/-65	50/-55	70	215	530
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 2	Autobrake Inoperative								
Good To Medium Reported Braking Action									
MAX MANUAL	2450	155/-155	75/100	-125/450	145/-100	60/-65	75	340	905
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 2	Autobrake Inoperative								
Medium Reported Braking Action									
MAX MANUAL	2735	180/-180	85/120	-145/545	200/-135	70/-75	80	460	1280
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 3	Autobrake Inoperative								
Medium To Poor Reported Braking Action									
MAX MANUAL	3170	220/-220	105/150	-195/775	415/-220	80/-90	90	780	2600
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 3	Autobrake Inoperative								
Poor Reported Braking Action									
MAX MANUAL	3600	260/-260	120/175	-245/1005	625/-305	85/-105	95	1100	3915
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 3	Autobrake Inoperative								

Reference distance is based on sea level, standard day, no wind or slope, and maximum available reverse thrust.
MAX MANUAL assumes maximum achievable manual braking.
Reference Distance includes an air distance allowance of 455 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***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
ANTISKID INOPERATIVE (Flaps 30)
VREF30

	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF	ONE REV	NO REV

Dry Runway

MAX MANUAL	1845	95/-105	45/60	-80/280	55/-45	40/-45	60	125	300
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 2	Autobrake Inoperative								

Good Reported Braking Action

MAX MANUAL	2045	115/-120	55/75	-95/340	80/-65	50/-50	65	185	455
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 2	Autobrake Inoperative								

Good To Medium Reported Braking Action

MAX MANUAL	2305	140/-145	70/90	-120/435	135/-95	60/-60	75	290	765
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 2	Autobrake Inoperative								

Medium Reported Braking Action

MAX MANUAL	2565	165/-165	80/105	-140/530	190/-125	65/-70	80	395	1075
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 3	Autobrake Inoperative								

Medium To Poor Reported Braking Action

MAX MANUAL	2960	200/-200	95/130	-190/755	390/-205	70/-85	85	670	2145
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 3	Autobrake Inoperative								

Poor Reported Braking Action

MAX MANUAL	3355	235/-235	110/155	-235/980	590/-285	75/-100	90	945	3215
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 3	Autobrake Inoperative								

Reference distance is based on sea level, standard day, no wind or slope, and maximum available reverse thrust.
MAX MANUAL assumes maximum achievable manual braking.
Reference Distance includes an air distance allowance of 455 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***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
ANTISKID INOPERATIVE (Flaps 40)
VREF40

	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF	ONE REV	NO REV

Dry Runway

MAX MANUAL	1765	90/-100	45/60	-80/275	55/-45	40/-40	60	115	265
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 2	Autobrake Inoperative								

Good Reported Braking Action

MAX MANUAL	1955	105/-115	50/70	-95/335	80/-60	45/-45	65	170	405
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 2	Autobrake Inoperative								

Good To Medium Reported Braking Action

MAX MANUAL	2200	130/-135	60/85	-120/430	135/-90	55/-55	75	265	680
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 2	Autobrake Inoperative								

Medium Reported Braking Action

MAX MANUAL	2440	150/-155	70/100	-140/520	185/-120	60/-65	80	355	950
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 3	Autobrake Inoperative								

Medium To Poor Reported Braking Action

MAX MANUAL	2815	185/-190	85/125	-185/740	380/-200	65/-80	85	610	1905
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 3	Autobrake Inoperative								

Poor Reported Braking Action

MAX MANUAL	3190	220/-225	100/145	-230/960	575/-275	70/-95	85	860	2860
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 3	Autobrake Inoperative								

Reference distance is based on sea level, standard day, no wind or slope, and maximum available reverse thrust.
MAX MANUAL assumes maximum achievable manual braking.
Reference Distance includes an air distance allowance of 455 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***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

Jammed or Restricted Flight Controls (Flaps 15)

VREF15

	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF	ONE REV	NO REV
Dry Runway									
MAX MANUAL	1155	70/-60	25/30	-35/125	10/-10	20/-25	35	25	50
AUTOBRAKE MAX	1460	65/-75	30/40	-45/155	5/-5	30/-30	65	0	5
AUTOBRAKE 2	2510	155/-170	75/100	-105/355	35/-50	70/-70	95	100	100
Good Reported Braking Action									
MAX MANUAL	1530	75/-80	35/50	-60/205	35/-30	35/-35	50	80	185
AUTOBRAKE MAX	1635	85/-90	40/55	-60/215	30/-25	35/-35	55	90	205
AUTOBRAKE 2	2510	155/-170	75/100	-105/355	35/-50	70/-70	95	100	100
Good To Medium Reported Braking Action									
MAX MANUAL	1790	100/-105	50/65	-80/275	60/-50	45/-45	60	155	370
AUTOBRAKE MAX	1860	105/-110	50/70	-80/280	55/-45	45/-45	65	160	380
AUTOBRAKE 2	2540	160/-175	75/100	-110/380	50/-60	70/-70	95	120	190
Medium Reported Braking Action									
MAX MANUAL	2050	125/-130	60/80	-95/340	85/-65	50/-55	65	225	550
AUTOBRAKE MAX	2085	125/-130	60/80	-95/345	80/-65	50/-55	75	225	555
AUTOBRAKE 3	2205	125/-135	60/85	-100/355	60/-40	55/-60	100	145	465
Medium To Poor Reported Braking Action									
MAX MANUAL	2340	155/-155	75/100	-120/440	145/-100	60/-65	70	350	930
AUTOBRAKE MAX	2360	155/-155	75/100	-120/445	145/-100	60/-65	80	350	930
AUTOBRAKE 3	2430	155/-160	75/105	-125/450	130/-80	65/-70	100	310	890
Poor Reported Braking Action									
MAX MANUAL	2630	180/-180	85/120	-145/540	205/-135	70/-75	75	475	1310
AUTOBRAKE MAX	2630	180/-180	85/120	-145/540	205/-135	70/-75	80	475	1305
AUTOBRAKE 3	2650	180/-180	85/120	-145/540	200/-120	70/-75	95	475	1310

Reference distance is based on sea level, standard day, no wind or slope, and maximum available reverse thrust.
MAX MANUAL assumes maximum achievable manual braking.
Reference Distance includes an air distance allowance of 455 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***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

LEADING EDGE FLAPS TRANSIT (Flaps 15)

VREF15 + 15

	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF	ONE REV	NO REV
Dry Runway									
MAX MANUAL	1280	80/-70	25/35	-40/135	15/-15	25/-25	35	30	70
AUTOBRAKE MAX	1650	70/-80	35/45	-50/170	5/-5	40/-40	65	0	5
AUTOBRAKE 2	2875	175/-190	90/115	-115/385	50/-60	85/-85	100	155	160
Good Reported Braking Action									
MAX MANUAL	1720	85/-95	45/60	-65/220	40/-35	40/-40	50	105	240
AUTOBRAKE MAX	1840	90/-100	45/60	-65/230	35/-30	45/-45	60	115	260
AUTOBRAKE 2	2880	175/-190	90/115	-115/385	50/-60	85/-85	100	160	160
Good To Medium Reported Braking Action									
MAX MANUAL	2020	115/-120	60/80	-85/295	70/-55	50/-50	60	190	470
AUTOBRAKE MAX	2100	115/-125	60/80	-85/300	65/-50	55/-55	70	200	480
AUTOBRAKE 2	2910	180/-195	90/120	-120/410	65/-70	85/-85	100	185	270
Medium Reported Braking Action									
MAX MANUAL	2320	140/-145	70/95	-100/365	95/-75	60/-60	70	275	695
AUTOBRAKE MAX	2360	140/-150	70/95	-105/365	90/-70	60/-65	75	280	700
AUTOBRAKE 3	2525	140/-150	75/100	-110/380	65/-45	70/-70	110	175	570
Medium To Poor Reported Braking Action									
MAX MANUAL	2650	170/-175	85/120	-130/470	160/-115	70/-75	75	430	1160
AUTOBRAKE MAX	2670	170/-180	85/120	-130/470	160/-115	70/-75	80	430	1160
AUTOBRAKE 3	2765	170/-175	90/120	-135/475	140/-90	75/-80	105	370	1095
Poor Reported Braking Action									
MAX MANUAL	2975	200/-205	100/140	-155/570	225/-150	80/-85	80	580	1620
AUTOBRAKE MAX	2975	200/-205	100/140	-155/570	230/-155	80/-85	85	575	1615
AUTOBRAKE 3	3005	200/-200	100/140	-155/570	215/-130	80/-85	100	565	1615

Reference distance is based on sea level, standard day, no wind or slope, and maximum available reverse thrust.
MAX MANUAL assumes maximum achievable manual braking.
Reference Distance includes an air distance allowance of 455 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***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

LOSS OF SYSTEM A (Flaps 15)

VREF15

	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF	ONE REV	NO REV

Dry Runway

MAX MANUAL	1270	70/-65	25/35	-40/135	15/-15	25/-25	45	35	60
AUTOBRAKE MAX	1450	65/-75	30/40	-45/155	0/0	30/-30	60	0	10
AUTOBRAKE 2	2615	150/-175	75/95	-110/365	0/-10	75/-75	140	0	0

Good Reported Braking Action

MAX MANUAL	1770	95/-100	45/60	-70/235	50/-40	40/-45	70	135	275
AUTOBRAKE MAX	1780	95/-105	45/65	-70/235	40/-35	45/-45	75	135	275
AUTOBRAKE 2	2615	150/-175	75/95	-110/365	0/-10	75/-75	140	0	0

Good To Medium Reported Braking Action

MAX MANUAL	2080	125/-130	60/80	-90/310	85/-65	50/-55	80	245	560
AUTOBRAKE MAX	2075	125/-130	60/85	-90/310	80/-65	55/-55	85	240	555
AUTOBRAKE 2	2655	155/-175	75/100	-115/390	30/-25	75/-75	140	55	270

Medium Reported Braking Action

MAX MANUAL	2385	150/-155	75/100	-110/380	115/-90	60/-65	90	350	840
AUTOBRAKE MAX	2370	150/-155	75/100	-105/380	120/-95	60/-65	90	345	830
AUTOBRAKE 3	2370	150/-155	75/100	-105/380	120/-85	60/-65	90	345	830

Medium To Poor Reported Braking Action

MAX MANUAL	2720	185/-185	90/125	-135/485	190/-135	70/-75	100	530	1435
AUTOBRAKE MAX	2710	185/-185	90/125	-135/485	195/-140	70/-75	100	530	1430
AUTOBRAKE 3	2710	185/-185	90/125	-135/485	195/-135	70/-75	100	530	1430

Poor Reported Braking Action

MAX MANUAL	3055	215/-215	105/145	-160/590	265/-175	80/-85	105	710	2025
AUTOBRAKE MAX	3050	215/-215	105/150	-160/590	265/-180	80/-85	105	710	2025
AUTOBRAKE 3	3050	215/-215	105/150	-160/590	265/-180	80/-85	105	710	2025

Reference distance is based on sea level, standard day, no wind or slope, and maximum available reverse thrust.
MAX MANUAL assumes maximum achievable manual braking.
Reference Distance includes an air distance allowance of 455 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***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

LOSS OF SYSTEM A (Flaps 30)

VREF30

BRAKING CONFIGURATION	LANDING DISTANCE AND ADJUSTMENTS (M) REF DIST 65000 KG LANDING WEIGHT	WT ADJ PER 5000 KG ABV/BLW 65000 KG	ALT ADJ PER 1000 FT STD/HIGH*	WIND ADJ PER 10 KTS HEAD/ TAIL WIND	SLOPE ADJ PER 1% DOWN/ UP HILL	TEMP ADJ PER 10°C ABV/ BLW ISA	APP SPD ADJ PER 5 KTS ABOVE VREF	REVERSE THRUST ADJ ONE REV	REVERSE THRUST ADJ NO REV
Dry Runway									
MAX MANUAL	1210	65/-55	25/35	-40/130	15/-15	25/-25	45	30	50
AUTOBRAKE MAX	1365	60/-65	30/35	-45/145	0/0	30/-30	55	10	15
AUTOBRAKE 2	2410	135/-155	65/85	-105/350	0/-10	70/-70	135	0	0
Good Reported Braking Action									
MAX MANUAL	1685	85/-95	45/60	-65/225	45/-40	40/-40	70	120	240
AUTOBRAKE MAX	1700	90/-95	45/60	-65/230	40/-35	40/-40	75	120	240
AUTOBRAKE 2	2410	135/-155	65/85	-105/350	0/-10	70/-70	135	0	0
Good To Medium Reported Braking Action									
MAX MANUAL	1965	110/-120	55/75	-85/300	80/-65	50/-50	80	215	475
AUTOBRAKE MAX	1970	115/-120	60/75	-85/300	80/-65	50/-50	85	210	475
AUTOBRAKE 2	2450	140/-155	70/90	-110/375	30/-25	70/-70	135	55	235
Medium Reported Braking Action									
MAX MANUAL	2240	135/-140	65/90	-105/370	110/-85	55/-60	85	305	710
AUTOBRAKE MAX	2235	135/-140	70/90	-105/370	115/-90	55/-60	90	300	705
AUTOBRAKE 3	2235	135/-140	70/90	-105/370	115/-80	55/-60	90	300	705
Medium To Poor Reported Braking Action									
MAX MANUAL	2545	165/-170	80/110	-130/470	180/-125	65/-70	95	455	1180
AUTOBRAKE MAX	2540	165/-170	85/115	-130/470	185/-130	65/-70	95	455	1180
AUTOBRAKE 3	2540	165/-170	85/115	-130/470	185/-125	65/-70	95	455	1180
Poor Reported Braking Action									
MAX MANUAL	2845	195/-195	95/130	-155/570	250/-165	75/-80	100	605	1650
AUTOBRAKE MAX	2845	195/-195	95/135	-155/570	250/-165	75/-80	100	605	1650
AUTOBRAKE 3	2845	195/-195	95/135	-155/570	250/-165	75/-80	100	605	1650

Reference distance is based on sea level, standard day, no wind or slope, and maximum available reverse thrust.
MAX MANUAL assumes maximum achievable manual braking.
Reference Distance includes an air distance allowance of 455 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***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

LOSS OF SYSTEM A (Flaps 40)

VREF40

BRAKING CONFIGURATION	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF	ONE REV	NO REV
Dry Runway									
MAX MANUAL	1165	60/-55	25/30	-35/125	15/-15	25/-25	50	30	45
AUTOBRAKE MAX	1290	55/-60	25/35	-40/140	5/0	25/-25	55	10	20
AUTOBRAKE 2	2225	125/-140	60/80	-100/335	0/-5	60/-60	130	0	0
Good Reported Braking Action									
MAX MANUAL	1610	80/-90	40/55	-65/225	45/-40	35/-40	70	105	210
AUTOBRAKE MAX	1620	85/-90	40/55	-65/225	40/-35	40/-40	75	105	210
AUTOBRAKE 2	2225	125/-140	60/80	-100/335	0/-5	60/-60	130	0	0
Good To Medium Reported Braking Action									
MAX MANUAL	1865	105/-115	50/70	-85/295	75/-65	45/-50	80	185	415
AUTOBRAKE MAX	1870	105/-115	50/70	-85/295	75/-60	50/-50	80	185	415
AUTOBRAKE 2	2265	125/-145	60/85	-105/360	30/-20	60/-65	130	55	220
Medium Reported Braking Action									
MAX MANUAL	2120	125/-135	60/85	-100/360	105/-85	55/-55	85	265	615
AUTOBRAKE MAX	2120	125/-135	60/85	-100/360	110/-85	55/-55	85	265	615
AUTOBRAKE 3	2120	125/-135	60/85	-100/360	110/-80	55/-55	90	265	615
Medium To Poor Reported Braking Action									
MAX MANUAL	2400	155/-160	75/105	-125/460	175/-120	65/-65	90	395	1010
AUTOBRAKE MAX	2400	155/-160	75/105	-125/460	180/-125	65/-65	90	400	1010
AUTOBRAKE 3	2400	155/-160	75/105	-125/460	180/-120	65/-65	95	400	1010
Poor Reported Braking Action									
MAX MANUAL	2675	180/-185	85/120	-150/560	240/-155	70/-75	95	525	1400
AUTOBRAKE MAX	2680	180/-185	90/125	-150/560	245/-160	70/-75	95	530	1405
AUTOBRAKE 3	2680	180/-185	90/125	-150/560	245/-160	70/-75	95	530	1405

Reference distance is based on sea level, standard day, no wind or slope, and maximum available reverse thrust.
MAX MANUAL assumes maximum achievable manual braking.
Reference Distance includes an air distance allowance of 455 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***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
LOSS OF SYSTEM A AND SYSTEM B (Flaps 15)
VREF15

	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF	ONE REV	NO REV

Dry Runway

BRAKING CONFIGURATION	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	ONE REV	NO REV
MAX MANUAL	1720	80/-90	40/50	-60/195	35/-35	40/-40	75	-10	65
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 2	Autobrake Inoperative								

Good Reported Braking Action

BRAKING CONFIGURATION	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	ONE REV	NO REV
MAX MANUAL	2440	135/-145	65/90	-100/335	100/-80	60/-60	105	95	440
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 2	Autobrake Inoperative								

Good To Medium Reported Braking Action

BRAKING CONFIGURATION	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	ONE REV	NO REV
MAX MANUAL	2815	170/-180	85/115	-125/430	160/-120	70/-75	115	230	930
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 2	Autobrake Inoperative								

Medium Reported Braking Action

BRAKING CONFIGURATION	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	ONE REV	NO REV
MAX MANUAL	3185	200/-210	100/140	-150/525	215/-160	80/-85	120	365	1415
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 3	Autobrake Inoperative								

Medium To Poor Reported Braking Action

BRAKING CONFIGURATION	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	ONE REV	NO REV
MAX MANUAL	3555	240/-245	120/165	-180/655	345/-215	90/-100	125	590	2400
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 3	Autobrake Inoperative								

Poor Reported Braking Action

BRAKING CONFIGURATION	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	ONE REV	NO REV
MAX MANUAL	3920	275/-275	135/190	-210/785	475/-270	100/-110	130	815	3380
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 3	Autobrake Inoperative								

Reference distance is based on sea level, standard day, no wind or slope, and maximum available reverse thrust.
MAX MANUAL assumes maximum achievable manual braking.
Reference Distance includes an air distance allowance of 455 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***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

LOSS OF SYSTEM B (Flaps 15)

VREF15

	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF	ONE REV	NO REV

Dry Runway

MAX MANUAL	1290	55/-60	25/35	-45/145	20/-15	25/-25	40	40	70
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 2	Autobrake Inoperative								

Good Reported Braking Action

MAX MANUAL	1780	95/-100	45/65	-75/255	50/-45	45/-45	60	140	285
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 2	Autobrake Inoperative								

Good To Medium Reported Braking Action

MAX MANUAL	2075	125/-130	60/85	-95/335	90/-70	55/-55	70	240	550
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 2	Autobrake Inoperative								

Medium Reported Braking Action

MAX MANUAL	2365	150/-155	70/100	-115/410	125/-95	60/-65	75	340	815
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 3	Autobrake Inoperative								

Medium To Poor Reported Braking Action

MAX MANUAL	2675	180/-185	85/120	-145/525	210/-140	70/-75	85	505	1345
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 3	Autobrake Inoperative								

Poor Reported Braking Action

MAX MANUAL	2985	210/-210	100/140	-170/640	295/-180	75/-85	90	665	1870
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 3	Autobrake Inoperative								

Reference distance is based on sea level, standard day, no wind or slope, and maximum available reverse thrust.
MAX MANUAL assumes maximum achievable manual braking.
Reference Distance includes an air distance allowance of 455 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***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

MANUAL REVERSION (Flaps 15)

VREF15

	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF	ONE REV	NO REV

Dry Runway

MAX MANUAL	1720	80/-90	40/50	-60/195	35/-35	40/-40	75	-10	65
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 2	Autobrake Inoperative								

Good Reported Braking Action

MAX MANUAL	2440	135/-145	65/90	-100/335	100/-80	60/-60	105	95	440
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 2	Autobrake Inoperative								

Good To Medium Reported Braking Action

MAX MANUAL	2815	170/-180	85/115	-125/430	160/-120	70/-75	115	230	930
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 2	Autobrake Inoperative								

Medium Reported Braking Action

MAX MANUAL	3185	200/-210	100/140	-150/525	215/-160	80/-85	120	365	1415
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 3	Autobrake Inoperative								

Medium To Poor Reported Braking Action

MAX MANUAL	3555	240/-245	120/165	-180/655	345/-215	90/-100	125	590	2400
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 3	Autobrake Inoperative								

Poor Reported Braking Action

MAX MANUAL	3920	275/-275	135/190	-210/785	475/-270	100/-110	130	815	3380
AUTOBRAKE MAX	Autobrake Inoperative								
AUTOBRAKE 3	Autobrake Inoperative								

Reference distance is based on sea level, standard day, no wind or slope, and maximum available reverse thrust.
MAX MANUAL assumes maximum achievable manual braking.
Reference Distance includes an air distance allowance of 455 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***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

One Engine Inoperative Landing (Flaps 15)

VREF15

BRAKING CONFIGURATION	REF DIST 65000 KG LANDING WEIGHT	WT ADJ PER 5000 KG ABV/BLW 65000 KG	ALT ADJ PER 1000 FT STD/HIGH*	WIND ADJ PER 10 KTS HEAD/ TAIL WIND	SLOPE ADJ PER 1% DOWN/ UP HILL	TEMP ADJ PER 10°C ABV/ BLW ISA	APP SPD ADJ PER 5 KTS ABOVE VREF	REVERSE THRUST ADJ ONE REV	REVERSE THRUST ADJ NO REV
Dry Runway									
MAX MANUAL	1170	75/-65	25/30	-35/130	15/-10	25/-25	35	0	25
AUTOBRAKE MAX	1450	70/-75	30/40	-45/155	0/0	30/-30	60	0	0
AUTOBRAKE 2	2600	150/-170	75/95	-110/365	10/-25	75/-75	120	0	0
Good Reported Braking Action									
MAX MANUAL	1590	80/-85	40/50	-65/215	40/-35	40/-40	50	0	100
AUTOBRAKE MAX	1695	85/-95	40/55	-65/225	35/-30	40/-40	60	0	110
AUTOBRAKE 2	2600	150/-170	75/95	-110/365	10/-25	75/-75	120	0	0
Good To Medium Reported Braking Action									
MAX MANUAL	1910	110/-115	55/70	-85/295	75/-60	50/-50	60	0	205
AUTOBRAKE MAX	1980	110/-120	55/70	-85/300	70/-55	50/-50	70	0	215
AUTOBRAKE 2	2640	155/-175	75/100	-115/395	35/-40	75/-75	120	0	65
Medium Reported Braking Action									
MAX MANUAL	2225	135/-140	65/85	-105/370	110/-85	60/-60	70	0	310
AUTOBRAKE MAX	2265	135/-145	65/85	-105/375	105/-80	60/-60	80	0	315
AUTOBRAKE 3	2315	135/-150	65/85	-105/380	90/-65	60/-65	100	0	295
Medium To Poor Reported Braking Action									
MAX MANUAL	2615	170/-175	80/110	-135/490	200/-135	75/-75	80	0	540
AUTOBRAKE MAX	2635	170/-180	80/110	-135/490	200/-135	75/-75	90	0	540
AUTOBRAKE 3	2670	170/-180	80/110	-135/495	185/-125	75/-75	100	0	535
Poor Reported Braking Action									
MAX MANUAL	3000	200/-210	95/130	-165/605	290/-185	85/-85	90	0	765
AUTOBRAKE MAX	3000	200/-210	95/130	-165/605	290/-185	85/-85	95	0	765
AUTOBRAKE 3	3025	205/-210	95/130	-165/610	280/-180	85/-85	100	0	775

Reference distance is based on sea level, standard day, no wind or slope, and maximum available reverse thrust.
MAX MANUAL assumes maximum achievable manual braking.
Reference Distance includes an air distance allowance of 455 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***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

One Engine Inoperative Landing (Flaps 30)

VREF30

BRAKING CONFIGURATION	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF	ONE REV	NO REV

Dry Runway

MAX MANUAL	1120	60/-55	20/30	-35/125	15/-10	20/-20	35	0	25
AUTOBRAKE MAX	1365	60/-65	30/35	-45/150	0/0	30/-30	55	0	0
AUTOBRAKE 2	2390	135/-150	65/85	-105/350	10/-25	65/-65	110	0	0

Good Reported Braking Action

MAX MANUAL	1520	75/-80	35/50	-60/210	35/-30	35/-35	50	0	90
AUTOBRAKE MAX	1615	80/-90	40/50	-65/220	35/-30	35/-40	60	0	100
AUTOBRAKE 2	2390	135/-150	65/85	-105/350	10/-25	65/-65	110	0	0

Good To Medium Reported Braking Action

MAX MANUAL	1805	100/-105	50/65	-80/285	70/-55	45/-45	60	0	180
AUTOBRAKE MAX	1870	105/-115	50/65	-85/295	65/-55	45/-50	70	0	185
AUTOBRAKE 2	2430	140/-155	70/90	-110/375	35/-40	70/-70	110	0	55

Medium Reported Braking Action

MAX MANUAL	2090	120/-130	60/80	-100/360	105/-80	55/-55	70	0	265
AUTOBRAKE MAX	2125	125/-135	60/80	-100/365	95/-75	55/-55	80	0	270
AUTOBRAKE 3	2165	125/-135	60/80	-105/365	90/-65	55/-60	90	0	260

Medium To Poor Reported Braking Action

MAX MANUAL	2435	150/-160	75/100	-130/475	185/-125	65/-70	80	0	450
AUTOBRAKE MAX	2450	155/-165	75/100	-130/475	185/-120	65/-70	85	0	455
AUTOBRAKE 3	2485	155/-165	75/100	-135/475	175/-120	65/-70	90	0	450

Poor Reported Braking Action

MAX MANUAL	2775	180/-190	85/115	-155/585	265/-170	75/-80	85	0	635
AUTOBRAKE MAX	2775	180/-190	85/115	-155/585	270/-165	75/-80	90	0	635
AUTOBRAKE 3	2805	185/-190	90/120	-160/585	260/-170	75/-80	90	0	640

Reference distance is based on sea level, standard day, no wind or slope, and maximum available reverse thrust.
MAX MANUAL assumes maximum achievable manual braking.
Reference Distance includes an air distance allowance of 455 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***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

Stabilizer Trim Inoperative (Flaps 15)

VREF15

	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF	ONE REV	NO REV

Dry Runway

MAX MANUAL	1155	70/-60	25/30	-35/125	10/-10	20/-25	35	25	50
AUTOBRAKE MAX	1460	65/-75	30/40	-45/155	5/-5	30/-30	65	0	5
AUTOBRAKE 2	2510	155/-170	75/100	-105/355	35/-50	70/-70	95	100	100

Good Reported Braking Action

MAX MANUAL	1530	75/-80	35/50	-60/205	35/-30	35/-35	50	80	185
AUTOBRAKE MAX	1635	85/-90	40/55	-60/215	30/-25	35/-35	55	90	205
AUTOBRAKE 2	2510	155/-170	75/100	-105/355	35/-50	70/-70	95	100	100

Good To Medium Reported Braking Action

MAX MANUAL	1790	100/-105	50/65	-80/275	60/-50	45/-45	60	155	370
AUTOBRAKE MAX	1860	105/-110	50/70	-80/280	55/-45	45/-45	65	160	380
AUTOBRAKE 2	2540	160/-175	75/100	-110/380	50/-60	70/-70	95	120	190

Medium Reported Braking Action

MAX MANUAL	2050	125/-130	60/80	-95/340	85/-65	50/-55	65	225	550
AUTOBRAKE MAX	2085	125/-130	60/80	-95/345	80/-65	50/-55	75	225	555
AUTOBRAKE 3	2205	125/-135	60/85	-100/355	60/-40	55/-60	100	145	465

Medium To Poor Reported Braking Action

MAX MANUAL	2340	155/-155	75/100	-120/440	145/-100	60/-65	70	350	930
AUTOBRAKE MAX	2360	155/-155	75/100	-120/445	145/-100	60/-65	80	350	930
AUTOBRAKE 3	2430	155/-160	75/105	-125/450	130/-80	65/-70	100	310	890

Poor Reported Braking Action

MAX MANUAL	2630	180/-180	85/120	-145/540	205/-135	70/-75	75	475	1310
AUTOBRAKE MAX	2630	180/-180	85/120	-145/540	205/-135	70/-75	80	475	1305
AUTOBRAKE 3	2650	180/-180	85/120	-145/540	200/-120	70/-75	95	475	1310

Reference distance is based on sea level, standard day, no wind or slope, and maximum available reverse thrust.
MAX MANUAL assumes maximum achievable manual braking.
Reference Distance includes an air distance allowance of 455 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***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
Trailing Edge Flap Asymmetry (1 ≤ Flap Lever <15)
VREF40 + 30

BRAKING CONFIGURATION	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF	ONE REV	NO REV

Dry Runway

MAX MANUAL	1260	90/-65	25/40	-40/135	15/-15	25/-25	35	30	60
AUTOBRAKE MAX	1660	70/-75	35/45	-50/170	5/-5	40/-40	65	0	5
AUTOBRAKE 2	2880	165/-185	90/115	-115/385	55/-60	85/-85	100	165	175

Good Reported Braking Action

MAX MANUAL	1675	80/-85	40/55	-60/215	35/-30	40/-40	45	90	210
AUTOBRAKE MAX	1815	80/-90	45/60	-65/225	30/-25	45/-45	65	95	225
AUTOBRAKE 2	2885	160/-185	90/115	-115/385	55/-65	85/-85	95	165	175

Good To Medium Reported Braking Action

MAX MANUAL	1975	105/-110	55/75	-80/290	65/-55	50/-50	55	175	420
AUTOBRAKE MAX	2075	105/-115	60/80	-85/295	60/-50	55/-55	70	180	435
AUTOBRAKE 2	2915	165/-190	90/120	-120/410	70/-75	85/-85	95	190	270

Medium Reported Braking Action

MAX MANUAL	2275	125/-135	70/90	-100/360	90/-75	60/-60	65	255	625
AUTOBRAKE MAX	2330	130/-140	70/95	-100/360	85/-70	60/-60	75	260	640
AUTOBRAKE 3	2535	125/-140	70/95	-110/380	60/-45	70/-70	110	150	470

Medium To Poor Reported Braking Action

MAX MANUAL	2610	160/-165	85/115	-125/465	155/-115	70/-75	75	400	1070
AUTOBRAKE MAX	2635	160/-170	85/115	-125/465	155/-110	70/-75	80	400	1070
AUTOBRAKE 3	2765	155/-165	85/115	-135/475	135/-90	75/-80	110	340	985

Poor Reported Braking Action

MAX MANUAL	2945	190/-195	100/135	-150/565	220/-150	80/-85	80	545	1510
AUTOBRAKE MAX	2940	185/-195	100/135	-150/565	220/-145	80/-85	85	540	1500
AUTOBRAKE 3	2995	185/-190	100/135	-155/570	205/-130	80/-85	105	525	1495

Reference distance is based on sea level, standard day, no wind or slope, and maximum available reverse thrust.
MAX MANUAL assumes maximum achievable manual braking.
Reference Distance includes an air distance allowance of 455 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***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

Trailing Edge Flap Asymmetry (Flap Lever 15 or 25)

VREF15

	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF	ONE REV	NO REV
Dry Runway									
MAX MANUAL	1155	70/-60	25/30	-35/125	10/-10	20/-25	35	25	50
AUTOBRAKE MAX	1460	65/-75	30/40	-45/155	5/-5	30/-30	65	0	5
AUTOBRAKE 2	2510	155/-170	75/100	-105/355	35/-50	70/-70	95	100	100
Good Reported Braking Action									
MAX MANUAL	1530	75/-80	35/50	-60/205	35/-30	35/-35	50	80	185
AUTOBRAKE MAX	1635	85/-90	40/55	-60/215	30/-25	35/-35	55	90	205
AUTOBRAKE 2	2510	155/-170	75/100	-105/355	35/-50	70/-70	95	100	100
Good To Medium Reported Braking Action									
MAX MANUAL	1790	100/-105	50/65	-80/275	60/-50	45/-45	60	155	370
AUTOBRAKE MAX	1860	105/-110	50/70	-80/280	55/-45	45/-45	65	160	380
AUTOBRAKE 2	2540	160/-175	75/100	-110/380	50/-60	70/-70	95	120	190
Medium Reported Braking Action									
MAX MANUAL	2050	125/-130	60/80	-95/340	85/-65	50/-55	65	225	550
AUTOBRAKE MAX	2085	125/-130	60/80	-95/345	80/-65	50/-55	75	225	555
AUTOBRAKE 3	2205	125/-135	60/85	-100/355	60/-40	55/-60	100	145	465
Medium To Poor Reported Braking Action									
MAX MANUAL	2340	155/-155	75/100	-120/440	145/-100	60/-65	70	350	930
AUTOBRAKE MAX	2360	155/-155	75/100	-120/445	145/-100	60/-65	80	350	930
AUTOBRAKE 3	2430	155/-160	75/105	-125/450	130/-80	65/-70	100	310	890
Poor Reported Braking Action									
MAX MANUAL	2630	180/-180	85/120	-145/540	205/-135	70/-75	75	475	1310
AUTOBRAKE MAX	2630	180/-180	85/120	-145/540	205/-135	70/-75	80	475	1305
AUTOBRAKE 3	2650	180/-180	85/120	-145/540	200/-120	70/-75	95	475	1310

Reference distance is based on sea level, standard day, no wind or slope, and maximum available reverse thrust.
MAX MANUAL assumes maximum achievable manual braking.
Reference Distance includes an air distance allowance of 455 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***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
Trailing Edge Flap Asymmetry (Flap Lever 30)
VREF30

	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF	ONE REV	NO REV

Dry Runway

MAX MANUAL	1110	55/-55	20/30	-35/120	10/-10	20/-20	35	20	45
AUTOBRAKE MAX	1365	60/-65	30/35	-45/150	5/0	30/-30	60	0	5
AUTOBRAKE 2	2315	140/-150	65/90	-100/340	30/-45	65/-65	90	85	85

Good Reported Braking Action

MAX MANUAL	1465	70/-75	35/45	-60/200	30/-30	35/-35	50	75	165
AUTOBRAKE MAX	1560	75/-85	35/50	-60/210	30/-25	35/-35	60	80	185
AUTOBRAKE 2	2315	140/-150	65/90	-100/340	35/-45	65/-65	90	85	85

Good To Medium Reported Braking Action

MAX MANUAL	1705	95/-100	45/60	-75/265	55/-50	45/-45	60	135	325
AUTOBRAKE MAX	1765	95/-105	45/65	-80/275	55/-45	45/-45	65	140	335
AUTOBRAKE 2	2345	140/-155	70/90	-105/365	50/-55	65/-65	90	105	170

Medium Reported Braking Action

MAX MANUAL	1940	115/-120	55/75	-90/330	80/-65	50/-50	65	195	480
AUTOBRAKE MAX	1970	115/-120	55/75	-95/335	75/-60	50/-50	70	200	480
AUTOBRAKE 3	2060	115/-125	55/75	-95/345	60/-40	50/-55	95	140	425

Medium To Poor Reported Braking Action

MAX MANUAL	2205	140/-145	70/90	-115/430	140/-95	55/-60	70	305	790
AUTOBRAKE MAX	2220	140/-145	70/95	-120/430	135/-95	60/-60	75	305	790
AUTOBRAKE 3	2275	140/-145	70/95	-120/435	125/-80	60/-65	95	275	770

Poor Reported Braking Action

MAX MANUAL	2465	160/-165	80/105	-140/525	195/-125	60/-65	75	410	1100
AUTOBRAKE MAX	2470	165/-165	80/110	-140/525	195/-130	65/-70	75	410	1100
AUTOBRAKE 3	2485	165/-165	80/110	-140/525	190/-115	65/-70	90	410	1110

Reference distance is based on sea level, standard day, no wind or slope, and maximum available reverse thrust.
MAX MANUAL assumes maximum achievable manual braking.
Reference Distance includes an air distance allowance of 455 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***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

Trailing Edge Flap Disagree (1 ≤ Indicated Flaps <15)

VREF40 + 30

BRAKING CONFIGURATION	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF	ONE REV	NO REV
Dry Runway									
MAX MANUAL	1260	90/-65	25/40	-40/135	15/-15	25/-25	35	30	60
AUTOBRAKE MAX	1660	70/-75	35/45	-50/170	5/-5	40/-40	65	0	5
AUTOBRAKE 2	2880	165/-185	90/115	-115/385	55/-60	85/-85	100	165	175
Good Reported Braking Action									
MAX MANUAL	1675	80/-85	40/55	-60/215	35/-30	40/-40	45	90	210
AUTOBRAKE MAX	1815	80/-90	45/60	-65/225	30/-25	45/-45	65	95	225
AUTOBRAKE 2	2885	160/-185	90/115	-115/385	55/-65	85/-85	95	165	175
Good To Medium Reported Braking Action									
MAX MANUAL	1975	105/-110	55/75	-80/290	65/-55	50/-50	55	175	420
AUTOBRAKE MAX	2075	105/-115	60/80	-85/295	60/-50	55/-55	70	180	435
AUTOBRAKE 2	2915	165/-190	90/120	-120/410	70/-75	85/-85	95	190	270
Medium Reported Braking Action									
MAX MANUAL	2275	125/-135	70/90	-100/360	90/-75	60/-60	65	255	625
AUTOBRAKE MAX	2330	130/-140	70/95	-100/360	85/-70	60/-60	75	260	640
AUTOBRAKE 3	2535	125/-140	70/95	-110/380	60/-45	70/-70	110	150	470
Medium To Poor Reported Braking Action									
MAX MANUAL	2610	160/-165	85/115	-125/465	155/-115	70/-75	75	400	1070
AUTOBRAKE MAX	2635	160/-170	85/115	-125/465	155/-110	70/-75	80	400	1070
AUTOBRAKE 3	2765	155/-165	85/115	-135/475	135/-90	75/-80	110	340	985
Poor Reported Braking Action									
MAX MANUAL	2945	190/-195	100/135	-150/565	220/-150	80/-85	80	545	1510
AUTOBRAKE MAX	2940	185/-195	100/135	-150/565	220/-145	80/-85	85	540	1500
AUTOBRAKE 3	2995	185/-190	100/135	-155/570	205/-130	80/-85	105	525	1495

Reference distance is based on sea level, standard day, no wind or slope, and maximum available reverse thrust.
MAX MANUAL assumes maximum achievable manual braking.
Reference Distance includes an air distance allowance of 455 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***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

Trailing Edge Flap Disagree (15 ≤ Indicated Flaps <30)

VREF15

	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF	ONE REV	NO REV

Dry Runway

MAX MANUAL	1155	70/-60	25/30	-35/125	10/-10	20/-25	35	25	50
AUTOBRAKE MAX	1460	65/-75	30/40	-45/155	5/-5	30/-30	65	0	5
AUTOBRAKE 2	2510	155/-170	75/100	-105/355	35/-50	70/-70	95	100	100

Good Reported Braking Action

MAX MANUAL	1530	75/-80	35/50	-60/205	35/-30	35/-35	50	80	185
AUTOBRAKE MAX	1635	85/-90	40/55	-60/215	30/-25	35/-35	55	90	205
AUTOBRAKE 2	2510	155/-170	75/100	-105/355	35/-50	70/-70	95	100	100

Good To Medium Reported Braking Action

MAX MANUAL	1790	100/-105	50/65	-80/275	60/-50	45/-45	60	155	370
AUTOBRAKE MAX	1860	105/-110	50/70	-80/280	55/-45	45/-45	65	160	380
AUTOBRAKE 2	2540	160/-175	75/100	-110/380	50/-60	70/-70	95	120	190

Medium Reported Braking Action

MAX MANUAL	2050	125/-130	60/80	-95/340	85/-65	50/-55	65	225	550
AUTOBRAKE MAX	2085	125/-130	60/80	-95/345	80/-65	50/-55	75	225	555
AUTOBRAKE 3	2205	125/-135	60/85	-100/355	60/-40	55/-60	100	145	465

Medium To Poor Reported Braking Action

MAX MANUAL	2340	155/-155	75/100	-120/440	145/-100	60/-65	70	350	930
AUTOBRAKE MAX	2360	155/-155	75/100	-120/445	145/-100	60/-65	80	350	930
AUTOBRAKE 3	2430	155/-160	75/105	-125/450	130/-80	65/-70	100	310	890

Poor Reported Braking Action

MAX MANUAL	2630	180/-180	85/120	-145/540	205/-135	70/-75	75	475	1310
AUTOBRAKE MAX	2630	180/-180	85/120	-145/540	205/-135	70/-75	80	475	1305
AUTOBRAKE 3	2650	180/-180	85/120	-145/540	200/-120	70/-75	95	475	1310

Reference distance is based on sea level, standard day, no wind or slope, and maximum available reverse thrust.
MAX MANUAL assumes maximum achievable manual braking.
Reference Distance includes an air distance allowance of 455 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***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

Trailing Edge Flap Disagree (30 ≤ Indicated Flaps <40)

VREF30

	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF	ONE REV	NO REV

Dry Runway

MAX MANUAL	1110	55/-55	20/30	-35/120	10/-10	20/-20	35	20	45
AUTOBRAKE MAX	1365	60/-65	30/35	-45/150	5/0	30/-30	60	0	5
AUTOBRAKE 2	2315	140/-150	65/90	-100/340	30/-45	65/-65	90	85	85

Good Reported Braking Action

MAX MANUAL	1465	70/-75	35/45	-60/200	30/-30	35/-35	50	75	165
AUTOBRAKE MAX	1560	75/-85	35/50	-60/210	30/-25	35/-35	60	80	185
AUTOBRAKE 2	2315	140/-150	65/90	-100/340	35/-45	65/-65	90	85	85

Good To Medium Reported Braking Action

MAX MANUAL	1705	95/-100	45/60	-75/265	55/-50	45/-45	60	135	325
AUTOBRAKE MAX	1765	95/-105	45/65	-80/275	55/-45	45/-45	65	140	335
AUTOBRAKE 2	2345	140/-155	70/90	-105/365	50/-55	65/-65	90	105	170

Medium Reported Braking Action

MAX MANUAL	1940	115/-120	55/75	-90/330	80/-65	50/-50	65	195	480
AUTOBRAKE MAX	1970	115/-120	55/75	-95/335	75/-60	50/-50	70	200	480
AUTOBRAKE 3	2060	115/-125	55/75	-95/345	60/-40	50/-55	95	140	425

Medium To Poor Reported Braking Action

MAX MANUAL	2205	140/-145	70/90	-115/430	140/-95	55/-60	70	305	790
AUTOBRAKE MAX	2220	140/-145	70/95	-120/430	135/-95	60/-60	75	305	790
AUTOBRAKE 3	2275	140/-145	70/95	-120/435	125/-80	60/-65	95	275	770

Poor Reported Braking Action

MAX MANUAL	2465	160/-165	80/105	-140/525	195/-125	60/-65	75	410	1100
AUTOBRAKE MAX	2470	165/-165	80/110	-140/525	195/-130	65/-70	75	410	1100
AUTOBRAKE 3	2485	165/-165	80/110	-140/525	190/-115	65/-70	90	410	1110

Reference distance is based on sea level, standard day, no wind or slope, and maximum available reverse thrust.
MAX MANUAL assumes maximum achievable manual braking.
Reference Distance includes an air distance allowance of 455 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***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

Trailing Edge Flaps Up Landing

VREF40 + 40

	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	APP SPD ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	65000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 65000 KG	PER 1000 FT STD/HIGH*	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF	ONE REV	NO REV
Dry Runway									
MAX MANUAL	1335	110/-70	30/70	-40/140	15/-15	30/-30	45	30	70
AUTOBRAKE MAX	1795	75/-80	40/55	-55/180	5/-5	40/-45	70	5	10
AUTOBRAKE 2	3120	175/-195	100/130	-120/400	65/-70	90/-90	95	205	235
Good Reported Braking Action									
MAX MANUAL	1750	80/-90	45/60	-65/220	35/-30	40/-45	45	90	205
AUTOBRAKE MAX	1945	85/-95	50/65	-70/235	25/-25	45/-50	65	80	200
AUTOBRAKE 2	3120	175/-195	100/130	-120/400	65/-70	90/-90	95	205	235
Good To Medium Reported Braking Action									
MAX MANUAL	2080	110/-115	60/80	-85/295	65/-55	55/-55	55	175	415
AUTOBRAKE MAX	2215	110/-120	65/85	-90/305	60/-50	55/-60	70	175	425
AUTOBRAKE 2	3145	180/-200	100/130	-125/425	80/-80	90/-90	95	225	325
Medium Reported Braking Action									
MAX MANUAL	2405	135/-140	70/95	-105/365	95/-75	65/-65	65	260	625
AUTOBRAKE MAX	2480	135/-145	75/100	-105/370	90/-75	65/-65	70	265	645
AUTOBRAKE 3	2755	135/-155	80/105	-115/395	60/-55	75/-80	105	145	435
Medium To Poor Reported Braking Action									
MAX MANUAL	2775	170/-175	90/120	-130/475	165/-115	75/-80	75	415	1080
AUTOBRAKE MAX	2815	165/-175	90/125	-130/475	160/-115	75/-80	80	415	1085
AUTOBRAKE 3	2995	165/-180	95/125	-140/490	135/-100	85/-90	105	335	965
Poor Reported Braking Action									
MAX MANUAL	3140	200/-205	105/145	-155/580	230/-155	85/-90	80	565	1530
AUTOBRAKE MAX	3145	195/-205	105/145	-155/580	230/-150	85/-90	90	560	1520
AUTOBRAKE 3	3230	190/-205	105/145	-160/585	210/-140	90/-95	100	520	1495

Reference distance is based on sea level, standard day, no wind or slope, and maximum available reverse thrust.
MAX MANUAL assumes maximum achievable manual braking.
Reference Distance includes an air distance allowance of 455 m from threshold to touchdown.
Actual (unfactored) distances are shown.

***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

Recommended Brake Cooling Schedule

Reference Brake Energy Per Brake (Millions of Foot Pounds)

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

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

Adjusted Brake Energy Per Brake (Millions of Foot Pounds)

No Reverse Thrust

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

Two Engine Detent Reverse Thrust

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

Cooling Time (Minutes) - Category C Steel Brakes

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

ADVISORY INFORMATION

Recommended Brake Cooling Schedule

Cooling Time (Minutes) - Category N Carbon Brakes

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

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

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

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

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

Intentionally
Blank

ENGINE INOP

Initial Max Continuous %N1

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

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

%N1 Adjustments for Engine Bleeds

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

ENGINE INOP

Max Continuous %N1
37000 FT to 29000 FT Pressure Altitudes

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

%N1 Adjustments for Engine Bleeds

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

ENGINE INOP

Max Continuous %N1

27000 FT to 20000 FT Pressure Altitudes

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

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

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

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

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

%N1 Adjustments for Engine Bleeds

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

ENGINE INOP

Max Continuous %N1
18000 FT to 12000 FT Pressure Altitudes

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

%N1 Adjustments for Engine Bleeds

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

ENGINE INOP

Max Continuous %N1
10000 FT to 1000 FT Pressure Altitudes

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

%N1 Adjustments for Engine Bleeds

BLEED CONFIGURATION	PRESSURE ALTITUDE (1000 FT)			
	1	3	5	10
ENGINE ANTI-ICE ON	-0.6	-0.8	-0.8	-0.8
ENGINE & WING ANTI-ICE ON	-2.9	-3.0	-2.7	-3.2

ENGINE INOP

MAX CONTINUOUS THRUST

Driftdown Speed/Level Off Altitude

100 ft/min residual rate of climb

WEIGHT (1000 KG)		OPTIMUM DRIFTDOWN SPEED (KIAS)	LEVEL OFF ALTITUDE (FT)		
START DRIFTDOWN	LEVEL OFF		ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
85	82	271	18500	17300	15900
80	77	263	20200	19000	17700
75	72	255	21600	20600	19400
70	67	247	23100	22200	21100
65	62	238	24700	23800	22800
60	57	229	26800	25800	24700
55	53	219	29100	28100	27000
50	48	209	31200	30400	29400
45	43	199	33300	32600	31700
40	38	187	35600	34900	34000

Includes APU fuel burn.

ENGINE INOP

MAX CONTINUOUS THRUST

Driftdown/LRC Cruise Range Capability

Ground to Air Miles Conversion

AIR DISTANCE (NM)					GROUND DISTANCE (NM)	AIR DISTANCE (NM)				
HEADWIND COMPONENT (KTS)						TAILWIND COMPONENT (KTS)				
100	80	60	40	20		20	40	60	80	100
138	128	120	112	106	100	95	90	86	82	78
275	256	239	225	212	200	190	180	172	164	157
413	384	359	337	317	300	284	270	258	246	235
551	512	479	449	423	400	379	360	344	328	314
689	640	598	562	529	500	474	451	429	410	392
826	768	718	674	635	600	569	541	515	492	471
964	896	838	786	741	700	664	631	601	574	549
1102	1025	957	898	846	800	758	721	687	656	628
1240	1153	1077	1011	952	900	853	811	773	738	706
1377	1281	1197	1123	1058	1000	948	901	859	820	785
1515	1409	1317	1235	1164	1100	1043	991	945	902	863
1653	1537	1436	1348	1270	1200	1138	1081	1030	984	942
1792	1666	1556	1460	1375	1300	1232	1171	1116	1066	1020
1930	1794	1676	1573	1481	1400	1327	1261	1202	1148	1098
2068	1922	1796	1685	1587	1500	1422	1351	1288	1230	1177
2207	2051	1916	1798	1693	1600	1517	1441	1373	1312	1255
2345	2180	2036	1910	1799	1700	1611	1531	1459	1393	1333
2484	2309	2156	2023	1905	1800	1706	1621	1545	1475	1411

Driftdown/Cruise Fuel and Time

AIR DIST (NM)	FUEL REQUIRED (1000 KG)										TIME (HR:MIN)
	WEIGHT AT START OF DRIFTDOWN (1000 KG)										
	40	45	50	55	60	65	70	75	80	85	
100	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0:16
200	0.8	0.8	0.9	0.9	1.0	1.0	1.1	1.1	1.2	1.3	0:33
300	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	0:49
400	1.6	1.8	1.9	2.0	2.2	2.3	2.5	2.6	2.8	2.9	1:06
500	2.0	2.2	2.4	2.6	2.8	3.0	3.2	3.3	3.5	3.7	1:22
600	2.4	2.7	2.9	3.1	3.3	3.6	3.8	4.0	4.3	4.5	1:39
700	2.8	3.1	3.4	3.6	3.9	4.2	4.5	4.7	5.0	5.3	1:55
800	3.2	3.6	3.9	4.2	4.5	4.8	5.1	5.4	5.7	6.1	2:11
900	3.6	4.0	4.3	4.7	5.0	5.4	5.7	6.1	6.4	6.8	2:28
1000	4.0	4.4	4.8	5.2	5.6	6.0	6.4	6.7	7.1	7.6	2:44
1100	4.4	4.8	5.3	5.7	6.1	6.6	7.0	7.4	7.9	8.3	3:01
1200	4.8	5.3	5.7	6.2	6.7	7.1	7.6	8.1	8.6	9.0	3:17
1300	5.2	5.7	6.2	6.7	7.2	7.7	8.2	8.7	9.2	9.8	3:34
1400	5.5	6.1	6.6	7.2	7.7	8.3	8.8	9.4	9.9	10.5	3:51
1500	5.9	6.5	7.1	7.7	8.3	8.9	9.4	10.0	10.6	11.2	4:07
1600	6.3	6.9	7.5	8.2	8.8	9.4	10.0	10.7	11.3	12.0	4:24
1700	6.6	7.3	8.0	8.6	9.3	10.0	10.6	11.3	12.0	12.7	4:41
1800	7.0	7.7	8.4	9.1	9.8	10.5	11.2	11.9	12.6	13.4	4:57

Includes APU fuel burn.
Driftdown at optimum driftdown speed and cruise at long range cruise speed.

ENGINE INOP

MAX CONTINUOUS THRUST

Long Range Cruise Altitude Capability

100 ft/min residual rate of climb

WEIGHT (1000 KG)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
85	15200	12600	9900
80	17200	15300	12500
75	19200	17400	15000
70	20900	19700	17300
65	22500	21300	19800
60	24100	23000	21600
55	26300	24800	23500
50	29000	27700	25800
45	31400	30500	29200
40	33800	33000	31800

With engine anti-ice on, decrease altitude capability by 1200 ft.
With engine and wing anti-ice on, decrease altitude capability by 5500 ft.

ENGINE INOP

Long Range Cruise Control

WEIGHT (1000 KG)		PRESSURE ALTITUDE (1000 FT)									
		10	15	17	19	21	23	25	27	29	31
85	%N1	91.8	95.5	97.9							
	MACH	.561	.600	.616							
	KIAS	311	303	300							
	FF/ENG	3067	3033	3052							
80	%N1	90.1	94.0	95.9	98.5						
	MACH	.545	.590	.603	.621						
	KIAS	302	299	294	291						
	FF/ENG	2875	2870	2846	2886						
75	%N1	88.4	92.5	94.0	96.1						
	MACH	.528	.579	.593	.607						
	KIAS	293	293	288	284						
	FF/ENG	2684	2709	2674	2662						
70	%N1	86.5	90.7	92.3	94.0	96.2					
	MACH	.510	.562	.582	.595	.610					
	KIAS	282	284	283	278	274					
	FF/ENG	2494	2518	2520	2481	2487					
65	%N1	84.5	88.7	90.4	92.2	93.9	96.4				
	MACH	.491	.542	.563	.584	.596	.612				
	KIAS	271	274	274	273	268	265				
	FF/ENG	2306	2327	2330	2330	2295	2317				
60	%N1	82.3	86.5	88.3	90.0	91.9	93.7	96.4			
	MACH	.471	.521	.543	.564	.585	.597	.614			
	KIAS	261	263	263	263	263	258	254			
	FF/ENG	2124	2137	2139	2140	2143	2114	2146			
55	%N1	80.2	84.2	85.9	87.7	89.5	91.4	93.3	96.2		
	MACH	.453	.498	.520	.541	.563	.585	.597	.614		
	KIAS	250	251	252	252	253	252	247	244		
	FF/ENG	1954	1948	1950	1950	1953	1958	1938	1971		
50	%N1	77.8	81.6	83.4	85.2	87.0	88.7	90.7	92.7	95.7	
	MACH	.434	.475	.495	.516	.538	.561	.583	.596	.613	
	KIAS	240	239	239	240	241	241	241	236	233	
	FF/ENG	1791	1764	1762	1762	1764	1767	1777	1765	1793	
45	%N1	75.5	79.1	80.6	82.3	84.1	85.9	87.7	89.7	91.8	94.8
	MACH	.415	.452	.469	.489	.511	.533	.556	.578	.593	.610
	KIAS	229	227	227	227	228	229	229	229	225	222
	FF/ENG	1636	1594	1582	1575	1577	1580	1586	1600	1593	1613
40	%N1	73.0	76.2	77.8	79.4	81.0	82.8	84.6	86.4	88.3	90.7
	MACH	.395	.429	.445	.462	.480	.502	.525	.548	.571	.589
	KIAS	218	215	215	214	214	215	216	216	216	214
	FF/ENG	1485	1434	1416	1402	1392	1394	1400	1410	1421	1424

ENGINE INOP

MAX CONTINUOUS THRUST

Long Range Cruise Diversion Fuel and Time

Ground to Air Miles Conversion

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

Reference Fuel and Time Required at Check Point

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

Fuel Required Adjustments (1000 KG)

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

Includes APU fuel burn.

ENGINE INOP

MAX CONTINUOUS THRUST

Holding

Flaps Up

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)							
		1500	5000	10000	15000	20000	25000	30000	35000
85	%N1	81.1	84.1	88.3	92.8				
	KIAS	250	251	252	253				
	FF/ENG	2740	2730	2750	2800				
80	%N1	79.5	82.4	86.5	91.0	98.3			
	KIAS	242	243	244	245	247			
	FF/ENG	2580	2570	2570	2610	2740			
75	%N1	77.8	80.5	84.7	89.1	95.0			
	KIAS	235	236	236	238	239			
	FF/ENG	2420	2400	2400	2420	2490			
70	%N1	76.0	78.6	82.8	87.1	92.1			
	KIAS	227	227	228	229	231			
	FF/ENG	2260	2240	2230	2250	2270			
65	%N1	74.0	76.7	80.8	85.0	89.7	97.7		
	KIAS	219	219	220	221	222	224		
	FF/ENG	2100	2090	2070	2070	2080	2230		
60	%N1	71.7	74.6	78.5	82.8	87.4	93.7		
	KIAS	210	210	211	212	213	214		
	FF/ENG	1950	1930	1910	1910	1910	1970		
55	%N1	69.4	72.3	76.3	80.5	84.9	90.0		
	KIAS	200	201	202	203	204	205		
	FF/ENG	1800	1770	1750	1740	1730	1760		
50	%N1	66.9	69.7	73.8	77.8	82.3	87.0	94.9	
	KIAS	192	192	192	193	194	195	196	
	FF/ENG	1650	1620	1600	1580	1570	1570	1680	
45	%N1	64.2	66.9	70.9	75.0	79.4	84.0	89.6	
	KIAS	185	185	185	185	185	185	186	
	FF/ENG	1500	1470	1440	1420	1400	1400	1450	
40	%N1	61.1	64.0	67.8	72.0	76.2	80.7	85.4	94.0
	KIAS	178	178	178	178	178	178	178	178
	FF/ENG	1350	1330	1300	1270	1250	1240	1260	1360

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

ENGINE INOP

ADVISORY INFORMATION

Gear Down Landing Rate of Climb Available

Flaps 15

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

Rate of climb capability shown is valid for 60000 kg, gear down at VREF15+5.
Decrease rate of climb 130 ft/min per 5000 kg greater than 60000 kg.
Increase rate of climb 160 ft/min per 5000 kg less than 60000 kg.

Flaps 30

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

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

GEAR DOWN

Long Range Cruise Altitude Capability

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

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

Long Range Cruise Control

WEIGHT (1000 KG)		PRESSURE ALTITUDE (1000 FT)								
		10	21	23	25	27	29	31	33	35
85	%N1	85.9								
	MACH	.482								
	KIAS	267								
	FF/ENG	2421								
80	%N1	84.2								
	MACH	.468								
	KIAS	259								
	FF/ENG	2271								
75	%N1	82.5	91.7							
	MACH	.454	.554							
	KIAS	251	248							
	FF/ENG	2123	2101							
70	%N1	80.6	89.8	91.7						
	MACH	.440	.541	.557						
	KIAS	243	242	240						
	FF/ENG	1977	1960	1950						
65	%N1	78.6	87.9	89.5	91.6	94.5				
	MACH	.425	.524	.543	.560	.578				
	KIAS	235	234	233	231	229				
	FF/ENG	1835	1812	1806	1805	1836				
60	%N1	76.5	85.6	87.4	89.1	91.3	94.5			
	MACH	.409	.504	.525	.544	.562	.580			
	KIAS	226	225	225	224	222	220			
	FF/ENG	1696	1661	1661	1658	1664	1696			
55	%N1	74.4	83.3	85.0	86.8	88.5	90.9	94.1		
	MACH	.393	.484	.504	.525	.545	.562	.581		
	KIAS	217	216	216	216	215	213	211		
	FF/ENG	1559	1515	1512	1515	1517	1523	1555		
50	%N1	71.9	80.7	82.5	84.2	86.0	87.8	90.2	93.5	
	MACH	.376	.463	.482	.502	.523	.544	.561	.580	
	KIAS	207	206	206	206	206	205	203	201	
	FF/ENG	1424	1371	1367	1368	1374	1377	1381	1411	
45	%N1	69.1	78.0	79.7	81.4	83.1	85.0	86.8	89.1	92.5
	MACH	.358	.441	.458	.477	.498	.520	.541	.559	.578
	KIAS	197	196	196	196	196	196	195	193	191
	FF/ENG	1294	1231	1224	1224	1230	1235	1237	1239	1265
40	%N1	66.2	74.9	76.6	78.3	80.0	81.8	83.6	85.5	87.7
	MACH	.340	.417	.434	.452	.471	.491	.513	.535	.554
	KIAS	187	185	185	185	185	185	185	185	183
	FF/ENG	1170	1098	1085	1083	1089	1092	1094	1096	1097

GEAR DOWN

Long Range Cruise Enroute Fuel and Time
Ground to Air Miles Conversion

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

Reference Fuel and Time Required at Check Point

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

Fuel Required Adjustments (1000 KG)

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

GEAR DOWN

Descent

VREF40 + 70 KIAS

PRESSURE ALTITUDE (FT)	TIME (MIN)	FUEL (KG)	DISTANCE (NM)
41000	21	280	91
39000	20	270	86
37000	19	270	81
35000	19	260	77
33000	18	260	72
31000	17	250	68
29000	17	250	64
27000	16	240	60
25000	15	230	56
23000	14	230	52
21000	13	220	48
19000	13	210	44
17000	12	200	40
15000	11	190	36
10000	8	170	26
5000	6	140	16
1500	4	110	9

Allowances for a straight-in approach are included.

GEAR DOWN

Holding

Flaps Up

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)							
		1500	5000	10000	15000	20000	25000	30000	35000
85	%N1	75.8	78.5	82.7	87.0	92.0			
	KIAS	230	230	230	230	230			
	FF/ENG	2240	2230	2220	2240	2260			
80	%N1	74.2	77.0	81.1	85.4	90.0			
	KIAS	225	225	225	225	225			
	FF/ENG	2120	2110	2100	2100	2110			
75	%N1	72.5	75.4	79.4	83.7	88.3	94.8		
	KIAS	220	220	220	220	220	220		
	FF/ENG	2000	1990	1970	1970	1970	2050		
70	%N1	70.8	73.7	77.6	81.9	86.4	91.8		
	KIAS	216	216	216	216	216	216		
	FF/ENG	1890	1870	1850	1840	1840	1870		
65	%N1	69.0	71.9	75.9	80.1	84.5	89.3		
	KIAS	211	211	211	211	211	211		
	FF/ENG	1770	1750	1730	1720	1710	1730		
60	%N1	67.1	69.8	74.0	78.0	82.5	87.1	94.3	
	KIAS	204	204	204	204	204	204	204	
	FF/ENG	1660	1630	1610	1600	1580	1590	1670	
55	%N1	65.1	67.8	71.9	75.9	80.3	84.8	90.4	
	KIAS	198	198	198	198	198	198	198	
	FF/ENG	1540	1520	1490	1480	1460	1460	1500	
50	%N1	62.8	65.6	69.6	73.7	78.0	82.4	87.1	
	KIAS	192	192	192	192	192	192	192	
	FF/ENG	1430	1400	1380	1360	1330	1330	1350	
45	%N1	60.3	63.3	67.1	71.4	75.5	79.9	84.5	91.5
	KIAS	185	185	185	185	185	185	185	185
	FF/ENG	1310	1290	1270	1250	1220	1210	1220	1270
40	%N1	57.9	60.6	64.6	68.7	72.9	77.3	81.7	86.8
	KIAS	178	178	178	178	178	178	178	178
	FF/ENG	1200	1180	1160	1130	1110	1090	1100	1110

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

GEAR DOWN
ENGINE INOP

MAX CONTINUOUS THRUST

Driftdown Speed/Level Off Altitude

100 ft/min residual rate of climb

WEIGHT (1000 KG)		OPTIMUM DRIFTDOWN SPEED (KIAS)	LEVEL OFF ALTITUDE (FT)		
START DRIFTDOWN	LEVEL OFF		ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
85	80	227	1700		
80	76	223	4000	2300	200
75	71	218	6300	4900	2800
70	66	213	8600	7300	5300
65	62	208	10900	9800	8000
60	57	202	13200	12300	10900
55	52	196	15600	14800	13900
50	47	190	18100	17300	16500
45	43	183	20600	19800	18900
40	38	176	23100	22300	21400

Includes APU fuel burn.

Long Range Cruise Altitude Capability

100 ft/min residual rate of climb

WEIGHT (1000 KG)	PRESSURE ALTITUDE (FT)		
	ISA + 10°C & BELOW	ISA + 15°C	ISA + 20°C
75	1500		
70	4500	2500	
65	7500	5900	3400
60	10600	9200	6900
55	13300	12300	10600
50	16200	15400	14500
45	19300	18300	17500
40	22200	21400	20500

GEAR DOWN
ENGINE INOP

MAX CONTINUOUS THRUST

Long Range Cruise Control

WEIGHT (1000 KG)		PRESSURE ALTITUDE (1000 FT)									
		5	7	9	11	13	15	17	19	21	23
70	%N1	94.8									
	MACH	.389									
	KIAS	235									
	FF/ENG	3774									
65	%N1	92.6	94.3	96.9							
	MACH	.376	.389	.402							
	KIAS	228	227	226							
	FF/ENG	3477	3485	3527							
60	%N1	90.2	91.9	93.7	96.3						
	MACH	.364	.375	.388	.402						
	KIAS	220	219	218	218						
	FF/ENG	3192	3191	3198	3240						
55	%N1	87.8	89.3	91.0	92.8	95.4					
	MACH	.351	.362	.374	.387	.400					
	KIAS	212	211	210	209	209					
	FF/ENG	2924	2909	2906	2913	2951					
50	%N1	85.3	86.7	88.2	89.9	91.7	94.2	98.2			
	MACH	.338	.348	.359	.371	.384	.398	.412			
	KIAS	204	203	202	201	200	199	198			
	FF/ENG	2672	2647	2630	2626	2633	2657	2737			
45	%N1	82.7	84.0	85.4	86.9	88.6	90.4	92.7	96.6		
	MACH	.325	.334	.344	.355	.367	.380	.393	.408		
	KIAS	196	195	193	192	191	190	189	189		
	FF/ENG	2432	2400	2374	2356	2351	2352	2359	2417		
40	%N1	79.8	81.1	82.5	83.9	85.4	87.0	88.8	90.8	94.1	98.4
	MACH	.311	.320	.329	.339	.349	.361	.374	.387	.402	.418
	KIAS	188	186	184	183	182	181	180	179	179	178
	FF/ENG	2206	2166	2133	2107	2088	2076	2069	2065	2101	2201

GEAR DOWN
ENGINE INOP
MAX CONTINUOUS THRUST

Long Range Cruise Diversion Fuel and Time
Ground to Air Miles Conversion

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

Reference Fuel and Time Required at Check Point

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

Fuel Required Adjustments (1000 KG)

REFERENCE FUEL REQUIRED (1000 KG)	WEIGHT AT CHECK POINT (1000 KG)				
	40	50	60	70	80
1	-0.2	-0.1	0.0	0.1	0.3
2	-0.3	-0.2	0.0	0.3	0.6
3	-0.5	-0.3	0.0	0.5	1.0
4	-0.6	-0.3	0.0	0.7	1.3
5	-0.8	-0.4	0.0	0.9	1.7
6	-1.0	-0.5	0.0	1.0	2.0
7	-1.1	-0.6	0.0	1.2	2.4
8	-1.3	-0.7	0.0	1.4	2.7
9	-1.5	-0.7	0.0	1.6	3.1
10	-1.6	-0.8	0.0	1.8	3.5
11	-1.8	-0.9	0.0	1.9	3.8
12	-1.9	-1.0	0.0	2.1	4.2
13	-2.1	-1.1	0.0	2.3	4.5
14	-2.3	-1.1	0.0	2.5	4.9

Includes APU fuel burn.

GEAR DOWN
ENGINE INOP
MAX CONTINUOUS THRUST

Holding
Flaps Up

WEIGHT (1000 KG)		PRESSURE ALTITUDE (FT)			
		1500	5000	10000	15000
80	%N1	93.4			
	KIAS	225			
	FF/ENG	4140			
75	%N1	91.4	94.7		
	KIAS	220	220		
	FF/ENG	3870	3910		
70	%N1	89.4	92.6		
	KIAS	216	216		
	FF/ENG	3610	3640		
65	%N1	87.4	90.5	95.9	
	KIAS	211	211	211	
	FF/ENG	3360	3380	3460	
60	%N1	85.2	88.2	92.9	
	KIAS	204	204	204	
	FF/ENG	3110	3110	3150	
55	%N1	82.9	85.9	90.4	97.2
	KIAS	198	198	198	198
	FF/ENG	2860	2860	2880	3010
50	%N1	80.4	83.4	87.7	92.8
	KIAS	192	192	192	192
	FF/ENG	2630	2620	2620	2670
45	%N1	77.8	80.7	85.0	89.6
	KIAS	185	185	185	185
	FF/ENG	2400	2380	2380	2400
40	%N1	75.1	77.8	82.1	86.5
	KIAS	178	178	178	178
	FF/ENG	2180	2160	2140	2140

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

Performance Inflight - QRH — Chapter PI-QRH

Text — Section 65

Introduction

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

General

Flight with Unreliable Airspeed / Turbulent Air Penetration

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

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

Max Climb %N1

This table shows Max Climb %N1 for a 280/.78 climb speed schedule, normal engine bleed for packs on or off and anti-ice off. Enter the table with airport pressure altitude and TAT and read %N1. %N1 adjustments are shown for anti-ice operation.

Go-around %N1

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

VREF

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

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

Advisory Information

Reported Braking Action

When landing on slippery runways or runways contaminated with ice, snow, slush, or standing water, the reported braking action must be considered. A table is provided that correlates a runway description to a reported braking action that can then be used to determine the appropriate Normal Configuration Landing Distance or Non-Normal Configuration Landing Distance.

Normal Configuration Landing Distance

Tables are provided as advisory information for normal configuration landing distances on dry runways and runways with good, good-to-medium, medium, medium-to-poor, and poor reported braking action. Landing distances (reference distances plus adjustments) are 115% of the actual landing distance. The Normal Configuration Landing Distance tables should be used enroute to make a landing distance assessment for time of arrival.

The reference landing distance is the distance from threshold to complete stop. It includes an air distance allowance of 1500 ft from threshold to touchdown. The reference distance is based on a reference landing weight and speed at sea level, standard day, zero wind, zero slope, two-engine detent No. 2 reverse thrust, and auto speedbrakes.

To use these tables, determine the reference landing distance for the selected braking configuration and reported braking action. Adjust this reference distance for landing weight, altitude, wind, slope, temperature, approach speed, and the number of operative thrust reversers. Each correction is applied independently to the reference landing distance. A correction for use of manual speedbrakes is provided in the table notes.

Use of the autobrake system commands the airplane to a constant deceleration rate. In some conditions, such as a runway with "poor" reported braking action, the airplane may not be able to achieve these deceleration rates. In these cases, runway slope and inoperative reversers influence the stopping distance. Since it cannot be determined quickly when this becomes a factor, it is appropriate to add the effects of slope and inoperative reversers when using the autobrake system.

Non-normal Configuration Landing Distance

Advisory information is provided to support non-normal configurations that affect landing. Landing distances and adjustments are provided for dry runways and runways with good, good-to-medium, medium, medium-to-poor, and poor reported braking action. Landing distances (reference distances plus adjustments) are representative of the actual landing distance, and are not factored. The Non-Normal Configuration Landing Distance tables should be used enroute to make a landing distance assessment for time of arrival.

The reference landing distance is the distance from threshold to complete stop. It includes an air distance allowance of 1500 ft from threshold to touchdown. The reference distance is based on a reference landing weight and speed at sea level, standard day, zero wind, zero slope, and maximum available reverse thrust.

Tables for Non-Normal Configuration Landing Distance in this section are similar in format and used in the same manner as tables for the Normal Configuration Landing Distance previously described.

Recommended Brake Cooling Schedule

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

Use of the recommended cooling schedule will help avoid brake overheat and fuse plug problems that could result from repeated landings at short time intervals or a rejected takeoff.

Enter the 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. Notes providing adjustments for wind are included below the table.

To determine the energy per brake absorbed during landing, enter the appropriate Adjusted Brake Energy Per Brake table (No Reverse Thrust or 2 Engine Reverse) with the reference brake energy per brake and the type of braking used during landing (Max Manual, Max Auto, or Autobrake). The resulting number is the adjusted brake energy per brake and represents the energy absorbed in each brake during the landing.

The recommended cooling time is found in the appropriate (steel or carbon brakes) final table by entering with the adjusted brake energy per brake. Times are provided for ground cooling and inflight gear down cooling.

Brake Temperature Monitor System (BTMS) indications are also shown. If brake cooling is determined from the BTMS, use the hottest brake indication 10 to 15 minutes after the airplane has come to a complete stop, or inflight with gear retracted to determine recommended cooling schedule.

Engine Inoperative

Initial Max Continuous %N1

The Initial Max Continuous %N1 setting for use following an engine failure is shown. The table is based on the typical all engine cruise speed of.79M to provide a target %N1 setting at the start of driftdown. Once driftdown is established, the Max Continuous %N1 table should be used to determine %N1 for the given conditions.

Max Continuous %N1

Power setting is based on one engine operating with one A/C pack operating and all anti-ice bleeds off. Enter the table with pressure altitude, TAT, and IAS or Mach to read %N1.

It is desirable to maintain engine thrust level within the limits of the Max Cruise thrust rating. However, where thrust level in excess of Max Cruise rating is required, such as for meeting terrain clearance, ATC altitude assignments, or to attain maximum range capability, it is permissible to use the thrust needed up to the Max Continuous thrust rating. The Max Continuous thrust rating is intended primarily for emergency use at the discretion of the pilot and is the maximum thrust that may be used continuously.

Driftdown Speed/Level Off Altitude

The table shows optimum driftdown speed as a function of cruise weight at start of driftdown. Also shown are the approximate weight and pressure altitude at which the airplane will level off considering 100 ft/min residual rate of climb.

The level off altitude is dependent on air temperature (ISA deviation).

Driftdown/LRC Range Capability

This table shows the range capability from the start of driftdown. Driftdown is continued to level off altitude. As weight decreases due to fuel burn, the airplane is accelerated to Long Range Cruise speed. Cruise is continued at level off altitude and Long Range Cruise speed.

To determine fuel required, enter the Ground to Air Miles Conversion table with the desired ground distance and adjust for anticipated winds to obtain air distance to destination. Then enter the Driftdown/Cruise Fuel and Time table with air distance and weight at start of driftdown to determine fuel and time required. If altitudes other than the level off altitude is used, fuel and time required may be obtained by using the Engine Inoperative Long Range Cruise Enroute Fuel and Time table.

Long Range Cruise Altitude Capability

The table shows the maximum altitude that can be maintained at a given weight and air temperature (ISA deviation), based on Long Range Cruise speed, Max Continuous thrust, and 100 ft/min residual rate of climb.

Long Range Cruise Control

The table provides target %N1, engine inoperative Long Range Cruise Mach number, IAS and fuel flow for the airplane weight and pressure altitude. The fuel flow values in this table reflect single engine fuel burn.

APU Operation During Flight

For APU operation during flight, increase fuel flow according to the following table. These increments include the APU fuel flow and the effect of increased drag from the APU door.

PRESSURE ALTITUDE (1000 FT)	APU FUEL FLOW (KG/HR)
39	45
35	45
31	50
25	60
20	65
15	75
10	85
5	95

Long Range Cruise Diversion Fuel and Time

Tables are provided for crews to determine the fuel and time required to proceed to an alternate airfield with one engine inoperative. The data is based on single engine Long Range Cruise speed and .78/280/250 descent. Enter with Air Distance as determined from the Ground to Air Miles Conversion table and read Fuel and Time required at the cruise pressure altitude. Adjust the fuel obtained for deviation from the reference weight at checkpoint as required by entering the off reference fuel adjustments table with the fuel required for the reference weight and the actual weight at checkpoint. Read fuel required and time for the actual weight.

Holding

Target %N1, indicated airspeed and fuel flow per engine information is tabulated for holding with flaps up based on the FMC optimum holding speed schedule. This is the higher of the maximum endurance speed and the maneuvering speed. Small variations in airspeed will not appreciably affect the overall endurance time. Enter the table with weight and pressure altitude to read %N1, IAS and fuel flow per engine.

Gear Down Landing Rate of Climb Available

Rate of climb data is provided as guidance information in the event an engine inoperative landing (manual or autoland) is planned. The tables show gear down rate of climb available for Flaps 15 and Flaps 30. Enter the table with TAT and pressure altitude to read rate of climb available. Apply adjustments shown to correct for weight.

Gear Down

This section contains performance for airplane operation with the landing gear extended. The data is based on engine bleeds for normal air conditioning.

Note: The Flight Management Computer System (FMCS) does not contain special provisions for operation with landing gear extended. As a result, the FMCS may generate inappropriate enroute speed schedules, display non-conservative predictions of fuel burn, estimated time of arrival (ETA), maximum altitude, and compute overly shallow descent path. An accurate estimated time of arrival (ETA) is available if current speed or Mach is entered into the VNAV cruise page.

Tables for gear down performance in this section are identical in format and used in the same manner as tables for the gear up configuration previously described.

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Maneuvers — Chapter Man
Table of Contents — Section TOC

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General

Non-Normal Maneuvers and Flight Patterns are included for training and review purposes.

Non-Normal Maneuvers

Flight crews are expected to do non-normal maneuvers from memory.

Flight Patterns

Flight patterns show procedures for some all-engine and engine-inoperative situations.

Flight patterns do not include all procedural items but show required/recommended:

- configuration changes
- thrust changes
- Mode Control Panel (MCP) changes
- pitch mode and roll mode changes
- checklist calls.

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Approach to Stall or Stall Recovery

All recoveries from approach to stall should be done as if an actual stall has occurred.

Immediately do the following at the first indication of stall (buffet or stick shaker).

Note: Do not use flight director commands during the recovery.

Pilot Flying	Pilot Monitoring

• Initiate the recovery:
  • Hold the control column firmly.
  • Disconnect autopilot and autothrottle.
  • Smoothly apply nose down elevator to reduce the angle of attack until buffet or stick shaker stops. Nose down stabilizer trim may be needed.*
	• Monitor altitude and airspeed.
	• Verify all required actions have been done and call out any omissions.
	• Call out any trend toward terrain contact.

• Continue the recovery:
  • Roll in the shortest direction to wings level if needed.**
  • Advance thrust levers as needed.
  • Retract the speedbrakes.
  • Do not change gear or flap configuration, except
    • During liftoff, if flaps are up, call for flaps 1.
	• Monitor altitude and airspeed.
	• Verify all required actions have been done and call out any omissions.
	• Call out any trend toward terrain contact.
	• Set the FLAP lever as directed.

• Complete the recovery:
  • Check airspeed and adjust thrust as needed.
  • Establish pitch attitude.
  • Return to the desired flight path.
• Re-engage the autopilot and autothrottle if desired.
	• Monitor altitude and airspeed.
	• Verify all required actions have been done and call out any omissions.
	• Call out any trend toward terrain contact.

WARNING: *If the control column does not provide the needed response, stabilizer trim may be necessary. Excessive use of pitch trim may aggravate the condition, or may result in loss of control or in high structural loads.

WARNING: ** Excessive use of pitch trim or rudder may aggravate the condition, or may result in loss of control or in high structural loads.

Rejected Takeoff

The captain has the sole responsibility for the decision to reject the takeoff. The decision must be made in time to start the rejected takeoff maneuver by V1. If the decision is to reject the takeoff, the captain must clearly announce "REJECT," immediately start the rejected takeoff maneuver and assume control of the airplane. If the first officer is making the takeoff, the first officer must maintain control of the airplane until the captain makes a positive input to the controls.

Prior to 80 knots, the takeoff should be rejected for any of the following:

- activation of the master caution system
- system failure(s)
- unusual noise or vibration
- tire failure
- abnormally slow acceleration
- takeoff configuration warning
- fire or fire warning
- engine failure
- predictive windshear warning
- if a side window opens
- if the airplane is unsafe or unable to fly.

Above 80 knots and prior to V1, the takeoff should be rejected for any of the following:

- fire or fire warning
- engine failure
- predictive windshear warning
- if the airplane is unsafe or unable to fly.

During the takeoff, the crewmember observing the non-normal situation will immediately call it out as clearly as possible.

Captain	First Officer
Without delay: Simultaneously close the thrust levers, disengage the autothrottles and apply maximum manual wheel brakes or verify operation of RTO autobrake. If RTO autobrake is selected, monitor system performance and apply manual wheel brakes if the AUTO BRAKE DISARM light illuminates or deceleration is not adequate. Raise SPEED BRAKE lever. Apply reverse thrust up to the maximum amount consistent with conditions. Continue maximum braking until certain the airplane will stop on the runway.	Verify actions as follows: Thrust levers closed. Autothrottles disengaged. Maximum brakes applied. Verify SPEED BRAKE lever UP and call “SPEEDBRAKES UP.” If SPEED BRAKE lever is not UP, call “SPEEDBRAKES NOT UP.” Reverse thrust applied. When both REV indications are green, call "REVERSERS NORMAL." If there is no REV indication(s) or the indication(s) stays amber, call "NO REVERSER ENGINE NUMBER 1", or "NO REVERSER ENGINE NUMBER 2", or "NO REVERSERS". Call out omitted action items.
Field length permitting: Initiate movement of the reverse thrust levers to reach the reverse idle detent by taxi speed.	Call out 60 knots. Communicate the reject decision to the control tower and cabin as soon as practical.
When the airplane is stopped, perform procedures as required. Review Brake Cooling Schedule for brake cooling time and precautions (refer to Performance Inflight Chapter.) Consider the following: The possibility of wheel fuse plugs melting The need to clear the runway The requirement for remote parking Wind direction in case of fire Alerting fire equipment Not setting the parking brake unless passenger evacuation is necessary Advising the ground crew of the hot brake hazard Advising passengers of the need to remain seated or evacuate Completion of Non-Normal checklist (if appropriate) for conditions which caused the RTO.	

Ground Proximity Warning System (GPWS) Response

GPWS Caution

Accomplish the following maneuver for any of these aural alerts:

- SINK RATE
- TERRAIN
- DON’T SINK
- TOO LOW FLAPS
- TOO LOW GEAR
- TOO LOW TERRAIN
- GLIDESLOPE
- BANK ANGLE
- AIRSPEED LOW (airplanes with AIRSPEED LOW aural)
- CAUTION TERRAIN

(SB Changes YC077, YC079)

- CAUTION OBSTACLE

Pilot Flying	Pilot Monitoring
Correct the flight path, airplane configuration, or airspeed.	

The below glideslope deviation alert may be cancelled or inhibited for:

- localizer or backcourse approach
- circling approach from an ILS
- when conditions require a deliberate approach below glideslope
- unreliable glideslope signal.

Note: If a terrain caution occurs when flying under daylight VMC, and positive visual verification is made that no obstacle or terrain hazard exists, the alert may be regarded as cautionary and the approach may be continued.

Note: Some aural alerts repeat.

GPWS Warning

Accomplish the following maneuver for any of these conditions:

- Activation of “PULL UP” or “TERRAIN TERRAIN PULL UP” warning.

YB521 - YC076, YC078, YC080 - YT197
(SB Changes YC077, YC079)

- Activation of the “PULL UP” or “OBSTACLE OBSTACLE PULL UP” warning.
- Other situations resulting in unacceptable flight toward terrain.

Pilot Flying	Pilot Monitoring
Disconnect autopilot. Disconnect autothrottle. Aggressively apply maximum* thrust. Simultaneously roll wings level and rotate to an initial pitch attitude of 20°. Retract speedbrakes. If terrain remains a threat, continue rotation up to the pitch limit indicator (if available) or stick shaker or initial buffet.	Assure maximum* thrust. Verify all required actions have been completed and call out any omissions.
Do not change gear or flap configuration until terrain separation is assured. Monitor radio altimeter for sustained or increasing terrain separation. When clear of terrain, slowly decrease pitch attitude and accelerate.	Monitor vertical speed and altitude (radio altitude for terrain clearance and barometric altitude for a minimum safe altitude.) Call out any trend toward terrain contact.

Note: Aft control column force increases as the airspeed decreases. In all cases, the pitch attitude that results in intermittent stick shaker or initial buffet is the upper pitch attitude limit. Flight at intermittent stick shaker may be required to obtain a positive terrain separation. Smooth, steady control will avoid a pitch attitude overshoot and stall.

Note: Do not use flight director commands.

Note: *Maximum thrust can be obtained by advancing the thrust levers full forward if the EECs are in the normal mode. If terrain contact is imminent, advance thrust levers full forward.

Note: If positive visual verification is made that no obstacle or terrain hazard exists when flying under daylight VMC conditions prior to a terrain or obstacle warning, the alert may be regarded as cautionary and the approach may be continued.

Traffic Avoidance

Immediately accomplish the following by recall whenever a TCAS traffic advisory (TA) or resolution advisory (RA) occurs.

WARNING: Comply with the RA if there is a conflict between the RA and air traffic control.

WARNING: Once an RA has been issued, safe separation could be compromised if current vertical speed is changed, except as necessary to comply with the RA. This is because TCAS II-to-TCAS II coordination may be in progress with the intruder aircraft, and any change in vertical speed that does not comply with the RA may negate the effectiveness of the others aircraft's compliance with the RA.

Note: If stick shaker or initial buffet occurs during the maneuver, immediately accomplish the APPROACH TO STALL RECOVERY procedure.

Note: If high speed buffet occurs during the maneuver, relax pitch force as necessary to reduce buffet, but continue the maneuver.

Note: Do not use flight director pitch commands until clear of conflict.

For TA:

Pilot Flying	Pilot Monitoring
Look for traffic using traffic display as a guide. Call out any conflicting traffic.	
If traffic is sighted, maneuver if needed.	

Note: Maneuvers based solely on a TA may result in reduced separation and are not recommended.

For RA, except a climb in landing configuration:

WARNING: A DESCEND (fly down) RA issued below 1000 feet AGL should not be followed.

Pilot Flying	Pilot Monitoring
If maneuvering is required, disengage the autopilot and autothrottle. Smoothly adjust pitch and thrust to satisfy the RA command. Follow the planned lateral flight path unless visual contact with the conflicting traffic requires other action.	
Attempt to establish visual contact. Call out any conflicting traffic.	

For a climb RA in landing configuration:

Pilot Flying	Pilot Monitoring
Disengage the autopilot and autothrottle. Advance thrust levers forward to ensure maximum thrust is attained and call for FLAPS 15. Smoothly adjust pitch to satisfy the RA command. Follow the planned lateral flight path unless visual contact with the conflicting traffic requires other action.	Verify maximum thrust set. Position flap lever to 15 detent.
Verify a positive rate of climb on the altimeter and call "GEAR UP."	Verify a positive rate of climb on the altimeter and call "POSITIVE RATE." Set the landing gear lever to UP.
Attempt to establish visual contact. Call out any conflicting traffic.	

Upset Recovery

An upset can generally be defined as unintentionally exceeding the following conditions:

- Pitch attitude greater than 25 degrees nose up, or
- Pitch attitude greater than 10 degrees nose down, or
- Bank angle greater than 45 degrees, or
- Within above parameters but flying at airspeeds inappropriate for the conditions.

The following techniques represent a logical progression for recovering the airplane. The sequence of actions is for guidance only and represents a series of options to be considered and used depending on the situation. Not all actions may be necessary once recovery is under way. If needed, use pitch trim sparingly. Careful use of rudder to aid roll control should be considered only if roll control is ineffective and the airplane is not stalled.

These techniques assume that the airplane is not stalled. A stalled condition can exist at any attitude and may be recognized by continuous stick shaker activation accompanied by one or more of the following:

- Buffeting which could be heavy at times
- Lack of pitch authority and/or roll control
- Inability to arrest descent rate.

If the airplane is stalled, recovery from the stall must be accomplished first by applying and maintaining nose down elevator until stall recovery is complete and stick shaker activation ceases.

Nose High Recovery

Pilot Flying	Pilot Monitoring
• Recognize and confirm the situation	
• Disconnect autopilot and autothrottle • Apply as much as full nose-down elevator • * Apply appropriate nose down stabilizer trim • Reduce thrust • * Roll (adjust bank angle) to obtain a nose down pitch rate • Complete the recovery: - When approaching the horizon, roll to wings level - Check airspeed and adjust thrust - Establish pitch attitude.	• Call out attitude, airspeed and altitude throughout the recovery • Verify all required actions have been completed and call out any omissions.

Nose Low Recovery

Pilot Flying	Pilot Monitoring
• Recognize and confirm the situation	
• Disconnect autopilot and autothrottle • Recover from stall, if required • * Roll in shortest direction to wings level (unload and roll if bank angle is more than 90 degrees) • Recover to level flight: - Apply nose up elevator - *Apply nose up trim, if required - Adjust thrust and drag as required.	• Call out attitude, airspeed and altitude throughout the recovery • Verify all required actions have been completed and call out any omissions.

WARNING: * Excessive use of pitch trim or rudder may aggravate an upset situation or may result in loss of control and/or high structural loads.

Windshear

Windshear Caution

For predictive windshear caution alert: ("MONITOR RADAR DISPLAY" aural).

Pilot Flying	Pilot Monitoring
Maneuver as required to avoid the windshear.	

Windshear Warning

Predictive windshear warning during takeoff roll: ("WINDSHEAR AHEAD, WINDSHEAR AHEAD" aural)

- prior to V1, reject takeoff
- after V1, perform the Windshear Escape Maneuver.

Windshear encountered during takeoff roll:

- If windshear is encountered prior to V1, there may not be sufficient runway remaining to stop if an RTO is initiated at V1. At VR, rotate at a normal rate toward a 15 degree pitch attitude. Once airborne, perform the Windshear Escape Maneuver.
- If windshear is encountered near the normal rotation speed and airspeed suddenly decreases, there may not be sufficient runway left to accelerate back to normal takeoff speed. If there is insufficient runway left to stop, initiate a normal rotation at least 2,000 feet before the end of the runway, even if airspeed is low. Higher than normal attitudes may be required to lift off in the remaining runway. Ensure maximum thrust is set.

Predictive windshear warning during approach: (“GO–AROUND, WINDSHEAR AHEAD” aural)

- perform the Windshear Escape Maneuver, or, at pilot’s discretion, perform a normal go–around.

Windshear encountered in flight:

- perform the Windshear Escape Maneuver.

Note: The following are indications the airplane is in windshear:

- windshear warning (two–tone siren followed by “WINDSHEAR, WINDSHEAR, WINDSHEAR”) or
- unacceptable flight path deviations.

Note: Unacceptable flight path deviations are recognized as uncontrolled changes from normal steady state flight conditions below 1000 feet AGL, in excess of any of the following:

- 15 knots indicated airspeed
- 500 fpm vertical speed
- 5° pitch attitude
- 1 dot displacement from the glideslope
- unusual thrust lever position for a significant period of time.

Windshear Escape Maneuver

Pilot Flying	Pilot Monitoring
MANUAL FLIGHT • Disconnect autopilot. • Press either TO/GA switch. • Aggressively apply maximum* thrust. • Disconnect autothrottle. • Simultaneously roll wings level and rotate toward an initial pitch attitude of 15 °. • Retract speedbrakes. • Follow flight director TO/GA guidance (if available).	• Verify maximum* thrust. • Verify all required actions have been completed and call out any omissions.
AUTOMATIC FLIGHT • Press either TO/GA switch**. • Verify TO/GA mode annunciation. • Verify GA thrust. • Retract speedbrakes. • Monitor system performance***.	• Verify GA* thrust. • Verify all required actions have been completed and call out any omissions.

Pilot Flying	Pilot Monitoring
MANUAL OR AUTOMATIC FLIGHT • Do not change flap or gear configuration until windshear is no longer a factor. • Monitor vertical speed and altitude. • Do not attempt to regain lost airspeed until windshear is no longer a factor.	• Monitor vertical speed and altitude. • Call out any trend toward terrain contact, descending flight path, or significant airspeed changes.

Note: Aft control column force increases as the airspeed decreases. In all cases, the pitch attitude that results in intermittent stick shaker or initial buffet is the upper pitch attitude limit. Flight at intermittent stick shaker may be required to obtain a positive terrain separation. Smooth, steady control will avoid a pitch attitude overshoot and stall.

Note: *Maximum thrust can be obtained by advancing the thrust levers full forward if the EECs are in the normal mode. If terrain contact is imminent, advance thrust levers full forward.

Note: ** If TO/GA is not available, disconnect autopilot and autothrottle and fly manually.

WARNING: * Severe windshear may exceed the performance of the AFDS. The pilot flying must be prepared to disconnect the autopilot and autothrottle and fly manually.**

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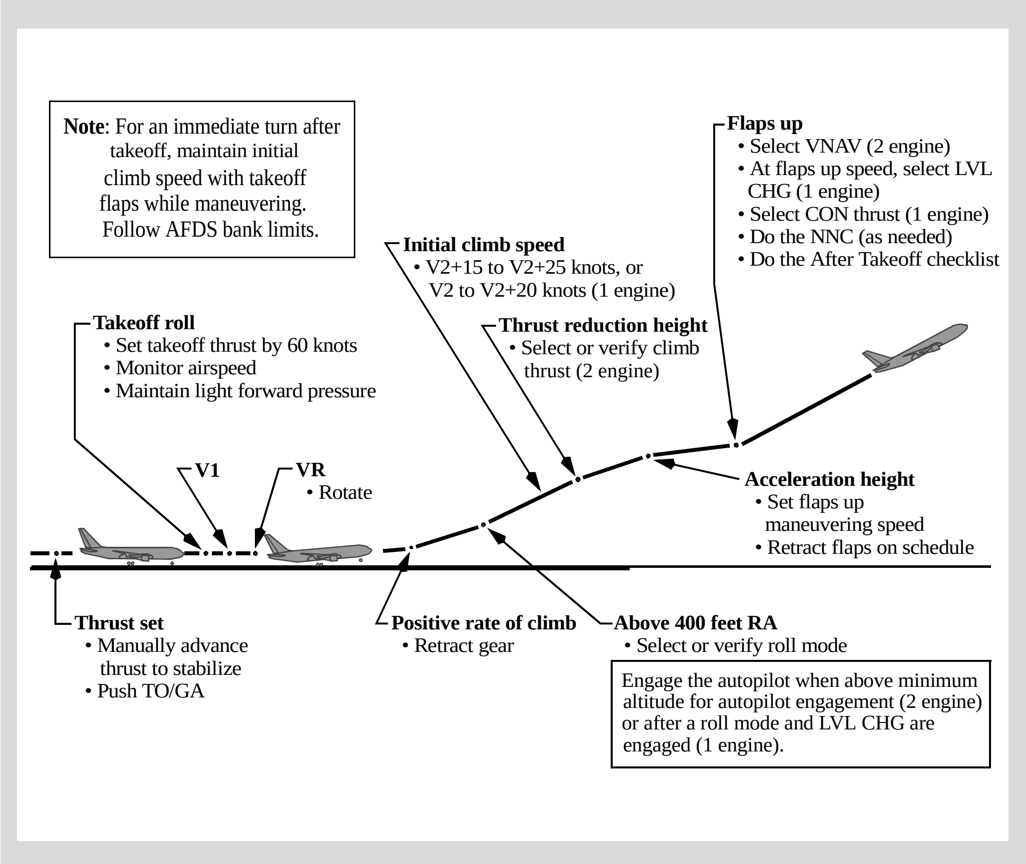
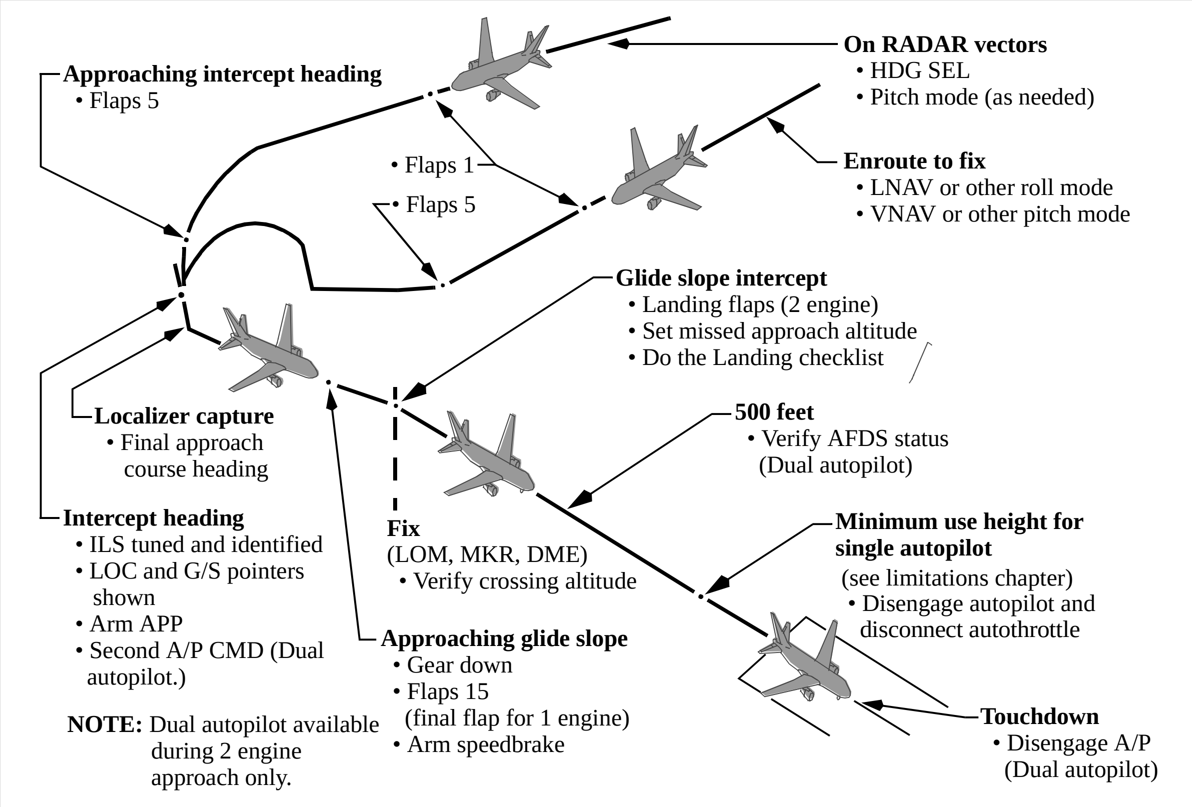
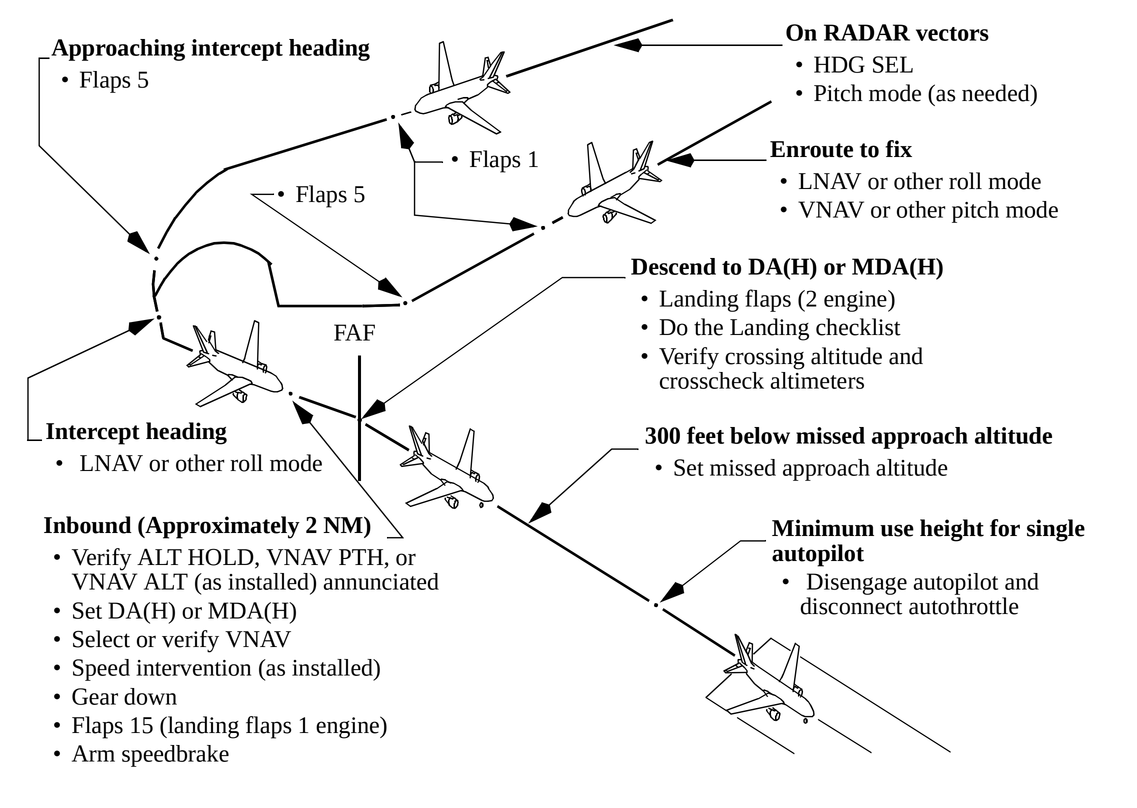
Takeoff


Note: For an immediate turn after takeoff, maintain initial climb speed with takeoff flaps while maneuvering. Follow AFDS bank limits.
Flaps up
• Select VNAV (2 engine)
• At flaps up speed, select LVL CHG (1 engine)
• Select CON thrust (1 engine)
• Do the NNC (as needed)
• Do the After Takeoff checklist
Initial climb speed
• V2+15 to V2+25 knots, or V2 to V2+20 knots (1 engine)
Takeoff roll
• Set takeoff thrust by 60 knots
• Monitor airspeed
• Maintain light forward pressure
Thrust reduction height
• Select or verify climb thrust (2 engine)
V1
VR
• Rotate
Acceleration height
• Set flaps up maneuvering speed
• Retract flaps on schedule
Thrust set
• Manually advance thrust to stabilize
• Push TO/GA
Positive rate of climb
• Retract gear
Above 400 feet RA
• Select or verify roll mode
Engage the autopilot when above minimum altitude for autopilot engagement (2 engine) or after a roll mode and LVL CHG are engaged (1 engine).

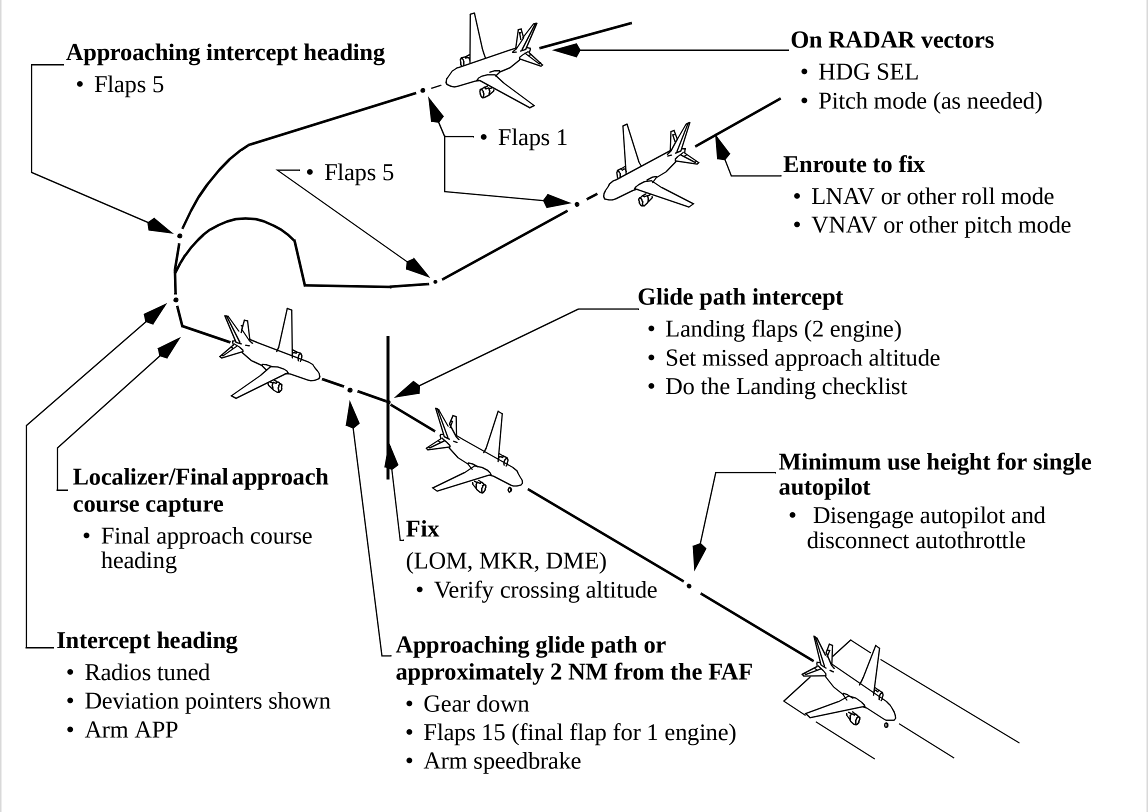
ILS Approach



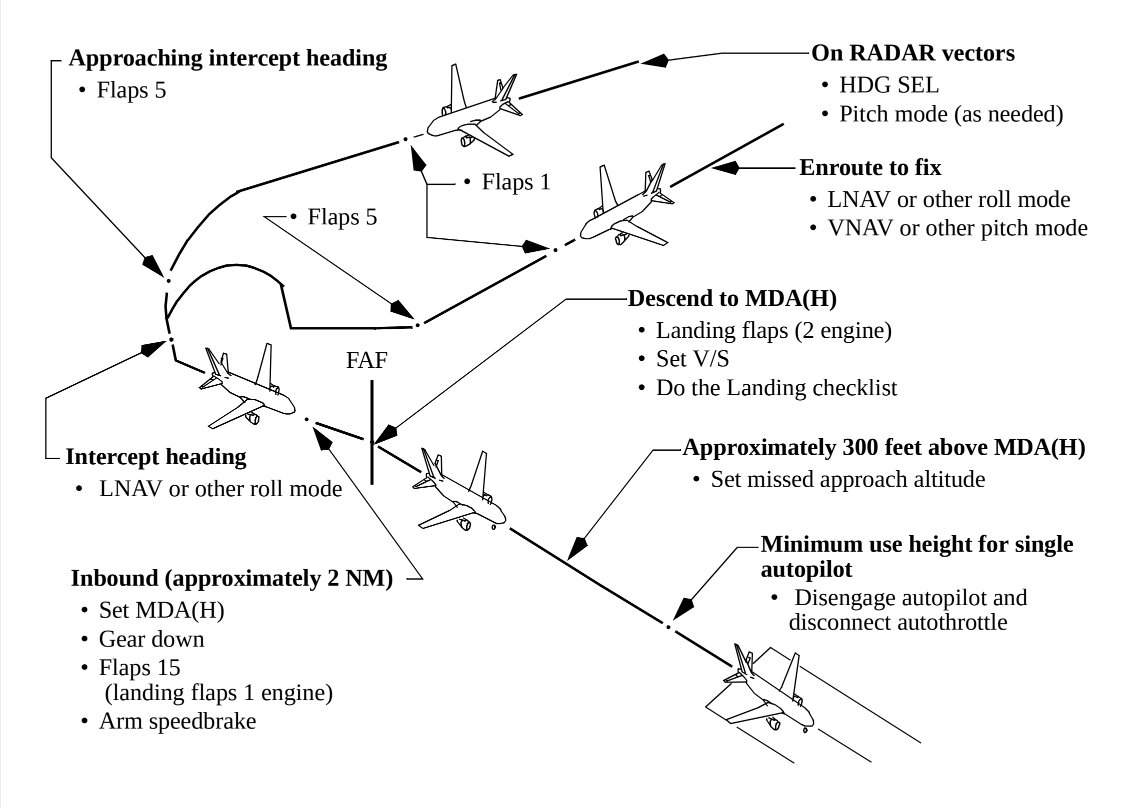
Instrument Approach Using VNAV



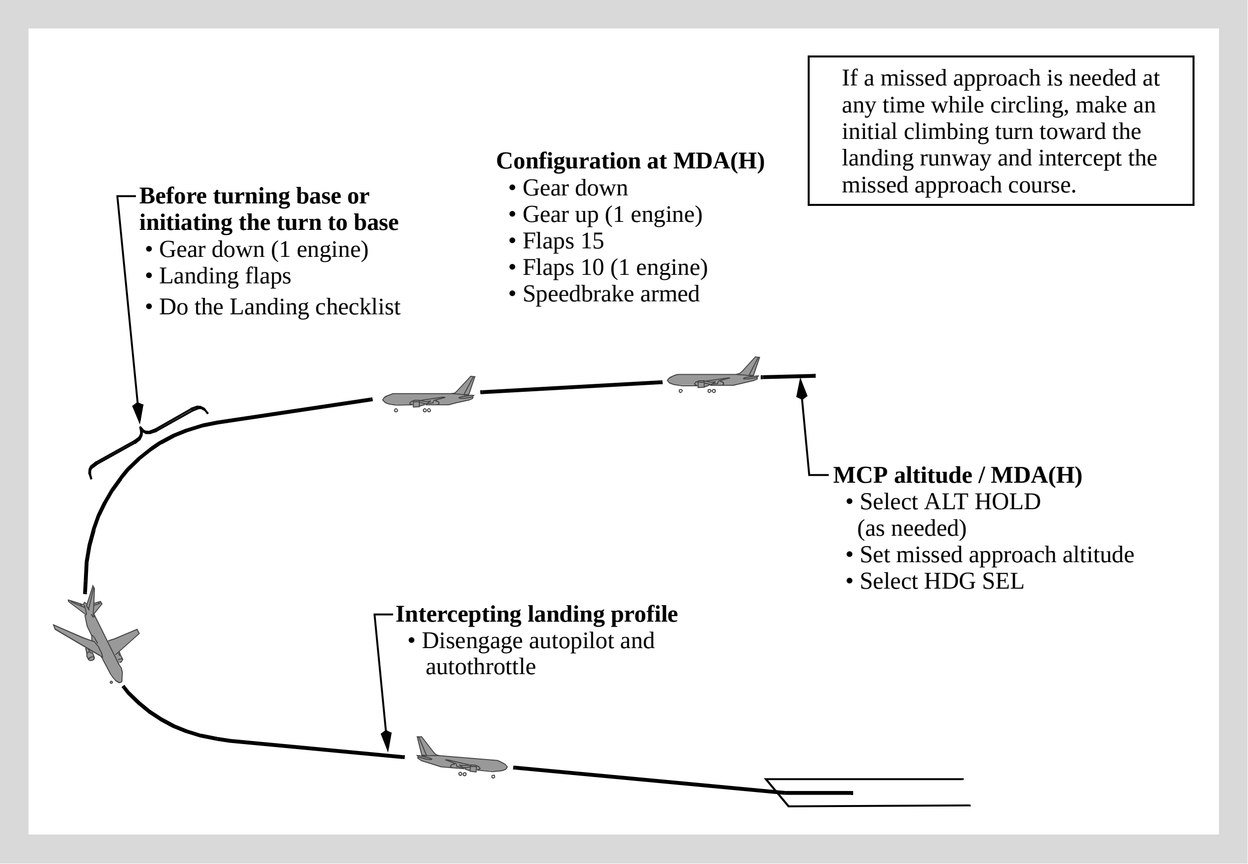
Instrument Approach Using IAN (As installed)



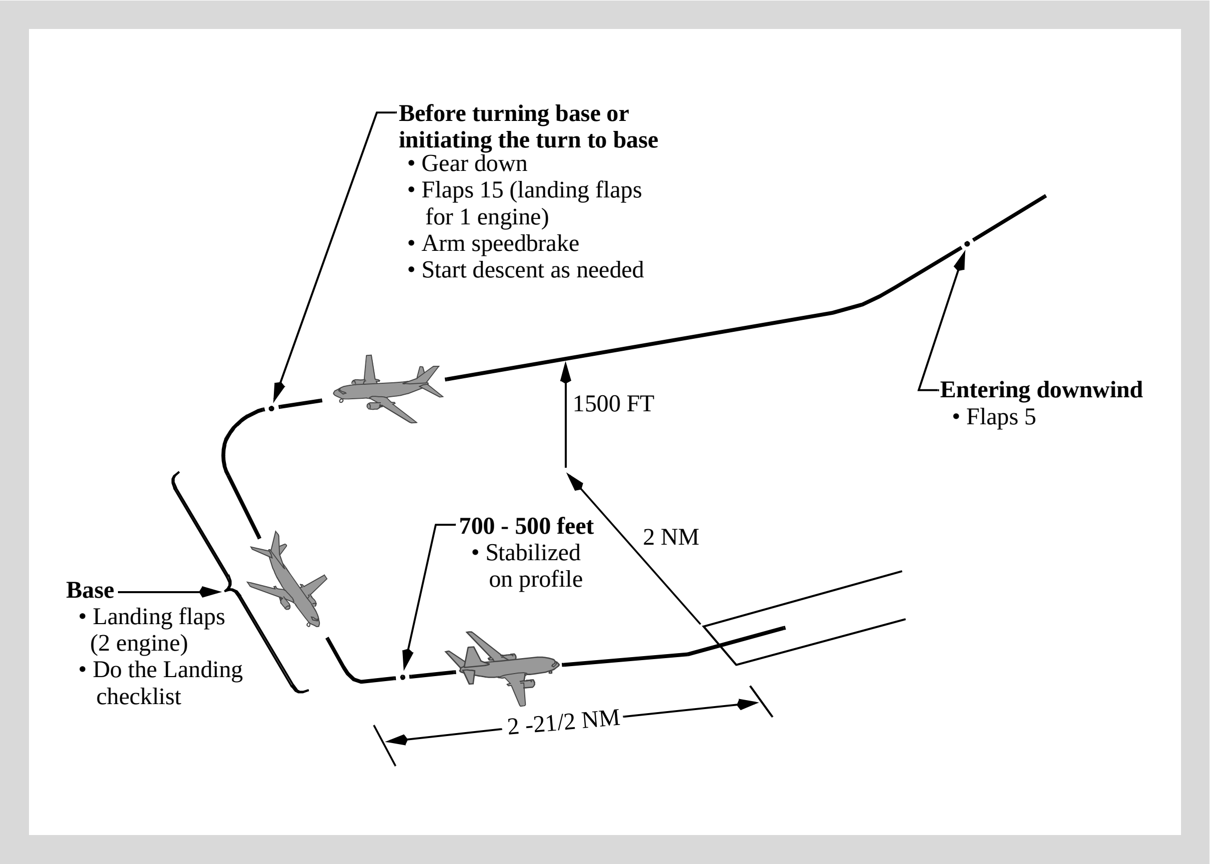
Instrument Approach Using V/S



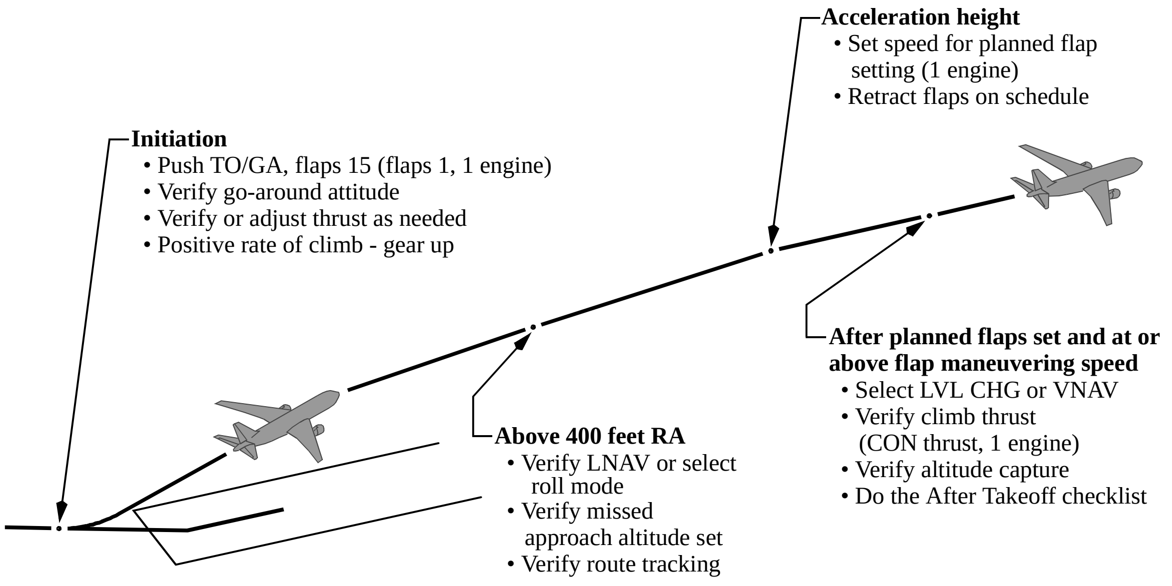
Circling Approach



Visual Traffic Pattern



Go–Around and Missed Approach



For a manual go-around:
- rotate manually
- select or verify go-around thrust
- engage autopilot as needed

Note: Any time the airspeed is below the top of the amber band, limit bank angle to 15°.

Checklist Instructions — Chapter CI

Table of Contents — Section TOC

Intentionally
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General

The aircraft listed in the table below are covered in the Quick Reference Handbook. The table information is used to distinguish data peculiar to one or more, but not all of the aircraft. Where data applies to all aircraft listed, no reference is made to individual aircraft numbers.

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.

Serial and tabulation numbers are supplied by Boeing.

Registry Number	Serial Number	Tabulation Number
PH-XRA	30784	YB521
PH-XRZ	33462	YB522
PH-XRY	33463	YB523
PH-XRX	33464	YB524
PH-XRV	34170	YB526
PH-XRB	28256	YB541
PH-XRC	29347	YB542
PH-XRD	30659	YB543
PH-XRE	30668	YB544
PH-HZD	28376	YC074
PH-HZE	28377	YC075
PH-HZF	28378	YC076
PH-HZG	28379	YC077
PH-HZI	28380	YC078
PH-HZJ	30389	YC079
PH-HZK	30390	YC080
PH-HZL	30391	YC081
PH-HZN	32943	YC083
PH-HZO	34169	YC084
PH-HZX	28248	YC092
PH-HZW	29345	YC093
F-GZHG	30650	YC094
PH-HSW	37160	YC095
PH-HSA	34171	YF801
PH-HSB	34172	YF802
PH-HSC	34173	YF803
PH-HSD	39260	YF804
PH-HSE	39259	YF805

Registry Number	Serial Number	Tabulation Number
PH-HSF	39261	YR931
PH-HSG	39262	YR932
PH-HSI	42148	YR933
PH-HSJ	42150	YR934
PH-HSK	41330	YT196
PH-HSM	42067	YT197

Revision Transmittal Letter

To: All holders of Transavia Airlines C.V. 737 Flight Crew Operations Manual (FCOM), Boeing Document Number D6-27370-8K2-TAV.

Subject: Flight Crew Operations Manual Revision.

This revision reflects the most current information available to The Boeing Company 45 days before the subject revision date. The following revision highlights explain changes in this revision. General information below explains the use of revision bars to identify new or revised information.

Revision Record

No.	Revision Date	Date Filed	No.	Revision Date	Date Filed
1	April 1, 1998		2	June 16, 1998	
3	February 28, 1999		4	August 27, 1999	
5	February 29, 2000		6	September 29, 2000	
7	April 1, 2001		8	October 15, 2001	
9	March 15, 2002		10	September 30, 2002	
11	January 3, 2003		12	March 31, 2003	
13	September 26, 2003		14	March 29, 2004	
15	September 27, 2004		16	March 28, 2005	
17	September 29, 2005		18	March 31, 2006	
19	September 28, 2006		20	March 15, 2007	
21	September 24, 2007		22	May 15, 2008	
23	September 18, 2008		24	March 27, 2009	
25	September 25, 2009		26	March 25, 2010	
27	September 23, 2010		28	March 18, 2011	
29	September 30, 2011		30	March 22, 2012	
31	April 30, 2012		32	September 27, 2012	
33	March 28, 2013		34	September 26, 2013	
35	March 27, 2014		36	September 25, 2014	

General

The Boeing Company issues FCOM revisions to provide new or revised procedures and information. Formal revisions also incorporate appropriate information from previously issued FCOM bulletins.

The revision date is the approximate date the manual is approved for printing. The revision is mailed a few weeks after this date.

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 FCOM content.

Pages containing revised technical material have revision bars associated with the changed text or illustration. Editorial revisions (for example, spelling corrections) may have revision bars with no associated highlight.

The Revision Record should be completed by the person incorporating the revision into the manual.

Filing Instructions

Consult the List of Effective Pages (CI.LEP). Pages identified with an asterisk (*) are either replacement pages or new (original) issue pages. Remove corresponding old pages and replace or add new pages. Remove pages that are marked DELETED; there are no replacement pages for deleted pages.

Revision Highlights

This section (CI.RR) replaces the existing section CI.RR in your manual.

Be careful when inserting changes not to throw away pages from the manual that are not replaced. Using the List of Effective Pages (CI.LEP) can help determine the correct content of the manual.

Throughout the manual, airplane effectivity may be updated to reflect coverage as listed on the Preface - Model Identification page, or to show service bulletin airplane effectivity. Highlights are not supplied.

This manual is published from a database; the text and illustrations are marked with configuration information. Occasionally, because the editors rearrange the database markers, or mark items with configuration information due to the addition of new database content, some customers may receive revision bars on content that appears to be unchanged. Pages may also be republished without revision bars due to slight changes in the flow of the document.

Chapter NNC - Non-Normal Checklists

Section 2 - Air Systems

Cabin Temperature Hot

2.6 - Added a new non-normal checklist to provide steps to the crew for the case that either flight deck or passenger cabin temperature gets excessively hot. This was a result of reports by airlines of Temperature Control Valve (TCV) failures that resulted in high temperatures in the flight deck or the passenger cabin.

ZONE TEMP

2.24 - Added a navigation step to the end of the checklist to send the crew to the new Cabin Temperature Hot non-normal checklist if needed.

Section 3 - Anti-Ice, Rain

Ice Crystal Icing

3.2 - New Ice Crystal Icing NNC created to provide flight crew action when encountering an ice crystal icing event.

Section 6 - Electrical

LOSS OF BOTH ENGINE DRIVEN GENERATORS

6.2,4 - Changed "may" to "can" for cross model-commonality. The word "may" denotes permission while the word "can" denotes the possibility of occurrence.

6.6 - Deleted "will" and replaced "not appear" with "is blank" for cross-model commonality.

Section 7 - Engines, APU

Loss Of Thrust On Both Engines

7.4-7 - Changed for cross-model standardization.

7.6 - Deleted step. This step is not needed, it is a duplicate of the last step in the checklist.

Engine In-Flight Start

7.17-18 - Changed for cross-model standardization.

7.17 - Removed "Slow acceleration" step for cross-model standardization. The current steps convey the necessary information and commands more succinctly

Volcanic Ash

7.27 - Changed for cross-model standardization.

7.27 - Removed "Slow accleration" step for cross-model standardization. The current steps convey the necessary information and commands more succinctly.

Section 11 - Flight Management, Navigation

IRS FAULT

11.8-9 - Changed for consistency with other NNC's.

11.9 - Changed "may" to "can" for cross model-commonality. The word "may" denotes permission while the word "can" denotes the possibility of occurrence.

11.10 - Deleted "will" and replaced "not appear" with "is blank" for cross-model commonality.

RUNWAY DISAGREE

11.11 - Added RUNWAY DISAGREE NNC associated with U11.

Chapter PI-QRH - Performance Inflight - QRH

Section 20 - Table of Contents

PI-QRH.TOC.20.1 - 737-700W CFM56-7B24 KG JAA CATF/M TALPA was added as Section 20.

Section 20 - General

General

PI-QRH.20.1 - 737-700W CFM56-7B24 KG JAA CATF/M TALPA was added as Section 20.

Section 40 - Table of Contents

PI-QRH.TOC.40.1 - 737-800W CFM56-7B26 KG M JAA CATC/N TALPA was added as Section 40.

Section 40 - General

General

PI-QRH.40.1 - 737-800W CFM56-7B26 KG M JAA CATC/N TALPA was added as Section 40.

Section 60 - Table of Contents

PI-QRH.TOC.60.1 - 737-800W CFM56-7B27 KG M JAA CATC/N TALPA was added as Section 60.

Section 60 - General

General

PI-QRH.60.1 - 737-800W CFM56-7B27 KG M JAA CATC/N TALPA was added as Section 60.

Chapter Man - Maneuvers

Section 1 - Non-Normal Maneuvers

Windshear Escape Maneuver

MAN.1.8 - Revised table format for cross-model standardization and clarity. Added "MANUAL OR AUTOMATIC FLIGHT" header for clarity.

Section 2 - Flight Patterns

Circling Approach

MAN.2.6 - Changed "Arm speedbrake" to "Speedbrake armed" to remove the implication that this is the point where the speedbrakes are armed, which it is not.

Quick Reference Handbook

* = Revised, Added, or Deleted

	7.15	March 27, 2014
*	7.16	September 25, 2014
*	7.17	September 25, 2014
*	7.18	September 25, 2014
	7.19	March 27, 2014
	7.20	March 27, 2014
	7.21	March 27, 2014
	7.22	March 27, 2014
	7.23	September 27, 2012
	7.24	September 27, 2012
*	7.25	September 25, 2014
	7.26	September 27, 2012
*	7.27	September 25, 2014
	7.28	September 27, 2012

8 Fire Protection (tab)

*	8.TOC.1-2	September 25, 2014
	8.1	May 15, 2008
*	8.2	September 25, 2014
	8.3	September 27, 2012
	8.4	March 28, 2013
	8.5	March 27, 2009
*	8.6	September 25, 2014
	8.7	September 27, 2012
*	8.8	September 25, 2014
*	8.9	September 25, 2014
*	8.10	September 25, 2014
*	8.11	September 25, 2014
*	8.12	September 25, 2014
*	8.13	September 25, 2014
*	8.14	September 25, 2014
*	8.15	September 25, 2014
*	8.16	September 25, 2014
*	8.17-18	Deleted

9 Flight Controls (tab)

	9.TOC.1-2	March 22, 2012
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	9.5	March 27, 2014
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	9.9	March 27, 2014
	9.10	March 27, 2014
	9.11	September 23, 2010
	9.12	March 27, 2014
	9.13	March 27, 2014
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	9.15	March 27, 2014
*	9.16	September 25, 2014
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	9.27	March 27, 2014
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	9.31	March 27, 2014
	9.32	March 27, 2014
	9.33	March 27, 2014
	9.34	September 23, 2010

10 Flight Instruments, Displays (tab)

	10.TOC.1-2	March 27, 2014
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	10.3	March 27, 2014
	10.4	March 27, 2014
	10.5	March 27, 2014
	10.6	March 27, 2014
	10.7	March 27, 2014
	10.8	March 27, 2014

11 Flight Management, Navigation (tab)

*	11.TOC.1-2	September 25, 2014
*	11.1	September 25, 2014
	11.2	September 26, 2013
	11.3	September 26, 2013
*	11.4	September 25, 2014
*	11.5	September 25, 2014
*	11.6	September 25, 2014
*	11.7	September 25, 2014
*	11.8	September 25, 2014
*	11.9	September 25, 2014
*	11.10	September 25, 2014
*	11.11	September 25, 2014
	11.12	September 27, 2012

12 Fuel (tab)

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	12.3	September 27, 2012
	12.4	March 27, 2014
*	12.5	September 25, 2014
	12.6	September 26, 2013
	12.7	September 26, 2013
	12.8	September 27, 2012
	12.9	March 28, 2013
	12.10	September 26, 2013
	12.11	September 27, 2012
	12.12	March 27, 2014

13 Hydraulics (tab)

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	13.3	March 27, 2014
	13.4	September 27, 2012
	13.5	March 27, 2014
	13.6	March 27, 2014
	13.7	September 27, 2012
	13.8	March 27, 2014
	13.9	March 27, 2014
	13.10	September 27, 2012
	13.11	March 27, 2014
	13.12	September 27, 2012

14 Landing Gear (tab)

* = Revised, Added, or Deleted

* 14.TOC.1-2	September 25, 2014
14.1	September 23, 2010
14.2	March 27, 2014
14.3	September 23, 2010
14.4	September 23, 2010
14.5	March 27, 2014
14.6	September 27, 2012
14.7	March 18, 2011
14.8	March 28, 2013
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14.11	March 27, 2014
14.12	September 23, 2010
14.13	March 27, 2014
14.14	March 27, 2014
14.15	September 23, 2010
14.16	September 27, 2012
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14.19	March 27, 2014
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15 Warning Systems (tab)

15.TOC.1-2	March 28, 2013
15.1	March 28, 2013
15.2	March 28, 2013
15.3	March 28, 2013
15.4	September 30, 2011

16 Electronic Flight Bag (tab)

* EFB.TOC.1-2	Deleted
* 16.TOC.1-2	September 25, 2014
* EFB.1-4	Deleted
* 16.1	September 25, 2014
* 16.2	September 25, 2014
* 16.3	September 25, 2014
* 16.4	September 25, 2014

Operational Information (tab)

* OI.TOC.0.1-2	Deleted
* OI.TOC.1-2	September 25, 2014
OI.1.1	September 26, 2013
OI.1.2	September 26, 2013

Performance Inflight - QRH (tab)

* PI-QRH.TOC.1-2	September 25, 2014
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* PI-QRH.30.1-2	Deleted
* PI-QRH.30.3	Deleted
* PI-QRH.30.4	Deleted
* PI-QRH.31.1-10	Deleted
* PI-QRH.31.11-12	Deleted
* PI-QRH.32.1-12	Deleted
* PI-QRH.33.1-4	Deleted
* PI-QRH.34.1-4	Deleted
* PI-QRH.35.1-6	Deleted
* PI-QRH.TOC.40.1-2	Deleted
* PI-QRH.40.1-2	Deleted
* PI-QRH.40.3	Deleted
* PI-QRH.40.4	Deleted
* PI-QRH.41.1-10	Deleted
* PI-QRH.41.11-12	Deleted
* PI-QRH.42.1-12	Deleted
* PI-QRH.43.1-4	Deleted
* PI-QRH.44.1-4	Deleted
* PI-QRH.45.1-6	Deleted
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* PI-QRH.81.12-14	Deleted
* PI-QRH.82.1-12	Deleted
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* PI-QRH.91.12-14	Deleted
* PI-QRH.92.1-12	Deleted
* PI-QRH.93.1-4	Deleted
* PI-QRH.94.1-4	Deleted
* PI-QRH.95.1-6	Deleted
* PI-QRH.TOC.110.1-2	Deleted
* PI-QRH.110.1-2	Deleted
* PI-QRH.110.3	Deleted
* PI-QRH.110.4	Deleted
* PI-QRH.111.1-3	Deleted
* PI-QRH.111.4-11	Deleted
* PI-QRH.111.12-14	Deleted
* PI-QRH.112.1-12	Deleted
* PI-QRH.113.1-4	Deleted
* PI-QRH.114.1-4	Deleted
* PI-QRH.115.1-6	Deleted

737-800W CFM56-7B27 KG M JAA CATC/N TAL-PA

* PI-QRH.TOC.60.1-2	September 25, 2014
* PI-QRH.60.1	September 25, 2014
* PI-QRH.60.2	September 25, 2014
* PI-QRH.60.3	September 25, 2014
* PI-QRH.60.4	September 25, 2014
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* PI-QRH.60.6	September 25, 2014
* PI-QRH.61.1	September 25, 2014
* PI-QRH.61.2	September 25, 2014
* PI-QRH.61.3	September 25, 2014
* PI-QRH.61.4	September 25, 2014
* PI-QRH.61.5	September 25, 2014
* PI-QRH.61.6	September 25, 2014
* PI-QRH.61.7	September 25, 2014
* PI-QRH.61.8	September 25, 2014
* PI-QRH.61.9	September 25, 2014
* PI-QRH.61.10	September 25, 2014
* PI-QRH.61.11	September 25, 2014
* PI-QRH.61.12	September 25, 2014
* PI-QRH.61.13	September 25, 2014
* PI-QRH.61.14	September 25, 2014
* PI-QRH.61.15	September 25, 2014
* PI-QRH.61.16	September 25, 2014
* PI-QRH.61.17	September 25, 2014
* PI-QRH.61.18	September 25, 2014
* PI-QRH.61.19	September 25, 2014
* PI-QRH.61.20	September 25, 2014
* PI-QRH.61.21	September 25, 2014

* = Revised, Added, or Deleted

Maneuvers (tab)

Checklist Instructions (tab)

Model Identification

Revision Record

List of Effective Pages

Checklist Instructions - Normal Checklists

Checklist Instructions - Non-Normal Checklists

Evacuation

* = Revised, Added, or Deleted

Introduction

This introduction gives guidelines for use of the Normal Checklist (NC).

The NC is organized by phase of flight.

The NC is used to verify that critical items have been done.

Normal Checklist Operation

Normal checklists are used after doing all respective procedural items.

The following table shows which pilot calls for the checklist and which pilot reads the checklist. Both pilots visually verify that each item is in the needed configuration or that the step is done. The far right column shows which pilot gives the response. This is different than the normal procedures where the far right column can show which pilot does the step.

Checklist	Call	Read	Verify	Respond
PREFLIGHT	Captain	First officer	Both	Area of responsibility
BEFORE START	Captain	First officer	Both	Area of responsibility
BEFORE TAXI	Captain	First officer	Both	Area of responsibility
BEFORE TAKEOFF	Pilot flying	Pilot monitoring	Both	Pilot flying
AFTER TAKEOFF	Pilot flying	Pilot monitoring	Both	Pilot monitoring
DESCENT	Pilot flying	Pilot monitoring	Both	Area of responsibility
APPROACH	Pilot flying	Pilot monitoring	Both	Area of responsibility
LANDING	Pilot flying	Pilot monitoring	Both	Pilot flying
SHUTDOWN	Captain	First officer	Both	Area of responsibility
SECURE	Captain	First officer	Both	Area of responsibility

If the airplane configuration does not agree with the needed configuration:

- stop the checklist
- complete the respective procedure steps
- continue the checklist

If it becomes apparent that an entire procedure was not done:

- stop the checklist
- complete the entire procedure
- do the checklist from the start

Try to do checklists before or after high work load times. The crew may need to stop a checklist for a short time to do other tasks. If the interruption is short, continue the checklist with the next step. If a pilot is not sure where the checklist was stopped, do the checklist from the start. If the checklist is stopped for a long time, also do the checklist from the start.

After completion of each checklist, the pilot reading the checklist calls, "___ CHECKLIST COMPLETE."

Checklist Content

The checklist has the minimum items needed to operate the airplane safely.

Normal checklists have items that meet any of the following criteria:

- items essential to safety of flight that are not monitored by an alerting system, or
- items essential to safety of flight that are monitored by an alerting system but if not done, would likely result in a catastrophic event if the alerting system fails, or
- items needed to meet regulatory requirements, or
- items needed to maintain fleet commonality between the 737, 747-400, 757, 767, 777, and 787, or
- items that enhance safety of flight and are not monitored by an alerting system (for example the autobrake), or
- during shutdown and secure, items that could result in injury to personnel or damage to equipment if not done.

Checklist Construction

When a checklist challenge does not end with “switch or lever”, then the challenge refers to system status. For example, “Landing Gear...Down”, refers to the status of the landing gear, not just the position of the lever.

When a checklist challenge ends with “switch or lever”, then the challenge refers to the position of the switch or lever. For example, “Engine start levers...CUTOFF” refers to the position of the levers.

Because normal checklists are done routinely, some checklist items are simplified to be more conversational such as "Autobrake.......RTO" instead of "AUTOBRAKE select switch.......RTO".

Introduction

The non-normal checklists chapter contains checklists used by the flight crew to manage non–normal situations. The checklists are grouped in sections which match the system description chapters in Volume 2.

The non-normal index contains checklists used by the flight crew to manage non-normal situations. The checklists are grouped in sections which match the system description chapters in Volume 2.

Most checklists correspond to a light, alert or other indication. In most cases, the MASTER CAUTION and system annunciator lights also illuminate to indicate the non-normal condition. These lights, alerts and other indications are the cues to select and do the associated checklist.

Checklists without a light, alert or other indication (such as Ditching) are called unannunciated checklists. Most unannunciated checklists are in the associated system section. For example, Fuel Leak Engine is in section 12, Fuel. Unannunciated checklists with no associated system are in section 0, Miscellaneous.

All checklists have condition statements. The condition statement briefly describes the situation that caused the light, alert or other indication. Unannunciated checklists also have condition statements to help in understanding the reason for the checklist.

Some checklists have objective statements. The objective statement briefly describes the expected result of doing the checklist or briefly describes the reason for steps in the checklist.

Checklists can have both memory and reference items. Memory items are critical steps that must be done before reading the checklist. The last memory item is followed by a dashed horizontal line. Reference items are actions to be done while reading the checklist.

Some checklists have additional information at the end of the checklist. The additional information provides data the crew may wish to consider. The additional information does not need to be read.

Checklists that need a quick response are listed in the Quick Action Index. In each system section, Quick Action Index checklists are listed first, followed by checklists that are not in the Quick Action Index. The titles of Quick Action Index checklists are printed in **bold** type. Checklist titles in upper case (such as AUTO BRAKE DISARM) are annunciated by a light, alert, or other indication. Checklist titles in upper and lower case (such as Window Damage) are not annunciated.

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Non–Normal Checklist Operation

Non–normal checklists start with steps to correct the situation. If needed, information for planning the rest of the flight is included. When special items are needed to configure the airplane for landing, the items are included in the Deferred Items section of the checklist. Flight patterns for some engine-out situations are located in the Maneuvers chapter and show the sequence of configuration changes.

While every attempt is made to supply needed non–normal checklists, it is not possible to develop checklists for all conceivable situations. In some smoke, fire or fumes situations, the flight crew may need to move between the Smoke, Fire or Fumes checklist and the Smoke or Fumes Removal checklist. In some multiple failure situations, the flight crew may need to combine the elements of more than one checklist. In all situations, the captain must assess the situation and use good judgment to determine the safest course of action.

It should be noted that, in determining the safest course of action, troubleshooting, i.e., taking steps beyond published non-normal checklist steps, may cause further loss of system function or system failure. Troubleshooting should only be considered when completion of the published non-normal checklist results in an unacceptable situation.

There are some situations where the flight crew must land at the nearest suitable airport. These situations include, but are not limited to, conditions where:

- the non–normal checklist includes the item "Plan to land at the nearest suitable airport."
- fire or smoke continues
- only one AC power source remains (engine or APU generator)
- only one hydraulic system remains (the standby system is considered a hydraulic system)
- any other situation determined by the flight crew to have a significant adverse effect on safety if the flight is continued.

YB521 - YB544, YC095 - YT197
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.

YC074 - YC094
Whether or not smoke has dissipated, if it cannot be visibly verified that the fire has been extinguished following fire suppression and/or smoke evacuation procedures, land immediately at the nearest suitable airport.

If a smoke, fire or fumes situation becomes uncontrollable, the flight crew should consider an immediate landing. Immediate landing implies immediate diversion to a runway. However, in a severe situation, the flight crew should consider an overweight landing, a tailwind landing, an off-airport landing, or a ditching.

Checklists directing an engine shutdown must be evaluated by the captain to determine whether an actual shutdown or operation at reduced thrust is the safest course of action. Consideration must be given to the probable effects of running the engine at reduced thrust.

There are no non–normal checklists for the loss of an engine indication or automatic display of the secondary engine indications. Continue normal engine operation unless a limit is exceeded.

Non–normal checklists also assume:

- During engine start and before takeoff, the associated non–normal checklist is done if a non-normal situation is identified. After completion of the checklist, the Dispatch Deviations Guide or operator equivalent is consulted to determine if Minimum Equipment List dispatch relief is available.
- System controls are in the normal configuration for the phase of flight before the start of the non–normal checklist.
- If the MASTER CAUTION and system annunciator lights illuminate, all related amber lights are reviewed to assist in recognizing the cause(s) of the alert.
- Aural alerts are silenced and the master caution system is reset by the flight crew as soon as the cause of the alert is recognized.

- The EMERGENCY position of the oxygen regulator is used when needed to supply positive pressure in the masks and goggles to remove contaminants. The 100% position of the oxygen regulator is used when positive pressure is not needed but contamination of the flight deck air exists. The Normal position of the oxygen regulator is used if prolonged use is needed and the situation allows. Normal boom microphone operation is restored when oxygen is no longer in use.
- Indicator lights are tested to verify suspected faults.
- In flight, reset of a tripped circuit breaker is not recommended unless directed by a non-normal checklist. However, a tripped circuit breaker may be reset once, after a short cooling period (approximately 2 minutes), if in the judgment of the captain, the situation resulting from the circuit breaker trip has a significant adverse effect on safety. On the ground, flight crew reset of a tripped circuit breaker should only be done after maintenance has determined that it is safe to reset the circuit breaker.
- Flight crew cycling (pulling and resetting) of a circuit breaker to clear a non-normal condition is not recommended, unless directed by a non-normal checklist.

After engine start and before takeoff, illumination of a red warning light, an amber caution light, an alert or other indication requires completion of the associated checklist. In certain cases, amber caution lights illuminate during MASTER CAUTION recall to inform the flight crew of the failure of one element in a system with redundant elements. If system operation is maintained by a second element, the amber caution light will extinguish when MASTER CAUTION is reset. In these situations, the amber caution light alerts the flight crew that normal system operation will be affected if another element fails. If an amber caution light illuminates during MASTER CAUTION recall, but extinguishes after MASTER CAUTION reset, completion of the associated checklist is not required.

Non–Normal Checklist Use

If a checklist or a step in a checklist is not applicable to all airplanes, airplane effectivity information is included in the checklist. Airplane effectivity can be listed by airplane number, registry number, serial number or tabulation number. If a checklist is applicable to some but not all airplanes, airplane effectivity is centered below the checklist title. If a step in a checklist is applicable to some but not all airplanes, airplane effectivity is included above the step. If a checklist or a step in a checklist is applicable to all airplanes, airplane effectivity information is not included.

The "Select Airplane" screen is used to specify the airplane for the intended flight. The Selected Airplane Banner at the top of the screen can be used to verify that the correct airplane has been selected. All checklists applicable to the selected airplane are provided.

Non–normal checklist use starts when the airplane flight path and configuration are correctly established. Only a few situations need an immediate response (such as CABIN ALTITUDE WARNING or Rapid Depressurization). Usually, time is available to assess the situation before corrective action is started. All actions must then be coordinated under the captain's supervision and done in a deliberate, systematic manner. Flight path control must never be compromised.

When a non–normal situation occurs, at the direction of the pilot flying, both crewmembers do all memory items in their areas of responsibility without delay.

The pilot flying calls for the checklist when:

- the flight path is under control
- the airplane is not in a critical phase of flight (such as takeoff or landing)
- all memory items are complete.

The pilot monitoring reads aloud:

- the checklist title
- as much of the condition statement as needed to verify that the correct checklist has been selected
- as much of the objective statement (if applicable) as needed to understand the expected result of doing the checklist.

The pilot flying does not need to repeat this information but must acknowledge that the information was heard and understood.

For checklists with memory items, the pilot monitoring first verifies that each memory item has been done. The checklist is normally read aloud during this verification. The pilot flying does not need to respond except for items that are not in agreement with the checklist. The item numbers do not need to be read.

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.

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 pilot flying does not need to repeat this information but must acknowledge that the information was heard and understood.

The word “Confirm” is added to checklist items when both crewmembers must verbally agree before action is taken. During an inflight non-normal situation, verbal confirmation is required for:

- an engine thrust lever
- an engine start lever
- an engine, APU or cargo fire switch
- a generator drive disconnect switch
- an IRS mode selector, when only one IRS is failed
- a flight control switch

This does not apply to the Loss of Thrust on Both Engines checklist.

With the airplane stationary on the ground:

- the captain and the first officer take action based on preflight and postflight areas of responsibility
- during an evacuation, the first officer sets the flap lever to 40.

With the airplane in flight or in motion on the ground:

- the pilot flying and the pilot monitoring take action based on each crewmember’s Areas of Responsibility.

After moving the control, the crewmember taking the action also states the checklist response.

The pilot flying may also direct reference checklists to be done by memory if no hazard is created by such action, or if the situation does not allow reference to the checklist.

Checklists include an Inoperative Items table only when the condition of the items is needed for planning the rest of the flight. The inoperative items, including the consequences (if any), are read aloud by the pilot monitoring. The pilot flying does not need to repeat this information but must acknowledge that the information was heard and understood.

After completion of the non–normal checklist, normal procedures are used to configure the airplane for each phase of flight.

When there are no deferred items, the DESCENT, APPROACH and LANDING normal checklists are used to verify that the configuration is correct for each phase of flight.

When there are deferred items, the non-normal checklist will include the item "**Checklist Complete Except Deferred Items.**" The pilot flying is to be made aware when there are deferred items. These items are included in the Deferred Items section of the checklist and may be delayed until the usual point during descent, approach or landing.

The deferred items are read aloud by the pilot monitoring. The pilot flying or the pilot monitoring takes action based on each crewmember's area of responsibility. After moving the control, the crewmember taking the action also states the response.

When there are deferred items, the Deferred Items section of the non-normal checklist will include the Descent, Approach and Landing normal checklists. These checklists should be used instead of the usual DESCENT, APPROACH and LANDING normal checklists. If a normal checklist item is changed as a result of the non-normal situation, the changed response is printed in **bold** type. The pilot flying or the pilot monitoring responds to the deferred normal checklist items based on each crewmember's area of responsibility. However, during the deferred Landing normal checklist, the pilot flying responds to all deferred normal checklist items.

If deferred items exist and the normal Descent, Approach or Landing checklist is selected, a Precaution symbol and the text "You have Deferred Items in Non-Normal Checklists" directs the crew back to the applicable non-normal checklist. The non-normal checklist can be quickly accessed by selecting the amber non-normal checklist button in the checklist queue at the bottom of the display screen.

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.

Each checklist has a "Checklist Complete" indicator at the end. A checklist is complete when each item in the checklist has a green check mark on its left, the text of the step is green and the "Checklist Complete" indicator is displayed at the bottom of the checklist. Additionally, the associated checklist button in the lower checklist queue will turn green with bright green text.

After completion of each non–normal checklist, the pilot monitoring states "___ CHECKLIST COMPLETE."

Additional information at the end of the checklist is not required to be read.

The flight crew must be aware that checklists cannot be created for all conceivable situations and are not intended to replace good judgment. In some situations, at the captain's discretion, deviation from a checklist may be needed.

Non-Normal Checklist Legend

Redirection Symbol

▶▶

The redirection symbol is used in two ways:

- In the Table of Contents of a system section, to direct the flight crew to a different system section.
- In a non-normal checklist, with the word "Go to", to direct the flight crew to a different checklist or to a different step in the current checklist.

Separator Symbol

The separator symbol is used in two ways:

- In the Table of Contents of a system section, to separate the Quick Action Index checklists from the checklists that are not in the Quick Action Index.
- In a non-normal checklist, to separate the memory items from the reference items.

Task Divider Symbol

The task divider symbol is used to indicate the end of one task and the beginning of another task.

Decision Symbol

Choose one:

◆

◆

The decision symbol is used to identify possible choices.

Precaution Symbol

The precaution symbol is used to identify information that the flight crew must consider before taking the action.

Non-Normal Checklist Legend

Redirection Symbol

▶▶

The redirection symbol directs the flight crew to a different checklist symbol.

Separator Symbol

The separator symbol is used 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 that the flight crew must consider before taking the action.

The precaution symbol is used in two ways:

- To identify information that the flight crew must consider before taking action.
- To alert the flight crew that there are deferred items in a non-normal checklist.

Intentionally
Blank

Evacuation Checklist is on the reverse side of this page.

Evacuation

Condition: Evacuation is needed.

1	PARKING BRAKE	Set	C
2	Speedbrake lever	DOWN	C
3	FLAP lever	40	F/O
4	Pressurization mode selector	MAN	F/O
5	Outflow VALVE switch	Hold in OPEN until the outflow VALVE indication shows fully open to depressurize the airplane	F/O
6	If time allows, verify that the flaps are 40 before the engine start levers are moved to CUTOFF.		C
7	Engine start levers (both)	CUTOFF	C
8	Advise the cabin to evacuate.		C

Notify the flight attendants via PA and activate the passenger evacuation switch.

9	Advise the tower.		F/O
10	Engine and APU fire switches (all)	Override and pull	F/O

11 **If** an engine or APU fire warning occurs:

Illuminated fire switch	Rotate to the stop and hold for 1 second	F/O

■ ■ ■ ■