



777-200/-300

Quick Reference Handbook

Aborted Engine Start L, R.....	7.1
Airspeed Unreliable.....	10.1
CABIN ALTITUDE.....	2.1
Dual Eng Fail/Stall.....	7.2
ENG AUTOSTART L, R.....	7.4
Eng Lim/Surge/Stall L, R.....	7.5
Eng Svr Damage/Sep L, R.....	7.10
Evacuation.....	Back Cover.4
FIRE APU.....	8.1
FIRE ENG L, R.....	8.2
Fire Eng on Ground L, R.....	Back Cover.2
Fire Eng Tailpipe L, R.....	8.7
Smoke, Fire or Fumes.....	8.8
STABILIZER.....	9.1

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**Non-Normal Checklists****Chapter EICAS****EICAS Messages****Section Index****A**

ADS-B OUT L	11.1
ADS-B OUT R	11.2
AIR DATA SYS	11.2
AIRSPEED LOW	15.1
ALTITUDE ALERT	15.1
ALTITUDE CALLOUTS	15.1
ALTN ATTITUDE	10.8
ANTI-ICE ENG L, R.....	3.1
ANTI-ICE LEAK ENG L, R.....	3.3
ANTI-ICE LOSS ENG L, R	3.5
ANTI-ICE ON.....	3.6
ANTI-ICE VLV WING L, R	3.6
ANTI-ICE WING.....	3.7
ANTISKID	14.1
APU LIMIT.....	7.12
APU SHUTDOWN	7.13
AUTO SPEEDBRAKE	9.3
AUTOBRAKE	14.2
AUTOPILOT	4.1
AUTOPILOT DISC	4.1
AUTOTHROTTLE DISC	4.1
AUTOTHROTTLE L, R.....	4.1

B

BARO SET DISAGREE	10.8
BLEED ISLN CLOSED C, L, R	2.2



BLEED ISLN OPEN C, L, R	2.2
BLEED LEAK BODY	2.2
BLEED LEAK L, R.....	2.3
BLEED LEAK STRUT L, R.....	2.4
BLEED LOSS BODY L.....	2.8
BLEED LOSS BODY R	2.8
BLEED LOSS BODY	2.7
BLEED LOSS WING L, R	2.9
BLEED OFF APU	2.9
BLEED OFF ENG L, R.....	2.10
BOTTLE 1, 2 DISCH ENG	8.12
BOTTLE DISCH APU	8.12
BOTTLE DISCH CARGO	8.13
BRAKE SOURCE	14.3
BRAKE TEMP.....	14.4

C

CABIN ALTITUDE AUTO	2.12
CABIN ALTITUDE.....	2.1
CARGO A/C FWD	2.25
CARGO HEAT AFT	2.25
CARGO HEAT BULK	2.26
CHKL INCOMPLETE NORM.....	10.8
CHKL NON-NORMAL.....	10.8
CONFIG DOORS	15.1
CONFIG FLAPS	15.1
CONFIG GEAR	15.2
CONFIG GEAR STEERING	15.2

CONFIG PARKING BRAKE	15.2
CONFIG RUDDER	15.2
CONFIG SPOILERS	15.3
CONFIG STABILIZER	15.3
CONFIG WARNING SYS	15.3
CREW OXYGEN LOW	1.1

D

DATALINK LOST	5.1
DATALINK SYS	5.1
DET FIRE APU	8.13
DET FIRE CARGO AFT, FWD	8.13
DET FIRE ENG L, R	8.13
DISPLAY SELECT PNL	10.9
DOOR AFT CARGO	1.1
DOOR AFT CARGO	1.2
DOOR BULK CARGO	1.4
DOOR E/E ACCESS	1.4
DOOR ENTRY 1-4L, R	1.4
DOOR ENTRY 1-5L, R	1.5
DOOR FWD ACCESS	1.5
DOOR FWD CARGO	1.6
DOOR WING SLIDE L, R	1.8
DOORS	1.8

E

EFIS CONTROL PNL L, R	10.9
ELEC AC BUS L, R	6.1
ELEC BACKUP GEN L, R	6.2



ELEC BACKUP SYS	6.3
ELEC BATTERY OFF	6.3
ELEC BUS ISLN L, R	6.3
ELEC CABIN/UTIL OFF	6.3
ELEC GEN DRIVE L, R	6.4
ELEC GEN OFF APU.....	6.4
ELEC GEN OFF L, R.....	6.5
ELEC GND HDLG BUS	6.5
ELEC IFE/SEATS OFF	6.5
ELEC STANDBY SYS	6.6
ELT ON	1.8
EMER LIGHTS	1.8
ENG AUTOSTART L, R	7.4
ENG AUTOSTART OFF	7.13
ENG CONTROL L, R	7.13
ENG EEC MODE L, R	7.14
ENG FAIL L, R.....	7.16
ENG FUEL FILTER L, R.....	7.22
ENG FUEL VALVE L, R	7.23
ENG IDLE DISAGREE	7.23
ENG LIMIT PROT L, R.....	7.28
ENG OIL FILTER L, R.....	7.30
ENG OIL PRESS L, R	7.34
ENG OIL TEMP L, R.....	7.38
ENG REV LIMITED L, R.....	7.41
ENG REVERSER L, R	7.42
ENG RPM LIMITED L, R	7.42
ENG SHUTDOWN	7.42

ENG SHUTDOWN L, R	7.42
ENG START VALVE L, R	7.43
ENG STARTER CUTOUT L, R	7.44
ENG THRUST L, R	7.45
EQUIP COOLING	2.26
EQUIP COOLING OVRD	2.26

F

FIRE APU	8.1
FIRE CARGO AFT	8.14
FIRE CARGO FWD	8.17
FIRE ENG L, R	8.2
FIRE WHEEL WELL	8.20
FLAP/SLAT CONTROL	9.8
FLAPS DRIVE	9.4
FLAPS PRIMARY FAIL	9.6
FLIGHT CONTROL MODE	9.10
FLIGHT CONTROLS	9.14
FLT CONTROL VALVE	9.15
FMC MESSAGE	11.7
FMC	11.6
FUEL AUTO JETTISON	12.1
FUEL CROSSFEED AFT	12.4
FUEL CROSSFEED FWD	12.4
FUEL DISAGREE	12.6
FUEL FLOW ENG L, R	12.8
FUEL IMBALANCE	12.13
FUEL IN CENTER	12.15



FUEL JETT NOZZLE L, R	12.15
FUEL JETTISON MAIN	12.17
FUEL JETTISON SYS	12.17
FUEL LOW CENTER	12.27
FUEL PRESS ENG L, R	12.28
FUEL PRESS ENG L+R	12.29
FUEL PUMP CENTER L, R	12.30
FUEL PUMP L AFT, FWD	12.30
FUEL PUMP R AFT, FWD	12.30
FUEL QTY LOW.....	12.31
FUEL SCAVENGE SYS.....	12.34
FUEL TEMP LOW.....	12.35
FUEL VALVE APU	12.35

G

GEAR DISAGREE	14.6
GEAR DOOR	14.9
GND PROX SYS	15.3
GPS L	11.7
GPS R.....	11.8
GPS.....	11.7

H

HEAT PITOT C.....	3.7
HEAT PITOT L	3.7
HEAT PITOT L+C+R.....	3.8
HEAT PITOT R.....	3.8
HF DATALINK	5.1
HYD AUTO CONTROL C	13.1

HYD AUTO CONTROL L, R.....	13.1
HYD OVERHEAT DEM C1, C2, L, R.....	13.1
HYD OVERHEAT PRI C1, C2	13.2
HYD OVERHEAT PRI L	13.2
HYD OVERHEAT PRI R.....	13.3
HYD PRESS DEM C1, C2, L, R.....	13.4
HYD PRESS PRI C1, C2	13.4
HYD PRESS PRI L	13.4
HYD PRESS PRI R.....	13.5
HYD PRESS SYS C	13.6
HYD PRESS SYS L	13.10
HYD PRESS SYS L+C	13.11
HYD PRESS SYS L+C+R	13.15
HYD PRESS SYS L+R	13.16
HYD PRESS SYS R	13.20
HYD PRESS SYS R+C.....	13.22
HYD QTY LOW C.....	13.27
HYD QTY LOW L, R	13.27
HYD QTY LOW L+C.....	13.27
HYD QTY LOW L+C+R.....	13.28
HYD QTY LOW L+R.....	13.28
HYD QTY LOW R+C	13.29

I

ICE DETECTORS.....	3.12
ICING ENG	3.12
ICING WING	3.12
ILS ANTENNA	11.14



INSUFFICIENT FUEL..... 11.14

L
LANDING ALTITUDE.....2.27

M
MAIN BATTERY DISCH 6.6
MAIN GEAR BRACE L, R..... 14.10
MAIN GEAR STEERING 14.11

N
NAV ADIRU INERTIAL 11.16
NAV UNABLE RNP 11.20
NO AUTOLAND 4.2
NO LAND 3 4.2

O
OUTFLOW VALVE AFT, FWD 2.28
OVERHEAT ENG L, R 8.22
OVERSPEED 15.4

P
PACK L 2.30
PACK L+R 2.31
PACK MODE L, R 2.33
PACK R 2.34
PASS OXYGEN LOW 1.9
PASS OXYGEN ON 1.9
PILOT RESPONSE 15.4
PITCH DOWN AUTHORITY.....9.18
PITCH UP AUTHORITY 9.20

PRI FLIGHT COMPUTERS	9.23

R

RADIO TRANSMIT	5.1
RAT UNLOCKED	13.31
RESERVE BRAKES/STRG	14.11

S

SATCOM	5.2
SATCOM DATALINK	5.2
SATCOM VOICE	5.2
SATVOICE LOST	5.2
SGL SOURCE AIR DATA	10.9
SGL SOURCE DISPLAYS	10.10
SGL SOURCE RAD ALT	10.10
SINGLE SOURCE F/D	10.10
SINGLE SOURCE ILS	11.21
SLATS DRIVE.....	9.26
SLATS PRIMARY FAIL.....	9.28
SMOKE COMPT UPR DR 2	8.26
SMOKE COMPT UPR DR 4	8.27
SMOKE CREW REST F/D	8.27
SMOKE CREW REST LWR.....	8.28
SMOKE LAV/COMPT	8.28
SMOKE LAVATORY	8.28
SMOKE REST UPR DR 1	8.32
SMOKE REST UPR DR 3	8.33
SMOKE REST UPR DR 5	8.34
SPEEDBRAKE EXTENDED	9.28



SPOILERS	9.29
STAB GREENBAND.....	9.30
STABILIZER	9.1
STABILIZER C.....	9.30
STABILIZER CUTOUT	9.31
STABILIZER R.....	9.31

T	
TAIL SKID	14.12
TAIL STRIKE.....	15.4
TCAS	15.6
TCAS OFF	15.6
TCAS RA CAPTAIN, F/O	15.6
TERR OVRD	15.6
TERR POS	15.6
THRUST ASYM COMP	9.31
TIRE PRESS.....	14.12
TRANSPONDER L, R	11.21
TRIM AIR L, R.....	2.35

V	
VHF DATALINK	5.2
VNAV STEP CLIMB	11.22

W	
WINDOW FLT DECK L, R.....	1.12
WINDOW HEAT	3.12
WINDOW HEAT L, R FWD	3.14
WINDOW HEAT L, R SIDE.....	3.16
WINDOWS.....	1.12



WINDSHEAR SYS	15.7



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Blank

**Non-Normal Checklists****Chapter Unann****Unannunciated Checklists****Section Index**

Aborted Engine Start L, R	7.1
ADS-B Failure	11.1
Airspeed Unreliable	10.1
Automatic Unlock	1.1
Cabin Temp Cold	2.14
Cabin Temp Hot	2.20
Ditching	0.1
Dual Eng Fail/Stall	7.2
Eng In-Flight Start L, R	7.24
Eng Lim/Surge/Stall L, R	7.5
Eng Svr Damage/Sep L, R	7.10
Evacuation	Back Cover.4
Fire Eng on Ground L, R	Back Cover.2
Fire Eng Tailpipe L, R	8.7
Fuel Jettison	12.16
Fuel Leak	12.18
Gear Lever Locked Down	14.9
GPS Data Unreliable	11.10
Ice Crystal Icing	3.9
Jammed Flight Controls	9.16
Lock Fail	1.9
Overweight Landing	0.3
Smoke or Fumes Removal	8.30
Smoke, Fire or Fumes	8.8
Tail Strike	15.5
Volcanic Ash	7.46



Window Damage Fwd L, R	1.10
Window Damage Side L, R.....	1.11

**Non-Normal Checklists****Chapter Alpha****Alphabetical****Section Index****A****Aborted Engine Start L, R.....7.1**

ADS-B Failure 11.1

ADS-B OUT L 11.1

ADS-B OUT R 11.2

AIR DATA SYS 11.2

AIRSPEED LOW 15.1

Airspeed Unreliable.....10.1

ALTITUDE ALERT 15.1

ALTITUDE CALLOUTS 15.1

ALTN ATTITUDE 10.8

ANTI-ICE ENG L, R.....3.1

ANTI-ICE LEAK ENG L, R.....3.3

ANTI-ICE LOSS ENG L, R 3.5

ANTI-ICE ON.....3.6

ANTI-ICE VLV WING L, R 3.6

ANTI-ICE WING.....3.7

ANTISKID 14.1

APU LIMIT 7.12

APU SHUTDOWN 7.13

AUTO SPEEDBRAKE 9.3

AUTOBRAKE 14.2

Automatic Unlock 1.1

AUTOPILOT 4.1

AUTOPILOT DISC 4.1

AUTOTHROTTLE DISC 4.1

AUTOTHROTTLE L, R..... 4.1

B

BARO SET DISAGREE 10.8

BLEED ISLN CLOSED C, L, R 2.2

BLEED ISLN OPEN C, L, R 2.2

BLEED LEAK BODY 2.2

BLEED LEAK L, R..... 2.3

BLEED LEAK STRUT L, R..... 2.4

BLEED LOSS BODY L..... 2.8

BLEED LOSS BODY R 2.8

BLEED LOSS BODY 2.7

BLEED LOSS WING L, R 2.9

BLEED OFF APU 2.9

BLEED OFF ENG L, R.....2.10

BOTTLE 1, 2 DISCH ENG 8.12

BOTTLE DISCH APU 8.12

BOTTLE DISCH CARGO 8.13

BRAKE SOURCE 14.3

BRAKE TEMP.....14.4

C

CABIN ALTITUDE AUTO 2.12

CABIN ALTITUDE..... 2.1

Cabin Temp Cold 2.14

Cabin Temp Hot 2.20

CARGO A/C FWD 2.25

CARGO HEAT AFT 2.25

CARGO HEAT BULK 2.26

CHKL INCOMPLETE NORM	10.8
CHKL NON-NORMAL	10.8
CONFIG DOORS	15.1
CONFIG FLAPS	15.1
CONFIG GEAR	15.2
CONFIG GEAR STEERING	15.2
CONFIG PARKING BRAKE	15.2
CONFIG RUDDER	15.2
CONFIG SPOILERS	15.3
CONFIG STABILIZER	15.3
CONFIG WARNING SYS	15.3
CREW OXYGEN LOW	1.1

D

DATALINK LOST	5.1
DATALINK SYS	5.1
DET FIRE APU	8.13
DET FIRE CARGO AFT, FWD	8.13
DET FIRE ENG L, R	8.13
DISPLAY SELECT PNL	10.9
Ditching	0.1
DOOR AFT CARGO	1.1
DOOR AFT CARGO	1.2
DOOR BULK CARGO	1.4
DOOR E/E ACCESS	1.4
DOOR ENTRY 1-4L, R	1.4
DOOR ENTRY 1-5L, R	1.5
DOOR FWD ACCESS	1.5

DOOR FWD CARGO.....	1.6
DOOR WING SLIDE L, R	1.8
DOORS	1.8
Dual Eng Fail/Stall	7.2

E	
EFIS CONTROL PNL L, R	10.9
ELEC AC BUS L, R.....	6.1
ELEC BACKUP GEN L, R.....	6.2
ELEC BACKUP SYS.....	6.3
ELEC BATTERY OFF	6.3
ELEC BUS ISLN L, R	6.3
ELEC CABIN/UTIL OFF	6.3
ELEC GEN DRIVE L, R	6.4
ELEC GEN OFF APU.....	6.4
ELEC GEN OFF L, R.....	6.5
ELEC GND HDLG BUS	6.5
ELEC IFE/SEATS OFF	6.5
ELEC STANDBY SYS	6.6
ELT ON	1.8
EMER LIGHTS	1.8
ENG AUTOSTART L, R	7.4
ENG AUTOSTART OFF	7.13
ENG CONTROL L, R	7.13
ENG EEC MODE L, R	7.14
ENG FAIL L, R.....	7.16
ENG FUEL FILTER L, R.....	7.22
ENG FUEL VALVE L, R	7.23

ENG IDLE DISAGREE	7.23
Eng In-Flight Start L, R	7.24
Eng Lim/Surge/Stall L, R	7.5
ENG LIMIT PROT L, R.....	7.28
ENG OIL FILTER L, R.....	7.30
ENG OIL PRESS L, R	7.34
ENG OIL TEMP L, R.....	7.38
ENG REV LIMITED L, R.....	7.41
ENG REVERSER L, R	7.42
ENG RPM LIMITED L, R	7.42
ENG SHUTDOWN	7.42
ENG SHUTDOWN L, R	7.42
ENG START VALVE L, R.....	7.43
ENG STARTER CUTOUT L, R.....	7.44
Eng Svr Damage/Sep L, R	7.10
ENG THRUST L, R	7.45
EQUIP COOLING	2.26
EQUIP COOLING OVRD	2.26
Evacuation	Back Cover.4
F	
FIRE APU	8.1
FIRE CARGO AFT.....	8.14
FIRE CARGO FWD	8.17
FIRE ENG L, R	8.2
Fire Eng on Ground L, R	Back Cover.2
Fire Eng Tailpipe L, R	8.7
FIRE WHEEL WELL.....	8.20

FLAP/SLAT CONTROL	9.8
FLAPS DRIVE	9.4
FLAPS PRIMARY FAIL	9.6
FLIGHT CONTROL MODE	9.10
FLIGHT CONTROLS	9.14
FLT CONTROL VALVE	9.15
FMC MESSAGE	11.7
FMC.....	11.6
FUEL AUTO JETTISON	12.1
FUEL CROSSFEED AFT	12.4
FUEL CROSSFEED FWD	12.4
FUEL DISAGREE	12.6
FUEL FLOW ENG L, R	12.8
FUEL IMBALANCE	12.13
FUEL IN CENTER	12.15
FUEL JETT NOZZLE L, R	12.15
FUEL JETTISON MAIN	12.17
FUEL JETTISON SYS	12.17
Fuel Jettison	12.16
Fuel Leak	12.18
FUEL LOW CENTER	12.27
FUEL PRESS ENG L, R	12.28
FUEL PRESS ENG L+R	12.29
FUEL PUMP CENTER L, R	12.30
FUEL PUMP L AFT, FWD	12.30
FUEL PUMP R AFT, FWD	12.30
FUEL QTY LOW.....	12.31
FUEL SCAVENGE SYS.....	12.34

FUEL TEMP LOW.....	12.35
FUEL VALVE APU	12.35

G

GEAR DISAGREE	14.6
GEAR DOOR	14.9
Gear Lever Locked Down.....	14.9
GND PROX SYS	15.3
GPS Data Unreliable	11.10
GPS L	11.7
GPS R.....	11.8
GPS.....	11.7

H

HEAT PITOT C.....	3.7
HEAT PITOT L	3.7
HEAT PITOT L+C+R.....	3.8
HEAT PITOT R.....	3.8
HF DATALINK	5.1
HYD AUTO CONTROL C	13.1
HYD AUTO CONTROL L, R.....	13.1
HYD OVERHEAT DEM C1, C2, L, R.....	13.1
HYD OVERHEAT PRI C1, C2	13.2
HYD OVERHEAT PRI L	13.2
HYD OVERHEAT PRI R.....	13.3
HYD PRESS DEM C1, C2, L, R.....	13.4
HYD PRESS PRI C1, C2	13.4
HYD PRESS PRI L	13.4
HYD PRESS PRI R.....	13.5



HYD PRESS SYS C	13.6
HYD PRESS SYS L.....	13.10
HYD PRESS SYS L+C	13.11
HYD PRESS SYS L+C+R	13.15
HYD PRESS SYS L+R	13.16
HYD PRESS SYS R	13.20
HYD PRESS SYS R+C.....	13.22
HYD QTY LOW C.....	13.27
HYD QTY LOW L, R	13.27
HYD QTY LOW L+C.....	13.27
HYD QTY LOW L+C+R.....	13.28
HYD QTY LOW L+R.....	13.28
HYD QTY LOW R+C.....	13.29

I

Ice Crystal Icing.....	3.9
ICE DETECTORS.....	3.12
ICING ENG	3.12
ICING WING	3.12
ILS ANTENNA	11.14
INSUFFICIENT FUEL.....	11.14

J

Jammed Flight Controls.....	9.16

L

LANDING ALTITUDE.....	2.27
Lock Fail	1.9

M

MAIN BATTERY DISCH	6.6
MAIN GEAR BRACE L, R	14.10
MAIN GEAR STEERING	14.11

N

NAV ADIRU INERTIAL	11.16
NAV UNABLE RNP.....	11.20
NO AUTOLAND	4.2
NO LAND 3	4.2

O

OUTFLOW VALVE AFT, FWD	2.28
OVERHEAT ENG L, R.....	8.22
OVERSPEED	15.4
Overweight Landing.....	0.3

P

PACK L	2.30
PACK L+R	2.31
PACK MODE L, R	2.33
PACK R.....	2.34
PASS OXYGEN LOW	1.9
PASS OXYGEN ON	1.9
PILOT RESPONSE	15.4
PITCH DOWN AUTHORITY	9.18
PITCH UP AUTHORITY.....	9.20
PRI FLIGHT COMPUTERS	9.23



R

RADIO TRANSMIT..... 5.1

RAT UNLOCKED 13.31

RESERVE BRAKES/STRG..... 14.11

S

SATCOM 5.2

SATCOM DATALINK 5.2

SATCOM VOICE 5.2

SATVOICE LOST 5.2

SGL SOURCE AIR DATA 10.9

SGL SOURCE DISPLAYS 10.10

SGL SOURCE RAD ALT 10.10

SINGLE SOURCE F/D 10.10

SINGLE SOURCE ILS 11.21

SLATS DRIVE.....9.26

SLATS PRIMARY FAIL.....9.28

SMOKE COMPT UPR DR 2 8.26

SMOKE COMPT UPR DR 4 8.27

SMOKE CREW REST F/D 8.27

SMOKE CREW REST LWR.....8.28

SMOKE LAV/COMPT 8.28

SMOKE LAVATORY 8.28

Smoke or Fumes Removal 8.30

SMOKE REST UPR DR 1 8.32

SMOKE REST UPR DR 3 8.33

SMOKE REST UPR DR 5 8.34

Smoke, Fire or Fumes..... 8.8

SPEEDBRAKE EXTENDED	9.28
SPOILERS	9.29
STAB GREENBAND	9.30
STABILIZER	9.1
STABILIZER C.....	9.30
STABILIZER CUTOUT	9.31
STABILIZER R.....	9.31

T

TAIL SKID	14.12
TAIL STRIKE.....	15.4
Tail Strike	15.5
TCAS	15.6
TCAS OFF	15.6
TCAS RA CAPTAIN, F/O	15.6
TERR OVRD	15.6
TERR POS	15.6
THRUST ASYM COMP	9.31
TIRE PRESS.....	14.12
TRANSPONDER L, R	11.21
TRIM AIR L, R.....	2.35

V

VHF DATALINK	5.2
VNAV STEP CLIMB.....	11.22
Volcanic Ash	7.46

W

Window Damage Fwd L, R	1.10
Window Damage Side L, R.....	1.11



WINDOW FLT DECK L, R.....	1.12
WINDOW HEAT	3.12
WINDOW HEAT L, R FWD	3.14
WINDOW HEAT L, R SIDE.....	3.16
WINDOWS.....	1.12
WINDSHEAR SYS	15.7



Normal Checklists

Chapter NC

PREFLIGHT

Oxygen..... Tested, 100%
Flight instruments Heading____, Altimeter____
Parking brake Set
Fuel control switches..... CUTOFF

BEFORE START

Flight deck door Closed and locked
Passenger signs ____
MCP V2____, HDG/TRK____, ALTITUDE____
Takeoff speeds V1____, VR____, V2____
CDU preflight..... Completed
Trim ____ Units, 0, 0
Taxi and takeoff briefing Completed
Beacon.....ON

BEFORE TAXI

Anti-ice..... ____
Recall Checked
Autobrake RTO
Flight controls..... Checked
Ground personnel and equipment Clear

BEFORE TAKEOFF

Flaps ____



AFTER TAKEOFF

Landing gear UP

Flaps UP

DESCENT

Recall Checked

Notes Checked

Autobrake ☐

Landing data VREF , Minimums

Approach briefing Completed

APPROACH

Altimeters

LANDING

Speedbrake ARMED

Landing gear DOWN

Flaps

SHUTDOWN

Hydraulic panel Set

Fuel pumps Off

Flaps UP

Parking brake ☐

Fuel control switches CUTOFF

Weather radar Off



777 Flight Crew Operations Manual

SECURE

ADIRU OFF
Emergency lights OFF
Packs OFF



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Non-Normal Checklists

Chapter NNC

Miscellaneous

Section 0

Table of Contents

Ditching	0.1
Overweight Landing	0.3



Table of Contents

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Condition: Airplane ditching and evacuation are needed.

- 1 Plan to jettison fuel as needed to reduce VREF speeds.
- 2 **Checklist Complete Except Deferred Items**

Deferred Items

Below 5,000 feet

GND PROX GEAR OVRD switch OVRD

GND PROX TERR OVRD switch OVRD

PACK switches (both) Off

OUTFLOW VALVE switches (both) MAN

OUTFLOW VALVE MANUAL
switches (both). Hold in CLOSE
until the outflow valve
indications show fully closed

PASS SIGNS selectors (both) ON

Do **not** accomplish the following checklists:

PACK L

PACK R

CABIN ALTITUDE AUTO

On final approach (omit Landing checklist)

Landing gear lever UP
Flaps 30

▼ Continued on next page ▼



▼ Ditching continued ▼

Advise the cabin of imminent touchdown.
Maintain airspeed at VREF 30 to touchdown. Flare the airplane to achieve the minimum rate of descent at touchdown.

After impact

FUEL CONTROL switches (both) CUTOFF
APU fire switch Override and pull
■ ■ ■ ■

Overweight Landing

Condition: A landing at greater than the maximum landing weight is needed.

1 Choose one:

◆ **One engine is inoperative or at reduced thrust:**

GND PROX FLAP OVRD switch OVRD

Note: Use flaps 20 and VREF 20 for landing and flaps 5 for go-around. This gives greater climb capability.

▶▶ **Go to step 8**

◆ **Both engines are running normally:**

▶▶ **Go to step 2**

2 Refer to the Approach or Landing Climb Limited Weight table in the Performance Inflight chapter or other approved source.

▼ Continued on next page ▼

▼ Overweight Landing continued ▼

3 Choose one:

- ◆ Landing gross weight is **greater than** the Approach or Landing Climb Limited Weight:

GND PROX FLAP OVRD switch OVRD

Note: Use flaps 20 and VREF 20 for landing and flaps 5 for go-around. This gives greater climb capability.

►► **Go to step 8**

- ◆ Landing gross weight is **less than or equal to** the Approach or Landing Climb Limited Weight:

AP-BGJ - AP-BGL, AP-BHX, AP-BMG, AP-BMH

►► **Go to step 4**

AP-BGY - AP-BHW, AP-BID, AP-BMS

►► **Go to step 6**

AP-BGJ - AP-BGL, AP-BHX, AP-BMG, AP-BMH

4 Enter the landing gross weight on the APPROACH REF page.

▼ Continued on next page ▼

▼ Overweight Landing continued ▼

5 Choose one:

- ◆ VREF 30 + additives (wind and gusts, 5 knots minimum) is **at or below** 160 knots:

Note: Use flaps 30 and VREF 30 for landing and flaps 20 for go-around.



- ◆ VREF 30 + additives (wind and gusts, 5 knots minimum) is **above** 160 knots:

Note: Use flaps 25 and VREF 25 for landing and flaps 20 for go-around. This gives greater margin to the flap placard speed.

►► **Go to step 8**

AP-BGY - AP-BHW, AP-BID, AP-BMS

6 Enter the landing gross weight on the APPROACH REF page.

▼ Continued on next page ▼



▼ Overweight Landing continued ▼

7 Choose one:

◆ VREF 30 + additives (wind and gusts, 5 knots minimum) is **at or below** 170 knots:

Note: Use flaps 30 and VREF 30 for landing and flaps 20 for go-around.



◆ VREF 30 + additives (wind and gusts, 5 knots minimum) is **above** 170 knots:

Note: Use flaps 25 and VREF 25 for landing and flaps 20 for go-around. This gives greater margin to the flap placard speed.

►► Go to step 8

8 Checklist Complete Except Deferred Items

Deferred Items

Descent Checklist

- Recall Checked
- Notes. Checked
- Autobrake ____
- Landing data **VREF 20 ____ or VREF 25 ____, Minimums ____**
- Approach briefing Completed

▼ Continued on next page ▼

▼ Overweight Landing continued ▼

Approach Checklist

Altimeters _____

Landing Checklist

Speedbrake ARMED

Landing gear DOWN

Flaps. **20 or 25**





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Non-Normal Checklists

Chapter NNC

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

Section 1

Table of Contents

Automatic Unlock	1.1
CREW OXYGEN LOW	1.1
DOOR AFT CARGO	1.1
DOOR AFT CARGO	1.2
DOOR BULK CARGO	1.4
DOOR E/E ACCESS	1.4
DOOR ENTRY 1-4L, R	1.4
DOOR ENTRY 1-5L, R	1.5
DOOR FWD ACCESS	1.5
DOOR FWD CARGO	1.6
DOOR WING SLIDE L, R	1.8
DOORS	1.8
ELT ON	1.8
EMER LIGHTS	1.8
Lock Fail	1.9
PASS OXYGEN LOW	1.9
PASS OXYGEN ON	1.9
Window Damage Fwd L, R	1.10
Window Damage Side L, R	1.11
WINDOW FLT DECK L, R	1.12
WINDOWS	1.12

Table of Contents

Intentionally
Blank

Automatic Unlock

Condition: The correct emergency access code is entered.

- 1 FLT DECK DOOR lock selector Rotate to DENY and hold for 1 second



CREW OXYGEN LOW

Condition: Crew oxygen pressure is low.



[] DOOR AFT CARGO

AP-BGJ - AP-BID

Condition: The aft lower cargo door is not closed and secure.

Note: The aft lower cargo door is in a safe configuration as long as cabin pressurization is normal.

- 1 Continue normal operation.



[] DOOR AFT CARGO**AP-BMG - AP-BMS**

Condition: The aft lower cargo door is not closed and secure.

Objective: To reduce the cabin differential pressure to decrease the risk of door separation.

1 LDG ALT selector PULL ON, set 8000

2 Choose one:

◆ Airplane altitude is **at or below** 8,000 feet:

Level off at the lowest safe altitude.

▶▶ **Go to step 3**

◆ Airplane altitude is **above** 8,000 feet:

Descend to the lowest safe altitude or 8,000 feet, whichever is higher.

▶▶ **Go to step 3**

3 **After** level off, allow sufficient time for the cabin altitude to stabilize. This minimizes discomfort when the airplane is depressurized.

▼ Continued on next page ▼

▼ DOOR AFT CARGO continued ▼

4 Choose one:

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

►► **Go to step 5**

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

Don the oxygen masks.

Establish crew communications.

►► **Go to step 5**

5 OUTFLOW VALVE switches (both) MAN

Use momentary actuation of the outflow valve manual switches to avoid large and rapid pressurization changes. Valve can take up to 6 seconds to move the first time.

6  OUTFLOW VALVE

MANUAL switches (both) Move to OPEN
until the outflow
valve indications show
fully open to depressurize the airplane

7 **After** the airplane is depressurized, the crew may change altitude as needed.

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

CABIN ALTITUDE AUTO

LANDING ALTITUDE



[] DOOR BULK CARGO

Condition: The bulk cargo door is not closed and secure.

Note: The bulk cargo door is in a safe configuration as long as cabin pressurization is normal.

- 1 Continue normal operation.

**[] DOOR E/E ACCESS**

Condition: The electrical and electronic access door is not closed and secure.

Note: The E/E access door is in a safe configuration as long as cabin pressurization is normal.

- 1 Continue normal operation.

**[] DOOR ENTRY 1-4L, R**

AP-BGJ - AP-BGZ, AP-BHX, AP-BMG, AP-BMH

Condition: An entry door is not closed and secure.

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

- 1 Continue normal operation.



[] DOOR ENTRY 1-5L, R**AP-BHV, AP-BHW, AP-BID, AP-BMS**

Condition: An entry door is not closed and secure.

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

- 1 Continue normal operation.

**[] DOOR FWD ACCESS**

Condition: The forward access door is not closed and secure.

Note: The forward access door is in a safe configuration as long as cabin pressurization is normal.

- 1 Continue normal operation.



[] DOOR FWD CARGO

Condition: The forward lower cargo door is not closed and secure.

Objective: To reduce the cabin differential pressure to decrease the risk of door separation.

1 LDG ALT selector PULL ON, set 8000

2 Choose one:

◆ Airplane altitude is **at or below** 8,000 feet:

Level off at the lowest safe altitude.

▶▶ **Go to step 3**

◆ Airplane altitude is **above** 8,000 feet:

Descend to the lowest safe altitude or 8,000 feet, whichever is higher.

▶▶ **Go to step 3**

3 **After** level off, allow sufficient time for the cabin altitude to stabilize. This minimizes discomfort when the airplane is depressurized.

▼ Continued on next page ▼

▼ DOOR FWD CARGO continued ▼

4 Choose one:

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

►► **Go to step 5**

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

Don the oxygen masks.

Establish crew communications.

►► **Go to step 5**

5 OUTFLOW VALVE switches (both) MAN

Use momentary actuation of the outflow valve manual switches to avoid large and rapid pressurization changes. Valve can take up to 6 seconds to move the first time.

6  OUTFLOW VALVE

MANUAL switches (both) Move to OPEN
until the outflow
valve indications show
fully open to depressurize the airplane

7 **After** the airplane is depressurized, the crew may change altitude as needed.

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

CABIN ALTITUDE AUTO

LANDING ALTITUDE





DOOR WING SLIDE L, R

AP-BHV, AP-BHW, AP-BID, AP-BMS

Condition: The door for the unpressurized wing slide compartment is not closed and secure.



DOORS

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



[] ELT ON

Condition: The emergency locator transmitter is on.

- 1 Notify ATC in the event of erroneous ELT transmission.



EMER LIGHTS

Condition: One of these occurs:

- The emergency lights are on
- The emergency lights switch is not ARMED



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 possible overheating.

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

- 1  FLIGHT DECK ACCESS SYSTEM switch . . . OFF
- 2 The door can be locked with the deadbolt.



PASS OXYGEN LOW

AP-BMS

Condition: The passenger oxygen pressure is low.



PASS OXYGEN ON

Condition: The passenger oxygen system is on.





Window Damage Fwd L, R

Condition: The 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 descend, if needed, to minimize forces on the window.

1 **If** the window is arcing, shattered, or cracked:
FWD WINDOW HEAT switch
(affected window). Off

Do **not** accomplish the following checklist:
WINDOW HEAT FWD

2 **If** the window is deformed, or an air leak occurs:
Plan to land at the nearest suitable airport.

If the airplane altitude is above 10,000 feet:
Descend to the lowest safe altitude or
10,000 feet, whichever is higher.

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



Window Damage Side L, R

Condition: The 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 descend, if needed, to minimize forces on the window.

- 1 **If** the window is arcing, shattered, or cracked:

SIDE WINDOW HEAT switch

(affected window) Off

Do **not** accomplish the following checklist:

WINDOW HEAT SIDE

- 2 **If** the window is deformed, or an air leak occurs:

Plan to land at the nearest suitable airport.

If the airplane altitude is above 10,000 feet:

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

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



[] WINDOW FLT DECK L, R

Condition: The side window is not closed and secure.

- 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** pressurization **is normal**:

Note: The window is in a safe configuration as long as cabin pressurization is normal.

Continue normal operation.



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

Level off at the lowest safe altitude.

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

**[] WINDOWS**

Condition: The left and right side windows are not closed and secure.

▼ Continued on next page ▼

▼ **WINDOWS continued** ▼

- 1 Maintain the maneuvering speed for the existing flap setting until the windows are closed.
- 2 The force needed to close the windows increases with airspeed. It may not be possible to close the windows at speeds above 250 knots.
- 3 Close and lock the windows.

- 4 Choose one:

◆ Both windows **lock and** pressurization **is normal**:

Continue normal operation.



◆ Any window does **not lock or** pressurization is **not normal**:

Level off at the lowest safe altitude.

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





Intentionally
Blank



Non-Normal Checklists

Chapter NNC

Air Systems

Section 2

Table of Contents

CABIN ALTITUDE 2.1-----
BLEED ISLN CLOSED C, L, R 2.2

BLEED ISLN OPEN C, L, R.....2.2

BLEED LEAK BODY 2.2

BLEED LEAK L, R.....2.3

BLEED LEAK STRUT L, R.....2.4

BLEED LOSS BODY 2.7

BLEED LOSS BODY L 2.8

BLEED LOSS BODY R 2.8

BLEED LOSS WING L, R 2.9

BLEED OFF APU 2.9

BLEED OFF ENG L, R.....2.10

CABIN ALTITUDE 2.1

CABIN ALTITUDE AUTO.....2.12

Cabin Temp Cold.....2.14

Cabin Temp Hot.....2.20

CARGO A/C FWD.....2.25

CARGO HEAT AFT.....2.25

CARGO HEAT BULK.....2.26

EQUIP COOLING 2.26

EQUIP COOLING OVRD 2.26

LANDING ALTITUDE 2.27

OUTFLOW VALVE AFT, FWD 2.28

PACK L 2.30

PACK L+R 2.31



Table of Contents

PACK MODE L, R 2.33

PACK R 2.34

TRIM AIR L, R.....2.35

[] CABIN ALTITUDE

Condition: Cabin altitude is excessive.

- 1 Don the oxygen masks.
- 2 Establish crew communications.
- 3 Check the cabin altitude and rate.
- 4 **If** the cabin altitude is uncontrollable:
PASS OXYGEN switch Push to ON and
hold for 1 second

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

To descend:

Move the thrust levers to idle

Extend the speedbrakes

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

Descend at V_{mo}/M_{mo}

-
- 5 **If** the cabin altitude is controllable:
Continue normal operation.



BLEED ISLN CLOSED C, L, R

Condition: One of the following occurs:

- The isolation valve is failed closed
- The bleed isolation switch is off



BLEED ISLN OPEN C, L, R

Condition: The isolation valve is failed open.



[] BLEED LEAK BODY

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

- 1 The air supply controller automatically isolates the heat source within approximately 3 minutes by closing the bleed and isolation valves.

Caution! Do not change the APU bleed, engine bleed, or bleed isolation switch positions. Airplane damage can occur.

- 2 Pilot action is needed when a BLEED LOSS message shows.
- 3 Do **not** accomplish the following checklists:
 HYD PRESS DEM C1
 HYD PRESS DEM C2



[] BLEED LEAK L, R

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

- 1 The air supply controller automatically isolates the heat source within approximately 5 minutes by closing the bleed and isolation valves.

Caution! Do not change the APU bleed, engine bleed, or bleed isolation switch positions. Airplane damage can occur.

- 2 Pilot action is needed when a BLEED LOSS message shows.
- 3 Do **not** accomplish the following checklists:

PACK

HYD PRESS DEM



[] BLEED LEAK STRUT L, R

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

- 1 The air supply controller automatically isolates the heat source by closing the bleed and isolation valves.

Caution! Do not change the APU bleed, engine bleed, or bleed isolation switch positions. Airplane damage can occur.

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

PACK

- 3 **Wait** 1 minute.

- 4 Choose one:

◆ BLEED LEAK STRUT message **blanks**:



◆ BLEED LEAK STRUT message **stays shown**:

▶▶ **Go to step 5**

- 5 A/T ARM switch
(affected side) Confirm OFF
- 6 Thrust lever
(affected side) Confirm Retard slowly
until the BLEED LEAK
STRUT message blanks
or the thrust lever is at idle

▼ Continued on next page ▼

▼ **BLEED LEAK STRUT L, R continued** ▼

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

8 Choose one:

◆ BLEED LEAK STRUT message **blanks**:

Note: Run the engine at a thrust setting that keeps the BLEED LEAK STRUT message blank.

►► **Go to step 9**

◆ BLEED LEAK STRUT message **stays shown**:

Note: Run the engine at idle for the rest of the flight.

►► **Go to step 9**

9 Transponder mode selector TA ONLY

Note: Do not use FMC performance predictions with an engine at reduced thrust.

▼ **Continued on next page** ▼



▼ BLEED LEAK STRUT L, R continued ▼

10 Choose one:

◆ Landing using flaps **20**:
GND PROX FLAP OVRD switch OVRD

Note: Use flaps 20 and VREF 20 for landing and flaps 5 for go-around.

▶▶ Go to step 11

◆ Landing using flaps **30 (if performance allows)**:

Note: Use flaps 30 and VREF 30 for landing and flaps 20 for go-around.



11 Checklist Complete Except Deferred Items

Deferred Items

Descent Checklist

- Recall Checked
- Notes. Checked
- Autobrake ____
- Landing data **VREF 20** ____, **Minimums** ____
- Approach briefing Completed

Approach Checklist

- Altimeters ____

▼ Continued on next page ▼

▼ BLEED LEAK STRUT L, R continued ▼

Landing Checklist

Speedbrake ARMED
 Landing gear DOWN
 Flaps. **20**



[] BLEED LOSS BODY

Condition: Bleed air from the left and right body ducts is not available.

- 1 C1 and C2 AIR DEMAND pump selectors OFF

Caution! Do not change the APU bleed, engine bleed, or bleed isolation switch positions. Airplane damage can occur.

Note: Gear retraction time increases to approximately 3 minutes due to reduced center hydraulic system capacity. HYD PRESS SYS C and GEAR DISAGREE messages show during retraction.

- 2 Do **not** accomplish the following checklists:

HYD PRESS DEM C1

HYD PRESS DEM C2



[] BLEED LOSS BODY L

Condition: Bleed air from the left body duct is not available.

- 1 C1 AIR DEMAND pump selector OFF

Caution! Do not change the APU bleed, engine bleed, or bleed isolation switch positions. Airplane damage can occur.

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

HYD PRESS DEM C1



[] BLEED LOSS BODY R

Condition: Bleed air from the right body duct is not available.

- 1 C2 AIR DEMAND pump selector OFF

Caution! Do not change the APU bleed, engine bleed, or bleed isolation switch positions. Airplane damage can occur.

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

HYD PRESS DEM C2



[] BLEED LOSS WING L, R

Condition: Bleed air from the wing duct is not available.

Objective: To prevent possible asymmetrical ice buildup on the wings.

1 WING ANTI-ICE selector OFF

Caution! Do not change the APU bleed, engine bleed, or bleed isolation switch positions. Airplane damage can occur.

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

PACK



BLEED OFF APU

Condition: One of the following occurs:

- The APU bleed valve is closed because of a system fault
- The APU bleed switch is off



[] BLEED OFF ENG L, R

Condition: One of the following occurs:

- The engine bleed valve is closed because of a system fault
- The engine bleed switch is off

1 Choose one:

◆ On the **ground**:

▶▶ **Go to step 2**

◆ In **flight**:

▶▶ **Go to step 5**

Attempt only one reset per flight.

2  **ENG BLEED AIR** switch
(affected side) Off, then ON

3 Wait one minute.

4 Choose one:

◆ BLEED OFF ENG message is **blank**:



◆ BLEED OFF ENG message **shows**:

▶▶ **Go to step 5**

5 **ENG BLEED AIR** switch
(affected side) Off





Intentionally
Blank

[] CABIN ALTITUDE AUTO

Condition: One of these occurs:

- Automatic pressurization control is failed
- Both outflow valve switches are in manual

1 OUTFLOW VALVE switches (both) MAN

Use momentary actuation of the outflow valve manual switches to avoid large and rapid pressurization changes. Valves can take up to 6 seconds to move the first time.

2  OUTFLOW VALVE MANUAL switches (both) Move to
OPEN or CLOSE
as needed to control
cabin rate and altitude

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

Recommended cabin altitude in cruise is:

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

3 **Checklist Complete Except Deferred Items**

▼ Continued on next page ▼

▼ CABIN ALTITUDE AUTO continued ▼

Deferred Items

Descent Checklist

Recall Checked
Notes Checked
Autobrake ____
Landing data VREF ____, Minimums ____
Approach briefing Completed

Approach Checklist

Altimeters ____

At pattern altitude

Use momentary actuation of the outflow valve manual switches to avoid large and rapid pressurization changes.



OUTFLOW VALVE MANUAL

switches (both) Move to OPEN
until the outflow valve
indications show fully open to
depressurize the airplane

Landing Checklist

Speedbrake ARMED
Landing gear DOWN
Flaps ____





Cabin Temp Cold

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

Objective: To regain temperature control or to descend and configure for manual ventilation.

1 AIR COND RESET switch Push and hold for 1 second

2 **Wait** 2 minutes.

3 Choose one:

◆Outlet air is **becoming warmer**:
 ■ ■ ■ ■

◆Outlet air is **excessively cold**:
 ▶▶ **Go to step 4**

4 TRIM AIR switches (both) Off

5 **Wait** 1 minute.

6 Choose one:

◆Outlet air is **becoming warmer**:
 ▶▶ **Go to step 29**

◆Outlet air is **excessively cold**:
 ▶▶ **Go to step 7**

7 TRIM AIR switches (both) ON

8 L PACK switch Off

▼ Continued on next page ▼

▼ Cabin Temp Cold continued ▼

9 **Wait** 1 minute.

10 Choose one:

◆ Outlet air is **becoming warmer**:

▶▶ **Go to step 29**

◆ Outlet air is **excessively cold**:

▶▶ **Go to step 11**

11 L PACK switch AUTO

12 R PACK switch Off

13 **Wait** 1 minute.

14 Choose one:

◆ Outlet air is **becoming warmer**:

▶▶ **Go to step 29**

◆ Outlet air is **excessively cold**:

▶▶ **Go to step 15**

15 R PACK switch AUTO

16 If needed to change flight deck temperature, open the flight deck door. It can take up to 5 minutes for the flight deck temperature to change.

▼ Continued on next page ▼

▼ Cabin Temp Cold continued ▼

17 Choose one:

◆ Flight deck or cabin temperature is **becoming warmer**:

▶▶ **Go to step 29**

◆ Flight deck or cabin temperature is **excessively cold**:

▶▶ **Go to step 18**

18 Start a descent to the lowest safe altitude or 10,000 feet, whichever is higher.

19 Plan to land at the nearest suitable airport.

20 **When** at level off:

▶▶ **Go to step 21**

21 Maintain airspeed between 280 and 320 knots to ensure air circulation.

22 Choose one:

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

▶▶ **Go to step 23**

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

Don the oxygen masks.

Establish crew communications.

▶▶ **Go to step 23**

23 PACK switches (both) Off

▼ Continued on next page ▼

▼ Cabin Temp Cold continued ▼

24 Passenger body heat and airplane electronics will slowly raise the temperature.

25 OUTFLOW VALVE switches (both) MAN

Use momentary actuation to avoid rapid pressure changes.

26  FWD OUTFLOW VALVE
MANUAL switch Move to
OPEN until
valve is fully open
to depressurize the airplane

If indication is blank, hold the switch
in OPEN for 30 seconds.

Note: For the rest of the flight, control the temperature with the aft outflow valve:

- If the temperature becomes too hot, open the aft outflow valve
- If the temperature becomes too cold, close the aft outflow valve

27 The following notes are applicable:

▼ Continued on next page ▼

▼ Cabin Temp Cold continued ▼

Note: The following items have a minor effect on temperature:

- UPPER RECIRC FANS switch
- IFE/PASS SEATS power switch
- CABIN/UTILITY power switch
- SHOULDER and FOOT HEATERS controls
- Flight deck lighting intensity
- Flight deck sunvisors
- Cabin lighting
- Cabin window shades
- Opened or closed flight deck door

If the IFE/PASS SEATS switch is off for temperature control, to move powered passenger seats for landing or another reason, select the IFE/PASS SEATS switch ON. Once seats are positioned, select the IFE/PASS SEATS switch off, if needed.

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

CABIN ALTITUDE AUTO

OUTFLOW VALVE AFT

OUTFLOW VALVE FWD

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

PACK L

PACK R

PACK L+R

▼ Continued on next page ▼

**▼ Cabin Temp Cold continued ▼**

TRIM AIR L

TRIM AIR R





Cabin Temp Hot

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

Objective: To regain temperature control or to descend and configure for manual ventilation.

1 AIR COND RESET switch Push and hold for 1 second

2 **Wait** 2 minutes.

3 Choose one:

◆Outlet air is **becoming cooler**:
 ■ ■ ■ ■

◆Outlet air is **excessively hot**:
 ▶▶ **Go to step 4**

4 TRIM AIR switches (both) Off

5 **Wait** 1 minute.

6 Choose one:

◆Outlet air is **becoming cooler**:
 ▶▶ **Go to step 35**

◆Outlet air is **excessively hot**:
 ▶▶ **Go to step 7**

7 TRIM AIR switches (both) ON

8 L PACK switch Off

▼ **Continued on next page** ▼

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▼ Cabin Temp Hot continued ▼

9 **Wait** 1 minute.

10 Choose one:

◆ Outlet air is **becoming cooler**:

▶▶ **Go to step 35**

◆ Outlet air is **excessively hot**:

▶▶ **Go to step 11**

11 L PACK switch AUTO

12 R PACK switch Off

13 **Wait** 1 minute.

14 Choose one:

◆ Outlet air is **becoming cooler**:

▶▶ **Go to step 35**

◆ Outlet air is **excessively hot**:

▶▶ **Go to step 15**

15 R PACK switch AUTO

16 If needed to change flight deck temperature, open the flight deck door. It can take up to 5 minutes for the flight deck temperature to change.

▼ Continued on next page ▼



▼ Cabin Temp Hot continued ▼

17 Choose one:

◆ Flight deck or cabin temperature is **becoming cooler**:

▶▶ **Go to step 35**

◆ Flight deck or cabin temperature is **excessively hot**:

▶▶ **Go to step 18**

18 Start a descent to the lowest safe altitude or 10,000 feet, whichever is higher.

19 Plan to land at the nearest suitable airport.

20 UPPER RECIRC FANS switch Off

21 SHOULDER and FOOT HEATERS controls (all) OFF

22 Minimize flight deck lighting intensity.

23 During daylight, install the flight deck sunvisors.

24 **When** at level off:
▶▶ **Go to step 25**

25 Maintain airspeed between 280 and 320 knots to ensure air circulation.

▼ Continued on next page ▼

▼ Cabin Temp Hot continued ▼

26 Choose one:

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

▶▶ **Go to step 27**

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

Don the oxygen masks.

Establish crew communications.

▶▶ **Go to step 27**

27 PACK switches (both) Off

28 OUTFLOW VALVE switches (both) MAN

Use momentary actuation to avoid rapid pressure changes.

29  OUTFLOW VALVE MANUAL

switches (both) Move to
OPEN until
valves are fully open
to depressurize the airplane

If indications are blank, hold the
switches in OPEN for 30 seconds.

Note: For the rest of the flight, control the
temperature with the aft outflow valve:

- If the temperature becomes too cold, close the aft outflow valve
- If the temperature becomes too hot, open the aft outflow valve

▼ Continued on next page ▼



▼ Cabin Temp Hot continued ▼

- 30 Advise the cabin to:
 - Reduce cabin lighting to minimum needed
 - Close cabin window shades during daylight

31 **When** cabin window shades are closed:

▶▶ **Go to step 32**

- 32 IFE/PASS SEATS power switch Off
- 33 CABIN/UTILITY power switch Off

Note: The following items have a minor effect on temperature:

- UPPER RECIRC FANS switch
- IFE/PASS SEATS power switch
- CABIN/UTILITY power switch
- SHOULDER and FOOT HEATERS controls
- Flight deck lighting intensity
- Flight deck sunvisors
- Cabin lighting
- Cabin window shades
- Opened or closed flight deck door

To move powered passenger seats for landing or another reason, select the IFE/PASS SEATS switch ON. Once seats are positioned, select the IFE/PASS SEATS switch off, if needed.

▼ Continued on next page ▼

▼ Cabin Temp Hot continued ▼

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

CABIN ALTITUDE AUTO

OUTFLOW VALVE AFT

OUTFLOW VALVE FWD

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

PACK L

PACK R

PACK L+R

TRIM AIR L

TRIM AIR R



CARGO A/C FWD

AP-BGJ - AP-BGL, AP-BHX, AP-BMG, AP-BMH

Condition: Forward lower cargo air conditioning is inoperative.



CARGO HEAT AFT

Condition: One of these occurs:

- Aft lower cargo heat is inoperative
- The aft cargo temperature selector is OFF



CARGO HEAT BULK

Condition: One of these occurs:

- Bulk cargo heat is inoperative
- The bulk cargo temperature selector is OFF

**EQUIP COOLING**

Condition: The forward equipment cooling system is failed.

**[] EQUIP COOLING OVRD**

Condition: The equipment cooling system is in override mode.

- 1 **Wait** 2 minutes. This allows time for any smoke in the system to clear.
- 2 EQUIP COOLING switch Off, then AUTO
The EQUIP COOLING OVRD message blanks.
- 3 **Wait** 1 minute. This allows time for the system to reset.

▼ Continued on next page ▼

▼ EQUIP COOLING OVRD continued ▼

4 Choose one:

◆ EQUIP COOLING OVRD message **stays blank**:



◆ EQUIP COOLING OVRD message **shows again**:

Note: After 30 minutes of operation at low altitude and low cabin differential pressure, electronic equipment and displays may fail.



[] LANDING ALTITUDE

Condition: One of these occurs:

- The FMC does not supply a landing altitude
- The landing altitude selector is pulled

1 LDG ALT selector PULL ON, set manually





[] **OUTFLOW VALVE AFT, FWD**

Condition: One of these occurs:

- Automatic control of the outflow valve is inoperative
- The outflow valve switch is in manual

Objective: To allow the operable outflow valve to control cabin pressure.

- 1 OUTFLOW VALVE switch (affected side) MAN
- 2 OUTFLOW VALVE MANUAL
switch (affected side) Hold in
CLOSE until
the outflow valve
indication shows fully closed

3 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

- Recall Checked
- Notes. Checked
- Autobrake ____
- Landing data VREF ____, Minimums ____
- Approach briefing Completed

Approach Checklist

- Altimeters ____

▼ Continued on next page ▼

▼ **OUTFLOW VALVE AFT, FWD continued** ▼

At pattern altitude

Use momentary actuation of the outflow valve manual switch to avoid large and rapid pressurization changes.



OUTFLOW VALVE MANUAL

switch (affected side). Move to OPEN
until the outflow valve
indications show fully open

Landing Checklist

Speedbrake ARMED
Landing gear DOWN
Flaps ____



[] PACK L

Condition: The left pack is inoperative.

- 1 **Wait** 2 minutes. This allows time for an overheat condition to cool.
- 2 AIR COND RESET switch Push and hold for 1 second
- 3 **Wait** 2 minutes.
- 4 Choose one:
 - ◆ PACK L message **stays blank**:
■ ■ ■ ■
 - ◆ PACK L message **shows again**:
L PACK switch Off
■ ■ ■ ■

[] PACK L+R

Condition: Both packs are inoperative.

Objective: To prevent excessive cabin altitude and temperature by descending and increasing ventilation.

- 1 **Wait** 2 minutes. This allows time for an overheat condition to cool.
- 2 AIR COND RESET switch Push and hold for 1 second
- 3 **Wait** 2 minutes unless the PACK L+R message shows again.
- 4 Choose one:
 - ◆ PACK L+R message **stays blank**:


 - ◆ PACK L+R message **shows again**:

▶▶ Go to step 5
- 5 Descend to the lowest safe altitude or 10,000 feet, whichever is higher.

If needed to prevent excessive cabin altitude, descend with speedbrakes extended at Vmo/Mmo
- 6 **When** at level off:

▶▶ Go to step 7

▼ Continued on next page ▼



▼ PACK L+R continued ▼

- 7 Choose one:
- ◆ Airplane altitude is **at or below** 10,000 feet:
 - ▶▶ **Go to step 8**
 - ◆ Airplane altitude is **above** 10,000 feet:
 - Don the oxygen masks.
 - Establish crew communications.
 - ▶▶ **Go to step 8**
- 8 OUTFLOW VALVE switches (both) MAN
- 9 OUTFLOW VALVE MANUAL switches (both) Hold in OPEN for 30 seconds
- 10 UPPER RECIRC FANS switch Off
- 11 IFE/PASS SEATS power switch Off
- 12 CABIN/UTILITY power switch Off
- 13 SHOULDER and FOOT HEATERS (all) OFF
- 14 Minimize the flight deck lighting intensity.
- 15 Open the flight deck door.
- 16 **During** daylight:
 - Install the flight deck sunvisors.
 - Advise the cabin to close the cabin window shades.
- 17 Plan to land at the nearest suitable airport.

▼ Continued on next page ▼

▼ **PACK L+R continued** ▼

Note: To move powered passenger seats for landing or another reason, select the IFE/passenger seats switch ON. Once seats are positioned, select the IFE/passenger seats switch Off.

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

CABIN ALTITUDE AUTO



[] PACK MODE L, R

Condition: The pack is in the standby mode.

Note: At lower altitudes or higher outside air temperatures, the pack may shut down.



[] PACK R

Condition: The right pack is inoperative.

- 1 **Wait** 2 minutes. This allows time for an overheat condition to cool.
- 2 AIR COND RESET switch Push and hold for 1 second
- 3 **Wait** 2 minutes.
- 4 Choose one:
 - ◆ PACK R message **stays blank**:
 ■ ■ ■ ■
 - ◆ PACK R message **shows again**:
 R PACK switch Off
 ■ ■ ■ ■

[] TRIM AIR L, R

Condition: The trim air valve is closed.

- 1 **Wait** 2 minutes. This allows time for an overheat condition to cool.
- 2 AIR COND RESET switch Push and hold for 1 second
- 3 **Wait** 2 minutes.
- 4 Choose one:
 - ◆ TRIM AIR message **stays blank**:

■ ■ ■ ■
 - ◆ TRIM AIR message **shows again**:

TRIM AIR switch (affected side). Off

■ ■ ■ ■

Intentionally
Blank



Non-Normal Checklists

Chapter NNC

Anti-Ice, Rain

Section 3

Table of Contents

ANTI-ICE ENG L, R.....	3.1
ANTI-ICE LEAK ENG L, R.....	3.3
ANTI-ICE LOSS ENG L, R	3.5
ANTI-ICE ON.....	3.6
ANTI-ICE VLV WING L, R	3.6
ANTI-ICE WING.....	3.7
HEAT PITOT C.....	3.7
HEAT PITOT L	3.7
HEAT PITOT L+C+R.....	3.8
HEAT PITOT R.....	3.8
Ice Crystal Icing.....	3.9
ICE DETECTORS.....	3.12
ICING ENG.....	3.12
ICING WING.....	3.12
WINDOW HEAT	3.12
WINDOW HEAT L, R FWD	3.14
WINDOW HEAT L, R SIDE.....	3.16



Table of Contents

Intentionally
Blank

[] ANTI-ICE ENG L, R

Condition: The engine anti-ice valve is closed when commanded open.

1 Choose one:

◆ On the **ground**:

▶▶ **Go to step 2**

◆ In **flight**:

▶▶ **Go to step 6**

2 Thrust lever

(affected side) Advance until N1 is
approximately 3% above idle

3 Choose one:

◆ ANTI-ICE ENG message **blanks**:

■ ■ ■ ■

◆ ANTI-ICE ENG message **stays shown**:

ENGINE ANTI-ICE selector

(affected side). OFF, then ON

▶▶ **Go to step 4**

4 Choose one:

◆ ANTI-ICE ENG message **blanks**:

■ ■ ■ ■

◆ ANTI-ICE ENG message **stays shown**:

▶▶ **Go to step 5**

▼ Continued on next page ▼

▼ ANTI-ICE ENG L, R continued ▼

- 5 ENGINE ANTI-ICE selector
(affected side) OFF

Note: Avoid icing conditions.



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

- 7 Choose one:

◆ ANTI-ICE ENG message **blanks**:

Note: Run the affected engine anti-ice system manually.



◆ ANTI-ICE ENG message **stays shown**:

►► **Go to step 8**

- 8 ENGINE ANTI-ICE selector
(affected side) OFF

Note: Avoid icing conditions.



[] ANTI-ICE LEAK ENG L, R

Condition: A bleed air leak occurs in the engine anti-ice duct.

Objective: To reduce the flow of bleed air through the leak.

- 1 The engine anti-ice system automatically isolates the heat source within approximately 2 minutes by closing the engine anti-ice valve.

Note: Avoid icing conditions.

- 2 **Wait** 2 minutes.

- 3 Choose one:

◆ ANTI-ICE LEAK ENG message **blanks**:

■ ■ ■ ■

◆ ANTI-ICE LEAK ENG message **stays shown**:

▶▶ **Go to step 4**

- 4 A/T ARM switch
(affected side) Confirm OFF
- 5 Thrust lever
(affected side) Confirm Retard slowly
until the ANTI-ICE
LEAK ENG message blanks
or the thrust lever is at idle
- 6 Do **not** accomplish the following checklist:
AUTOTHROTTLE

▼ Continued on next page ▼

▼ ANTI-ICE LEAK ENG L, R continued ▼

7 Choose one:

◆ ANTI-ICE LEAK ENG message **blanks**:

Note: Run the engine at a thrust setting that keeps the ANTI-ICE LEAK ENG message blank.

►► **Go to step 8**

◆ ANTI-ICE LEAK ENG message **stays shown**:

Note: Run the engine at idle for the rest of the flight.

►► **Go to step 8**

8 Transponder mode selector TA ONLY

Note: Do not use FMC performance predictions with an engine at reduced thrust.

9 Choose one:

◆ Landing using flaps **20**:

GND PROX FLAP OVRD switch OVRD

Note: Use flaps 20 and VREF 20 for landing and flaps 5 for go-around.

►► **Go to step 10**

◆ Landing using flaps **30 (if performance allows)**:

Note: Use flaps 30 and VREF 30 for landing and flaps 20 for go-around.



▼ Continued on next page ▼

▼ **ANTI-ICE LEAK ENG L, R continued** ▼

10 Checklist Complete Except Deferred Items

Deferred Items

Descent Checklist

Recall Checked
Notes Checked
Autobrake ____
Landing data **VREF 20** ____, **Minimums** ____
Approach briefing Completed

Approach Checklist

Altimeters ____

Landing Checklist

Speedbrake ARMED
Landing gear DOWN
Flaps. **20**



ANTI-ICE LOSS ENG L, R

Condition: Anti-ice bleed air for the engine is not available.



[] ANTI-ICE ON

Condition: All of these occur:

- An anti-ice selector is ON
- TAT is more than 10 degrees C
- Ice is not detected

- 1 ENGINE ANTI-ICE
selectors (both) AUTO or OFF
 - 2 WING ANTI-ICE selector AUTO or OFF
- ■ ■ ■

[] ANTI-ICE VLV WING L, R

AP-BGJ, AP-BGK, AP-BGY - AP-BHV, AP-BHX, AP-BMH,
AP-BMS
(AP-BGL, AP-BHW, AP-BID, AP-BMG ;with installation of
AIMS BP17C or equivalent)

Condition: The affected wing anti-ice valve is not closed
on the ground.

- 1 WING ANTI-ICE selector OFF
 - 2 ENG BLEED AIR switch (affected side). Off
 - 3 BLEED AIR ISLN switch (affected side) Off
 - 4 PACK switch (affected side) Off
 - 5 Do **not** accomplish the following checklists:
BLEED OFF ENG
BLEED LOSS WING
PACK
- ■ ■ ■

[] ANTI-ICE WING

Condition: One or both wing anti-ice valves are failed closed.

1 WING ANTI-ICE selector OFF, then ON

2 Choose one:

◆ ANTI-ICE WING message **blanks**:

Run wing anti-ice manually.



◆ ANTI-ICE WING message **stays shown**:

WING ANTI-ICE selector OFF



[] HEAT PITOT C

Condition: The center pitot probe heat is failed.

Note: The standby air data is unreliable in icing conditions.



[] HEAT PITOT L

Condition: The left pitot probe heat is failed.

Note: The PFD air data is not affected by a single pitot heat failure. Ensure that the right AIR DATA/ATT source switch stays off.



[] HEAT PITOT L+C+R

Condition: The left, center and right pitot probe heat are failed.

Note: The air data is unreliable in icing conditions.

**[] HEAT PITOT R**

Condition: The right pitot probe heat is failed.

Note: The PFD air data is not affected by a single pitot heat failure. Ensure that the left AIR DATA/ATT source switch stays off.



Ice Crystal Icing

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

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

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

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

Note: TAT probe icing can cause one or more of the following abnormal engine indications:

- Reference/target N1 indications blank
- Reference/target N1 indications decrease while flying at a constant altitude and airspeed

- 1 Minimize time above amber and red weather radar returns.

▼ Continued on next page ▼

▼ Ice Crystal Icing continued ▼

- 2 If conditions allow, exit the ice crystal icing conditions laterally. Climbing or descending to exit ice crystal icing conditions is not recommended.
- 3 Choose one:
 - ◆ Autothrottle response **or** TAT indication is normal:
 - ▶▶ **Go to step 6**
 - ◆ Autothrottle is **unable** to maintain the selected airspeed **and** TAT indication stays near 0 degrees C:
 - ▶▶ **Go to step 4**
- 4 A/T ARM switches (both) OFF
- 5 Thrust levers (both) Set to maintain airspeed and airplane flight path
- 6 When in ice crystal icing conditions, the following can be unreliable:
 - Reference/target N1 indications and reference N1
 - TAS, TAT, SAT, ECON SPD, and LRC
- 7 **When** ice crystal icing conditions are no longer present:
 - The autothrottle can be activated, if needed.



▼ Continued on next page ▼

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

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

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

An erroneous TAT indication can occur as a result of ice crystals blocking the 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.

Vibration due to fan hub icing can be above 4 units. Fan blade ice removal procedures have no effect on fan hub icing. When clear of clouds, fan hub ice sublimates and engine vibration decreases over time. Fan hub ice can remain into descent.

AP-BGJ - AP-BGL, AP-BHX, AP-BMG, AP-BMH

The ICA indication on EICAS can show in clear air during engine self-test or calibration.

[] ICE DETECTORS

Condition: The ice detectors are failed.

Note: Run the engine and wing anti-ice systems manually.



ICING ENG

Condition: Ice is detected and an engine anti-ice selector is OFF.



ICING WING

Condition: Ice is detected and one of these occurs:

- The wing anti-ice selector is OFF
- The wing anti-ice takeoff inhibit is active



WINDOW HEAT

Condition: Two or more window heats are off.





Intentionally
Blank



[] **WINDOW HEAT L, R FWD**

Condition: Primary window heat for the forward window is inoperative.

Objective: To reset the system or remove power to prevent arcing.

1 Choose one:

◆ Affected window is **arcing, shattered, or cracked**:

▶▶ **Go to the Window Damage Fwd L, R checklist on page 1.10**

■ ■ ■ ■

◆ Affected window is **not** arcing, shattered, or cracked:

▶▶ **Go to step 2**

- 2 FWD WINDOW HEAT switch (affected side) Off
- 3 **Wait** 10 seconds.
- 4 FWD WINDOW HEAT switch (affected side) ON

▼ Continued on next page ▼

▼ WINDOW HEAT L, R FWD continued ▼

5 Choose one:

◆ WINDOW HEAT FWD message **blanks**:



◆ WINDOW HEAT FWD message **stays shown**:

FWD WINDOW HEAT
switch (affected side) Off

The window is defogged by the backup
system.



[] WINDOW HEAT L, R SIDE

Condition: Window heat for the side window is inoperative.

Objective: To reset the system or remove power to prevent arcing.

1 Choose one:

◆ Affected window is **arcing, shattered, or cracked**:

▶▶ **Go to the Window Damage Side L, R checklist on page 1.11**



◆ Affected window is **not** arcing, shattered, or damaged:

▶▶ **Go to step 2**

2 SIDE WINDOW HEAT
switch (affected side) Off

3 **Wait** 10 seconds.

4 SIDE WINDOW HEAT
switch (affected side) ON

5 Choose one:

◆ WINDOW HEAT SIDE message **blanks**:



◆ WINDOW HEAT SIDE message **stays shown**:

SIDE WINDOW HEAT
switch (affected side) Off





Non-Normal Checklists

Chapter NNC

Automatic Flight

Section 4

Table of Contents

AUTOPILOT	4.1
AUTOPILOT DISC	4.1
AUTOTHROTTLE DISC	4.1
AUTOTHROTTLE L, R.....	4.1
NO AUTOLAND.....	4.2
NO LAND 3.....	4.2



Table of Contents

Intentionally
Blank

AUTOPILOT

Condition: One or more of these occur:

- The autopilot is in a degraded mode other than the selected mode
- The engaged roll mode is failed
- The engaged pitch mode is failed
- The autopilot is in flight envelope protection



AUTOPILOT DISC

Condition: All autopilots are disengaged.



AUTOTHROTTLE DISC

Condition: Both autothrottles are disconnected.



[] AUTOTHROTTLE L, R

Condition: The autothrottle is inoperative.

- 1 A/T ARM switch
(affected side) Confirm OFF
- 2 The other autothrottle may be activated if needed.



NO AUTOLAND

Condition: The autoland system is not available.

**NO LAND 3**

Condition: The autoland system does not have redundancy for a triple channel autoland.





**Non-Normal Checklists
Communications**

**Chapter NNC
Section 5**

Table of Contents

DATALINK LOST	5.1
DATALINK SYS.....	5.1
HF DATALINK	5.1
RADIO TRANSMIT	5.1
SATCOM	5.2
SATCOM DATALINK	5.2
SATCOM VOICE.....	5.2
SATVOICE LOST.....	5.2
VHF DATALINK	5.2



Table of Contents

Intentionally
Blank

DATALINK LOST

Condition: The ACARS datalink is temporarily lost.



DATALINK SYS

Condition: The datalink system is failed.



HF DATALINK

AP-BGY - AP-BHW, AP-BID

Condition: The HF datalink is failed.



[] RADIO TRANSMIT

Condition: A microphone switch is on and causes a radio to transmit for 30 seconds or more.

Objective: To identify and isolate the stuck microphone switch.

- 1 Transmitter select switches
(all audio control panels). FLT interphone
- 2 The microphone with the stuck switch transmits on the flight interphone rather than over a radio.

Note: The affected audio control panel should stay on FLT interphone. All other audio panels may be used normally.



SATCOM

Condition: The SATCOM system is failed.

**SATCOM DATALINK**

Condition: The SATCOM datalink is failed.

**SATCOM VOICE**

Condition: SATCOM voice communication is failed.

**SATVOICE LOST**

AP-BMG, AP-BMH

Condition: SATCOM voice communication is temporarily lost.

**VHF DATALINK**

Condition: The VHF datalink is failed.





Non-Normal Checklists

Chapter NNC

Electrical

Section 6

Table of Contents

ELEC AC BUS L, R	6.1
ELEC BACKUP GEN L, R.....	6.2
ELEC BACKUP SYS.....	6.3
ELEC BATTERY OFF.....	6.3
ELEC BUS ISLN L, R.....	6.3
ELEC CABIN/UTIL OFF	6.3
ELEC GEN DRIVE L, R	6.4
ELEC GEN OFF APU.....	6.4
ELEC GEN OFF L, R.....	6.5
ELEC GND HDLG BUS	6.5
ELEC IFE/SEATS OFF	6.5
ELEC STANDBY SYS.....	6.6
MAIN BATTERY DISCH	6.6



Table of Contents

Intentionally
Blank

[] ELEC AC BUS L, R

Condition: The AC bus is not energized.

Objective: To restore power or use the APU to supply another source of power.

Attempt only one reset per flight.

1  GEN CTRL switch
(affected side) Off, then ON

2 Choose one:

◆ ELEC AC BUS message **blanks**:



◆ ELEC AC BUS message **stays shown**:

APU selector

(if APU available) START, then ON

Do **not** accomplish the following checklist:

ELEC GEN OFF

When the APU is running:

▶▶ **Go to step 3**

3 Choose one:

◆ ELEC AC BUS message **blanks**:



◆ ELEC AC BUS message **stays shown**:

▶▶ **Go to step 4**

▼ Continued on next page ▼

▼ ELEC AC BUS L, R continued ▼

Attempt only one reset per flight.

- 4  BUS TIE switch
(affected side). Off, then AUTO

5 Choose one:

◆ ELEC AC BUS message **blanks**:

■ ■ ■ ■

◆ ELEC AC BUS message **stays shown**:

Do **not** accomplish the following checklists:

WINDOW HEAT

HYD PRESS PRI

■ ■ ■ ■

[] ELEC BACKUP GEN L, R

Condition: The backup generator is failed.

Attempt only one reset per flight.

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

■ ■ ■ ■

[] ELEC BACKUP SYS

Condition: The backup power system is failed.

- Attempt only one reset per flight.
- 1  L BACKUP GEN switch Off, then ON
 - 2  R BACKUP GEN switch Off, then ON
- ■ ■ ■

ELEC BATTERY OFF

Condition: The battery switch is OFF.

■ ■ ■ ■

ELEC BUS ISLN L, R

Condition: The bus tie breaker is open.

■ ■ ■ ■

ELEC CABIN/UTIL OFF

Condition: The cabin/utility power switch is OFF.

■ ■ ■ ■

[] ELEC GEN DRIVE L, R

Condition: A generator drive fault occurs.

Action is irreversible.

- 1  DRIVE DISC switch
(affected side). Confirm. Push
and hold
for 1 second
- 2 APU selector
(if APU available) START, then ON
- 3 Do **not** accomplish the following checklist:
ELEC GEN OFF



[] ELEC GEN OFF APU

Condition: The generator control breaker is open.

Attempt only one reset per flight.

- 1  APU GEN switch. Off, then ON



[] ELEC GEN OFF L, R

Condition: The generator control breaker is open.

Objective: To reset the generator or use the APU to supply another source of power.

Attempt only one reset per flight.

1  GEN CTRL switch
(affected side) Off, then ON

2 Choose one:

◆ ELEC GEN OFF message **blanks**:



◆ ELEC GEN OFF message **stays shown**:

APU selector
(if APU available) START, then ON



ELEC GND HDLG BUS

Condition: A fault occurs in the ground handling bus.



ELEC IFE/SEATS OFF

Condition: The IFE/passenger seats power switch is OFF.



ELEC STANDBY SYS

Condition: A standby power system failure occurs.

**[] MAIN BATTERY DISCH**

Condition: One of these occurs:

- The main battery is discharging
- The hot battery bus is not energized

Note: The main battery can power the standby system for a minimum of 5 minutes.



**Non-Normal Checklists****Chapter NNC****Engines, APU****Section 7****Table of Contents**

Aborted Engine Start L, R.....	7.1
Dual Eng Fail/Stall	7.2
ENG AUTOSTART L, R	7.4
Eng Lim/Surge/Stall L, R.....	7.5
Eng Svr Damage/Sep L, R	7.10
- - - - -	
Aborted Engine Start L, R.....	7.1
APU LIMIT	7.12
APU SHUTDOWN	7.13
Dual Eng Fail/Stall	7.2
ENG AUTOSTART L, R	7.4
ENG AUTOSTART OFF	7.13
ENG CONTROL L, R.....	7.13
ENG EEC MODE L, R	7.14
ENG FAIL L, R.....	7.16
ENG FUEL FILTER L, R.....	7.22
ENG FUEL VALVE L, R	7.23
ENG IDLE DISAGREE	7.23
Eng In-Flight Start L, R	7.24
Eng Lim/Surge/Stall L, R.....	7.5
ENG LIMIT PROT L, R.....	7.28
ENG OIL FILTER L, R.....	7.30
ENG OIL PRESS L, R	7.34
ENG OIL TEMP L, R.....	7.38
ENG REV LIMITED L, R.....	7.41
ENG REVERSER L, R	7.42



Table of Contents

ENG RPM LIMITED L, R 7.42

ENG SHUTDOWN 7.42

ENG SHUTDOWN L, R 7.42

ENG START VALVE L, R 7.43

ENG STARTER CUTOUT L, R 7.44

Eng Svr Damage/Sep L, R 7.10

ENG THRUST L, R 7.45

Volcanic Ash 7.46

Aborted Engine Start L, R

Condition: On the ground, an aborted engine start is needed.

- 1 FUEL CONTROL switch
(affected side) CUTOFF
- - - - -
- 2 START/IGNITION selector
(affected side) START
- 3 Motor the engine for 30 seconds.
- 4 START/IGNITION selector
(affected side) NORM



Dual Eng Fail/Stall

Condition: Engine speed for both engines is below idle.

- 1 FUEL CONTROL switches
(both) CUTOFF, then RUN
- 2 RAM AIR TURBINE switch Push and
hold for 1 second
-
- 3 Do not manually abort the start if EGT turns red.
EGT turns red when EGT exceeds the start limit line
(lower red line). Autostart discontinues the current
start attempt before EGT becomes too high for
continued engine operation.
- 4 Set airspeed above 270 knots.
- 5 APU selector
(if APU available) START, then ON
- 6 **If** volcanic ash is suspected:
 - ▶▶ **Go to the Volcanic Ash checklist on
page 7.46, if not already done, and
return to this checklist when directed.**
- 7 Engines can accelerate to idle very slowly,
especially at high altitudes. The time from fuel
control switch to RUN to stabilized idle can take up
to two and a half minutes.
- 8 Do not interrupt autostart. Move the fuel control
switch to CUTOFF only when no further start
attempts are needed.

▼ Continued on next page ▼

▼ Dual Eng Fail/Stall continued ▼

9 **When** one engine is running:

▶▶ **Go to step 10**

10 FUEL CENTER PUMPS

switches (both) Off

11 **Wait** 5 seconds.

12 Choose one:

◆ FUEL IN CENTER message is **blank**:

▶▶ **Go to step 13**

◆ FUEL IN CENTER message **shows**:

FUEL CENTER PUMPS

switches (both) ON

▶▶ **Go to step 13**

13 **When** the HEAT PITOT L+C+R message blanks:

PRIMARY FLIGHT COMPUTERS

disconnect switch DISC,
then AUTO

This step restores the flight control normal mode.

Re-engage the autopilot as needed when the flight control normal mode is restored.



[] ENG AUTOSTART L, R

Condition: One of these occurs:

- Autostart did not start the engine
- Fuel control switch is in RUN at low engine RPM with the autostart switch OFF

1 FUEL CONTROL switch
(affected side) Confirm CUTOFF

2 Choose one:

◆ In **flight**:



◆ On the **ground**:

►► **Go to step 3**

3 START/IGNITION selector
(affected side) START

4 Motor the engine for 30 seconds.

5 START/IGNITION selector
(affected side) NORM



Eng Lim/Surge/Stall L, R

Condition: One or more of these occur:

- Engine indications are abnormal
- Engine indications are quickly nearing or show an exceedance
- Abnormal engine noises are heard, possibly with airframe vibration
- There is no response to thrust lever movement or the response is abnormal
- Flames in the engine inlet or exhaust are reported

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

▼ Continued on next page ▼

▼ Eng Lim/Surge/Stall L, R continued ▼

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**:

FUEL CONTROL switch

(affected side) Confirm . . CUTOFF

APU selector

(if APU available) START, then ON

Transponder mode selector TA ONLY

Plan to land at the nearest suitable airport.

▶▶ **Go to step 6**

Check that RPM and EGT follow thrust lever movement.

4  Thrust lever

(affected side) Advance slowly

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

▼ Continued on next page ▼

▼ Eng Lim/Surge/Stall L, R continued ▼

5 Choose one:

◆ Engine runs **normally**:



◆ Engine runs at **reduced** thrust:

Transponder mode selector TA ONLY

Note: Do not use FMC performance predictions with an engine at reduced thrust.

►► **Go to step 6**

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

AUTOTHROTTLE

▼ Continued on next page ▼

▼ Eng Lim/Surge/Stall L, R continued ▼

7 Choose one:

◆ Landing using flaps **20**:

GND PROX FLAP OVRD switch OVRD

Note: Use flaps 20 and VREF 20 for landing and flaps 5 for go-around.

Check the Non-Normal Configuration Landing Distance tables for ENG SHUTDOWN L,R in the Performance Inflight-QRH chapter or other approved source.

►► **Go to step 8**

◆ Landing using flaps **30 (if performance allows)**:

Note: Use flaps 30 and VREF 30 for landing and flaps 20 for go-around.

Check the Non-Normal Configuration Landing Distance tables for ENG SHUTDOWN L,R in the Performance Inflight-QRH chapter or other approved source.



8 Checklist Complete Except Deferred Items

Deferred Items

Descent Checklist

Recall Checked

Notes. Checked

▼ Continued on next page ▼

▼ Eng Lim/Surge/Stall L, R continued ▼

Autobrake _____

Landing data **VREF 20** _____, **Minimums** _____

Approach briefing Completed

Approach Checklist

Altimeters _____

Landing Checklist

Speedbrake ARMED

Landing gear DOWN

Flaps. **20**

Eng Svr Damage/Sep L, R

Condition: One or more of these occur:

- Airframe vibrations with abnormal engine indications
- Engine separation

- 1 A/T ARM switch
(affected side) Confirm OFF
- 2 Thrust lever
(affected side) Confirm Idle
- 3 FUEL CONTROL switch
(affected side) Confirm CUTOFF
- 4 Engine fire switch
(affected side) Confirm Pull

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

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

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

- 6 APU selector
(if APU available) START, then ON
- 7 Transponder mode selector TA ONLY
- 8 Plan to land at the nearest suitable airport.

▼ Continued on next page ▼

▼ Eng Svr Damage/Sep L, R continued ▼

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

AUTOTHROTTLE

ENG FAIL

10 Choose one:

◆ Landing using flaps **20**:

GND PROX FLAP OVRD switch OVRD

Note: Use flaps 20 and VREF 20 for landing and flaps 5 for go-around.

Check the Non-Normal Configuration Landing Distance tables for ENG SHUTDOWN L, R in the Performance Inflight-QRH chapter or other approved source.

►► **Go to step 11**

◆ Landing using flaps **30 (if performance allows)**:

Note: Use flaps 30 and VREF 30 for landing and flaps 20 for go-around.

Check the Non-Normal Configuration Landing Distance tables for ENG SHUTDOWN L, R in the Performance Inflight-QRH chapter or other approved source.



11 Checklist Complete Except Deferred Items

▼ Continued on next page ▼



▼ Eng Svr Damage/Sep L, R continued ▼

Deferred Items

Descent Checklist

- Recall Checked
- Notes. Checked
- Autobrake ____
- Landing data **VREF 20 ____**, **Minimums ____**
- Approach briefing Completed

Approach Checklist

- Altimeters ____

Landing Checklist

- Speedbrake ARMED
- Landing gear DOWN
- Flaps. **.20**



[] APU LIMIT

Condition: An APU limit exceedance occurs.

- 1 APU selector OFF



[] APU SHUTDOWN

Condition: An APU automatic shutdown occurs.

Objective: To reset the APU controller.

- 1 APU selector OFF
- 2 APU selector START, then ON

**ENG AUTOSTART OFF**

Condition: The engine autostart switch is OFF.

**ENG CONTROL L, R**

Condition: An EEC system fault occurs.



[] ENG EEC MODE L, R

Condition: An EEC is in the alternate control mode.

Objective: To run both engines in the alternate mode.

- 1 Autothrottle disconnect switch Push
- 2 Thrust levers (both) Retard to mid position

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

Push one switch at a time.

- 3  ENGINE EEC MODE switches (both) Off
- 4 Activate the autothrottle.

Note: Maximum thrust limiting is not available with autothrottle disconnected. Alternate thrust setting information shows on the N1 indication.

- 5 Resume normal thrust management. Observe thrust limits.
- 6 Do **not** accomplish the following checklist:
ENG EEC MODE (for other engine)





Intentionally
Blank

[] ENG FAIL L, R

Condition: Engine speed is below idle.

Objective: To restart the engine if needed, or configure for single engine operation.

- 1 **If** thrust is lost on **both** engines:
 - ▶▶ **Go to the Dual Eng Fail/Stall checklist on page 7.2**
 - ■ ■ ■

- 2 **If** airframe vibrations with abnormal engine indications exist:
 - ▶▶ **Go to the Eng Svr Damage/Sep L, R checklist on page 7.10**
 - ■ ■ ■

- 3 **If** an engine has separated:
 - ▶▶ **Go to the Eng Svr Damage/Sep L, R checklist on page 7.10**
 - ■ ■ ■

- 4 A/T ARM switch
(affected side) Confirm OFF
- 5 Thrust lever
(affected side) Confirm Idle
- 6 FUEL CONTROL switch
(affected side) Confirm CUTOFF

▼ Continued on next page ▼

▼ ENG FAIL L, R continued ▼

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

AUTOTHROTTLE

8 A restart can be attempted if there is N1 rotation and no abnormal airframe vibration.

9 Choose one:

◆ Restart **is** needed:

▶▶ **Go to step 10**

◆ Restart is **not** needed:

▶▶ **Go to step 22**

10 Engine can accelerate to idle very slowly, especially at high altitudes. The time from fuel control switch to RUN to stabilized idle can take up to two and a half minutes.

11 If N2 is steadily increasing and EGT stays within limits, do not interrupt the start.

12 Choose one:

◆ Crossbleed indication (X-BLD or XB) **shows**:

START/IGNITION selector
(affected side). START

▶▶ **Go to step 13**

◆ Crossbleed indication (X-BLD or XB) is **blank**:

▶▶ **Go to step 13**

▼ Continued on next page ▼

▼ ENG FAIL L, R continued ▼

13 Choose one:

◆ Autostart is **on**:

▶▶ **Go to step 14**

◆ Autostart is **off**:

▶▶ **Go to step 17**

14 Monitor EGT during start to prevent an EGT exceedance. Autostart allows EGT to exceed the in-flight start limit.

15 Do not interrupt autostart. Only abort the start if:

There is no oil pressure indication after the EGT increases.

EGT quickly nears or exceeds the start limit.

No further autostart attempts are needed.

16 FUEL CONTROL switch

(affected side) RUN

▶▶ **Go to step 19**

17 Abort the start if:

EGT does not rise within 30 seconds after selecting RUN.

There is no oil pressure indication after EGT increases.

N2 is not increasing.

▼ Continued on next page ▼

▼ENG FAIL L, R continued ▼

EGT quickly nears or exceeds the start limit.

18 Choose one:

◆ Crossbleed indication (X-BLD or XB) **shows**:

When at maximum motoring:

FUEL CONTROL switch
(affected side) RUN

▶▶ **Go to step 19**

◆ Crossbleed indication (X-BLD or XB) is **blank**:

FUEL CONTROL switch
(affected side). RUN

▶▶ **Go to step 19**

19 Choose one:

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



◆ Engine stays **failed**:

▶▶ **Go to step 20**

20 FUEL CONTROL switch
(affected side) Confirm. CUTOFF

21 START/IGNITION selector
(affected side) NORM

22 APU selector
(if APU available) START, then ON

▼ Continued on next page ▼

▼ **ENG FAIL L, R continued** ▼

23 Transponder mode selector TA ONLY

24 Plan to land at the nearest suitable airport.

25 Choose one:

◆ Landing using flaps **20**:

GND PROX FLAP OVRD switch OVRD

Note: Use flaps 20 and VREF 20 for landing and flaps 5 for go-around.

Check the Non-Normal Configuration Landing Distance Tables for ENG SHUTDOWN L, R in the Performance Inflight-QRH chapter or other approved source.

►► **Go to step 26**

◆ Landing using flaps **30 (if performance allows)**:

Note: Use flaps 30 and VREF 30 for landing and flaps 20 for go-around.

Check the Non-Normal Configuration Landing Distance Tables for ENG SHUTDOWN L, R in the Performance Inflight-QRH chapter or other approved source.



26 Checklist Complete Except Deferred Items

▼ **Continued on next page** ▼

▼ENG FAIL L, R continued▼

Deferred Items

Descent Checklist

Recall Checked
Notes Checked
Autobrake ____
Landing data **VREF 20** ____, **Minimums** ____
Approach briefing Completed

Approach Checklist

Altimeters ____

Landing Checklist

Speedbrake ARMED
Landing gear DOWN
Flaps. **20**



[] ENG FUEL FILTER L, R

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

1 Choose one:

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

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



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

►► **Go to step 2**

2 Plan to land at the nearest suitable airport.

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



[] ENG FUEL VALVE L, R

Condition: One or more of these occur:

- The engine fuel valve is not in the commanded position
- The fuel spar valve is not in the commanded position

- 1 **If** the ENG FUEL VALVE message shows when the fuel control switch is moved to CUTOFF, the engine may continue to run for approximately 10 seconds.
- 2 **If** on the ground:

Do not attempt engine start.

**ENG IDLE DISAGREE**

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



Eng In-Flight Start L, R

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

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

- 1 Engine can accelerate to idle very slowly, especially at high altitudes. The time from fuel control switch to RUN to stabilized idle can take up to two and a half minutes.
- 2 If N2 is steadily increasing and EGT stays within limits, do not interrupt the start.
- 3 Choose one:
 - ◆ Crossbleed indication (X-BLD or XB) **shows**:
 START/IGNITION selector
 (affected side) START
▶▶ Go to step 4
 - ◆ Crossbleed indication (X-BLD or XB) is **blank**:
▶▶ Go to step 4
- 4 Choose one:
 - ◆ Autostart is **on**:
▶▶ Go to step 5
 - ◆ Autostart is **off**:
▶▶ Go to step 8

▼ Continued on next page ▼

▼ Eng In-Flight Start L, R continued ▼

- 5 Monitor EGT during start to prevent an EGT exceedance. Autostart allows EGT to exceed the in-flight start limit.
- 6 Do not interrupt autostart. Only abort the start if:
 - There is no oil pressure indication after the EGT increases.
 - EGT quickly nears or exceeds the start limit.
 - No further autostart attempts are needed.
- 7 FUEL CONTROL switch
(affected side) RUN
 - ▶▶ **Go to step 10**
- 8 Abort the start if:
 - EGT does not rise within 30 seconds after selecting RUN.
 - There is no oil pressure indication after EGT increases.
 - N2 is not increasing.
 - EGT quickly nears or exceeds the start limit.

▼ Continued on next page ▼

▼ Eng In-Flight Start L, R continued ▼

9 Choose one:

◆ Crossbleed indication (X-BLD or XB) **shows:**

When at maximum motoring:

FUEL CONTROL switch
(affected side) RUN

►► **Go to step 10**

◆ Crossbleed indication (X-BLD or XB) is **blank:**

FUEL CONTROL switch
(affected side) RUN

►► **Go to step 10**

▼ Continued on next page ▼

▼ Eng In-Flight Start L, R continued ▼

10 Choose one:

◆ Engine **starts** and runs normally:

GND PROX FLAP OVRD switch Off

Transponder mode selector TA/RA



◆ Engine **fails** to start:

FUEL CONTROL switch

(affected side). Confirm. . CUTOFF

START/IGNITION selector

(affected side). NORM

Plan to land at the nearest suitable airport.

Note: Check the Non-Normal Configuration Landing Distance tables for ENG SHUTDOWN L, R in the Performance Inflight-QRH chapter or other approved source.





[] ENG LIMIT PROT L, R

Condition: The EEC is in the alternate mode and the commanded N1 exceeds the limit.

- 1 Thrust lever
(affected side) Confirm Retard until
N1 stays below
the amber line

Note: Do not use FMC performance predictions with an engine at reduced thrust.

- 2 Transponder mode selector TA ONLY
■ ■ ■ ■



Intentionally
Blank

[] ENG OIL FILTER L, R

Condition: Oil filter contamination has caused oil to bypass the oil filter.

Objective: To decrease oil pressure to stop filter bypass, or shut down the engine.

- 1 A/T ARM switch
(affected side) Confirm OFF
- 2 Thrust lever
(affected side) Confirm Retard
slowly until the
ENG OIL FILTER message
blanks or the thrust lever is at idle
- 3 Do **not** accomplish the following checklist:
AUTOTHROTTLE
- 4 Choose one:

◆ ENG OIL FILTER message **blanks**:

Note: Run the affected engine at a thrust setting that keeps the ENG OIL FILTER message blank.

Do not use FMC performance predictions with an engine at reduced thrust.

▶▶ **Go to step 8**

◆ ENG OIL FILTER message **stays shown**:

▶▶▶ **Go to step 5**

▼ Continued on next page ▼

▼ ENG OIL FILTER L, R continued ▼

- 5 FUEL CONTROL switch
(affected side) Confirm. CUTOFF
- 6 APU selector
(if APU available) START, then ON
- 7 Plan to land at the nearest suitable airport.
- 8 Transponder mode selector TA ONLY

▼ Continued on next page ▼

▼ ENG OIL FILTER L, R continued ▼

9 Choose one:

◆ Landing using flaps **20**:

GND PROX FLAP OVRD switch OVRD

Note: Use flaps 20 and VREF 20 for landing and flaps 5 for go-around.

Check the Non-Normal Configuration Landing Distance tables for ENG SHUTDOWN L, R in the Performance Inflight-QRH chapter or other approved source.

►► **Go to step 10**

◆ Landing using flaps **30 (if performance allows)**:

Note: Use flaps 30 and VREF 30 for landing and flaps 20 for go-around.

Check the Non-Normal Configuration Landing Distance tables for ENG SHUTDOWN L, R in the Performance Inflight-QRH chapter or other approved source.



10 Checklist Complete Except Deferred Items

▼ Continued on next page ▼

▼ ENG OIL FILTER L, R continued ▼

Deferred Items

Descent Checklist

Recall Checked
Notes Checked
Autobrake ____
Landing data **VREF 20** ____, **Minimums** ____
Approach briefing Completed

Approach Checklist

Altimeters ____

Landing Checklist

Speedbrake ARMED
Landing gear DOWN
Flaps. **20**





[] ENG OIL PRESS L, R

Condition: The engine oil pressure is low.

- 1 A/T ARM switch
(affected side) Confirm OFF
- 2 Thrust lever
(affected side) Confirm Idle
- 3 FUEL CONTROL switch
(affected side) Confirm CUTOFF
- 4 APU selector
(if APU available) START, then ON
- 5 Transponder mode selector TA ONLY
- 6 Plan to land at the nearest suitable airport.
- 7 Do **not** accomplish the following checklist:
AUTOTHROTTLE

▼ Continued on next page ▼

▼ ENG OIL PRESS L, R continued ▼

8 Choose one:

◆ Landing using flaps **20**:

GND PROX FLAP OVRD switch OVRD

Note: Use flaps 20 and VREF 20 for landing and flaps 5 for go-around.

Check the Non-Normal Configuration Landing Distance tables for ENG SHUTDOWN L, R in the Performance Inflight-QRH chapter or other approved source.

▶▶ **Go to step 9**

◆ Landing using flaps **30 (if performance allows)**:

Note: Use flaps 30 and VREF 30 for landing and flaps 20 for go-around.

Check the Non-Normal Configuration Landing Distance tables for ENG SHUTDOWN L, R in the Performance Inflight-QRH chapter or other approved source.


9 **Checklist Complete Except Deferred Items**

▼ Continued on next page ▼



▼ ENG OIL PRESS L, R continued ▼

Deferred Items

Descent Checklist

- Recall Checked
- Notes. Checked
- Autobrake ____
- Landing data **VREF 20 ____**, **Minimums ____**
- Approach briefing Completed

Approach Checklist

- Altimeters ____

Landing Checklist

- Speedbrake ARMED
- Landing gear DOWN
- Flaps **.20**



Intentionally
Blank

[] ENG OIL TEMP L, R

Condition: The engine oil temperature is high.

- 1 A/T ARM switch
(affected side) Confirm OFF
- 2 Thrust lever
(affected side) Confirm Move
to mid position

This allows the oil to cool.

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

AUTOTHROTTLE

- 4 Choose one:

◆ Oil temperature is **at or above** the red line limit:

▶▶ **Go to step 7**

◆ Oil temperature is **below** the red line limit:

▶▶ **Go to step 5**

- 5 Wait until one of these occurs:

Oil temperature is at or above the red line limit

Oil temperature is in the amber band for 15
minutes

Oil temperature is in the normal operating range

▼ Continued on next page ▼

▼ ENG OIL TEMP L, R continued ▼

6 Choose one:

◆ Oil temperature is **at or above the red line limit:**

▶▶ **Go to step 7**

◆ Oil temperature is in the **amber band for 15 minutes:**

▶▶ **Go to step 7**

◆ Oil temperature is in the **normal operating range:**

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

Do not use FMC performance predictions with an engine at reduced thrust.

If at any time the oil temperature is at or above the red line limit, restart the ENG OIL TEMP L, R checklist.

Transponder mode selector TA ONLY

▶▶ **Go to step 12**

7 Thrust lever
(affected side) Confirm. Idle

8 FUEL CONTROL switch
(affected side) Confirm. CUTOFF

▼ Continued on next page ▼

▼ ENG OIL TEMP L, R continued ▼

- 9 APU selector
(if APU available) START, then ON
- 10 Transponder mode selector TA ONLY
- 11 Plan to land at the nearest suitable airport.
- 12 Choose one:

◆ Landing using flaps **20**:

GND PROX FLAP OVRD switch OVRD

Note: Use flaps 20 and VREF 20 for landing and flaps 5 for go-around.

Check the Non-Normal Configuration Landing Distance tables for ENG SHUTDOWN L, R in the Performance Inflight-QRH chapter or other approved source.

►► **Go to step 13**

◆ Landing using flaps **30 (if performance allows)**:

Note: Use flaps 30 and VREF 30 for landing and flaps 20 for go-around.

Check the Non-Normal Configuration Landing Distance tables for ENG SHUTDOWN L, R in the Performance Inflight-QRH chapter or other approved source.



13 Checklist Complete Except Deferred Items

▼ Continued on next page ▼

▼ ENG OIL TEMP L, R continued ▼

Deferred Items

Descent Checklist

Recall Checked
Notes Checked
Autobrake ____
Landing data **VREF 20** ____, **Minimums** ____
Approach briefing Completed

Approach Checklist

Altimeters ____

Landing Checklist

Speedbrake ARMED
Landing gear DOWN
Flaps. **20**



[] ENG REV LIMITED L, R

Condition: The engine reverser operation is limited.

Note: On landing, the affected thrust reverser will not deploy or affected reverse thrust will be limited to idle.



ENG REVERSER L, R

Condition: A fault occurs in the thrust reverser system.

**ENG RPM LIMITED L, R**

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

**ENG SHUTDOWN**

Condition: Both engines were shut down by the fuel control switches or the engine fire switches.

**ENG SHUTDOWN L, R**

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



[] ENG START VALVE L, R

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

1 Ground or in-flight start using a bleed air source may be unsuccessful.

2 Choose one:

◆ On the **ground**:

FUEL CONTROL switch
(affected side) CUTOFF

START/IGNITION selector
(affected side) NORM



◆ In **flight**:

▶▶ **Go to step 3**

3 START/IGNITION selector
(affected side) NORM

4 Increase airspeed until the crossbleed indication (X-BLD or XB) blanks.



[] ENG STARTER CUTOUT L, R

Condition: One of these occurs:

- The start valve fails to close
- The start selector stays in start

Objective: To ensure start selector is in normal or to remove bleed air source from the starter and prevent possible asymmetrical ice buildup on the wings.

1 START/IGNITION selector
(affected side) NORM

2 Choose one:

◆ ENG STARTER CUTOUT message **blanks**:



◆ ENG STARTER CUTOUT message **stays shown**:

►► **Go to step 3**

3 ENG BLEED switch (affected side). Off

4 BLEED AIR ISLN switch (affected side) Off

5 **If** on the ground:

Disconnect the ground air source if it is in use.

6 WING ANTI-ICE selector OFF

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

BLEED LOSS WING

BLEED OFF ENG

PACK



ENG THRUST L, R

Condition: The engine thrust is less than the commanded thrust.



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

- 1 Exit the volcanic ash as quickly as possible. Consider a 180 degree turn. Consider a descending turn.
- 2 Don the oxygen masks and smoke goggles, if needed.
- 3 Establish crew communications, if needed.
- 4 Do **not** do the Dual Eng Fail/Stall checklist until directed.
- 5 **If** at any time during this checklist both engines fail:

Move both fuel control switches to CUTOFF, then RUN.

Push the ram air turbine switch and hold for 1 second.

- 6 Do **not** do the ENG FAIL checklist until directed.
- 7 **When** in volcanic ash:

Minimize thrust if practical. This reduces EGT and engine damage.

- 8 ENGINE ANTI-ICE selectors (both) ON
- 9 WING ANTI-ICE selector ON

▼ Continued on next page ▼

▼ Volcanic Ash continued ▼

10 RECIRC FANS switches (both) Off

11 APU selector
(if APU available) START, then ON

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

- Engine malfunctions, increasing EGT, engine stall, or flameout
- Decrease or loss of airspeed indications
- EQUIP COOLING OVRD message
- FIRE CARGO FWD or AFT messages

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

EQUIP COOLING OVRD

ANTI-ICE ON

13 Choose one:

◆ **Both engines are failed:**

▶▶ **Go to the Dual Eng Fail/Stall checklist on page 7.2**



◆ **A single engine is failed:**

▶▶ **Go to the ENG FAIL L, R checklist on page 7.16**



◆ **Both engines are running:**

▶▶ **Go to step 14**

▼ Continued on next page ▼

▼ Volcanic Ash continued ▼

14 Plan to land at the nearest suitable airport.





Non-Normal Checklists

Chapter NNC

Fire Protection

Section 8

Table of Contents

FIRE APU	8.1
FIRE ENG L, R	8.2
Fire Eng on Ground L, R	►► Back Cover.2
Fire Eng Tailpipe L, R	8.7
Smoke, Fire or Fumes	8.8
- - - - -	
BOTTLE 1, 2 DISCH ENG	8.12
BOTTLE DISCH APU	8.12
BOTTLE DISCH CARGO	8.13
DET FIRE APU	8.13
DET FIRE CARGO AFT, FWD	8.13
DET FIRE ENG L, R	8.13
FIRE APU	8.1
FIRE CARGO AFT	8.14
FIRE CARGO FWD	8.17
FIRE ENG L, R	8.2
Fire Eng on Ground L, R	►► Back Cover.2
Fire Eng Tailpipe L, R	8.7
FIRE WHEEL WELL	8.20
OVERHEAT ENG L, R	8.22
SMOKE COMPT UPR DR 2	8.26
SMOKE COMPT UPR DR 4	8.27
SMOKE CREW REST F/D	8.27
SMOKE CREW REST LWR	8.28
SMOKE LAVATORY	8.28
SMOKE LAV/COMPT	8.28



Table of Contents

Smoke or Fumes Removal 8.30

SMOKE REST UPR DR 1 8.32

SMOKE REST UPR DR 3 8.33

SMOKE REST UPR DR 5 8.34

Smoke, Fire or Fumes..... 8.8

[] FIRE APU

Condition: Fire is detected in the APU.

- 1 APU fire switch. . . . Confirm Pull, rotate to the stop and hold for 1 second
- 2 Choose one:
 - ◆ FIRE APU message **stays shown**:
 - Plan to land at the nearest suitable airport.
 - ▶▶ **Go to step 3**
 - ◆ FIRE APU message **blanks**:
 - ▶▶ **Go to step 3**
- 3 Do **not** accomplish the following checklist:
APU SHUTDOWN



[] FIRE ENG L, R

Condition: Fire is detected in the affected engine.

1 Choose one:

◆ On the **ground**:

▶▶ **Go to step 13**

◆ In **flight**:

▶▶ **Go to step 2**

2 A/T ARM switch

(affected side) Confirm OFF

3 Thrust lever

(affected side) Confirm Idle

4 FUEL CONTROL switch

(affected side) Confirm CUTOFF

5 Engine fire switch

(affected side) Confirm Pull

6 **If** the FIRE ENG message shows:

Engine fire switch

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

7 **If** after 30 seconds, the FIRE ENG message shows:

Engine fire switch

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

▼ Continued on next page ▼

▼ FIRE ENG L, R continued ▼

- 8 APU selector
(if APU available) START, then ON
- 9 Transponder mode selector TA ONLY
- 10 Plan to land at the nearest suitable airport.
- 11 Do **not** accomplish the following checklist:
AUTOTHROTTLE

▼ Continued on next page ▼



▼ FIRE ENG L, R continued ▼

12 Choose one:

◆ Landing using flaps **20**:

GND PROX FLAP OVRD switch OVRD

Note: Use flaps 20 and VREF 20 for landing and flaps 5 for go-around.
Check the Non-Normal Configuration Landing Distance tables for ENG SHUTDOWN L, R in the Performance Inflight-QRH chapter or other approved source.

▶▶ **Go to step 22**

◆ Landing using flaps **30 (if performance allows)**:

Note: Use flaps 30 and VREF 30 for landing and flaps 20 for go-around.
Check the Non-Normal Configuration Landing Distance tables for ENG SHUTDOWN L, R in the Performance Inflight-QRH chapter or other approved source.



- 13 Thrust levers (both) Idle C
- 14 PARKING BRAKE. Set C
- 15 Advise the cabin. C or F/O
- 16 FUEL CONTROL switch (affected side) CUTOFF C

▼ Continued on next page ▼

▼ FIRE ENG L, R continued ▼

17 Engine fire switch
(affected side) Pull F/O

18 **If** the FIRE ENG message shows:

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

19 Choose one:

◆ Evacuation is **needed**:

▶▶ **Go to the Evacuation checklist on
page Back Cover.4**



◆ Evacuation is **not** needed:

▶▶ **Go to step 20**

20 Advise the cabin. C

21 Advise ATC. F/O



22 **Checklist Complete Except Deferred Items**

▼ Continued on next page ▼



▼ FIRE ENG L, R continued ▼

Deferred Items

Descent Checklist

- Recall Checked
- Notes. Checked
- Autobrake ____
- Landing data **VREF 20 ____**, **Minimums ____**
- Approach briefing Completed

Approach Checklist

- Altimeters ____

Landing Checklist

- Speedbrake ARMED
- Landing gear DOWN
- Flaps **.20**



Fire Eng Tailpipe L, R

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

- 1 FUEL CONTROL switch
(affected side) CUTOFF
- 2 Advise the cabin.
- 3 Choose one:
 - ◆ Bleed air is **available**:

▶▶ **Go to step 4**
 - ◆ Bleed air is **not** available:

Advise ATC.

■ ■ ■ ■
- 4 START/IGNITION selector
(affected side) START
- 5 Advise ATC.
- 6 **When** the tailpipe fire is extinguished:
 START/IGNITION selector
 (affected side) NORM





Smoke, Fire or Fumes

Condition: Smoke, fire or fumes occurs.

Objective: To remove power from the ignition source.
To land the airplane as soon as possible, if needed.

- 1 Diversion may be needed.
- 2 Don oxygen masks and smoke goggles, if needed.
- 3 Establish crew and cabin communications.
- 4 IFE/PASS SEATS switch OFF
- 5 RECIRC FANS switches (both) Off
- 6 APU BLEED AIR switch Off
- 7 **Any time** the smoke or fumes becomes the greatest threat:

►► **Go to the Smoke or Fumes Removal checklist on page 8.30**

▼ Continued on next page ▼

▼ Smoke, Fire or Fumes continued ▼

8 Choose one:

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

Isolate and extinguish the source of the smoke, fire, or fumes.

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

▶▶ **Go to step 9**

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

▶▶ **Go to step 10**

9 Choose one:

- ◆ Source **is** visually confirmed to be extinguished **and** 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 8.30, if needed.**



- ◆ Source **is not** visually confirmed extinguished **or** smoke or fumes **continue**:

▶▶ **Go to step 10**

▼ Continued on next page ▼



▼ Smoke, Fire or Fumes continued ▼

- 10 Advise the cabin that the main cabin lighting will be turned off.
- 11 CABIN/UTILITY switch OFF
- 12 Initiate a diversion to the nearest suitable airport while continuing the checklist.
- 13 Consider an immediate landing if the smoke, fire or fumes situation becomes uncontrollable.
- 14 Do not delay landing in an attempt to complete the following steps.
- 15 C BLEED AIR ISLN switch Off
- 16 L PACK switch Off
- 17 L TRIM AIR switch Off
- 18 Do **not** accomplish the following checklists:
 - PACK L
 - TRIM AIR L
- 19 **Wait** 2 minutes unless the smoke or fumes are increasing.

▼ Continued on next page ▼

▼ Smoke, Fire or Fumes continued ▼

20 Choose one:

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

L PACK switch AUTO

L TRIM AIR switch ON

R PACK switch Off

R TRIM AIR switch Off

►► **Go to step 21**

◆ Smoke or fumes are **decreasing**:

►► **Go to the Smoke or Fumes Removal checklist on page 8.30, if needed.**



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

PACK R

TRIM AIR R

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

▼ Continued on next page ▼

▼ Smoke, Fire or Fumes continued ▼

23 Choose one:

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

C BLEED AIR ISLN switch AUTO

R PACK switch AUTO

R TRIM AIR switch ON

Consider an immediate landing.

►► **Go to the Smoke or Fumes Removal checklist on page 8.30, if needed.**



◆ Smoke or fumes are **decreasing**:

►► **Go to the Smoke or Fumes Removal checklist on page 8.30, if needed.**



BOTTLE 1, 2 DISCH ENG

Condition: The engine fire extinguisher bottle pressure is low.



BOTTLE DISCH APU

Condition: The APU fire extinguisher bottle pressure is low.



BOTTLE DISCH CARGO

Condition: Both rapid discharge cargo fire extinguisher bottle pressures are low.



[] DET FIRE APU

Condition: APU fire detection is failed.

1 Choose one:

◆ APU **is** running:

Plan to shut down the APU as soon as practical.



◆ APU is **not** running:

Note: Do not start the APU unless use is needed.



DET FIRE CARGO AFT, FWD

Condition: Lower cargo compartment smoke detection is failed.



DET FIRE ENG L, R

Condition: Engine fire and overheat detection is failed.



[] FIRE CARGO AFT

Condition: Smoke is detected in the aft lower cargo compartment.

- 1 AFT CARGO FIRE ARM switch Confirm ARMED
- 2 CARGO FIRE DISCH switch Push and hold for 1 second

3 Choose one:

◆ On the **ground**:

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



◆ In flight:

►► **Go to step 4**

- 4 LDG ALT selector PULL ON, set 8000
AP-BMG, AP-BMH
- 5 Establish cabin communications. Advise the cabin to:

Evacuate the lower crew rest compartment.

Close the hatches.

▼ Continued on next page ▼

▼ FIRE CARGO AFT continued ▼

6 Plan to land at the nearest suitable airport.

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

LANDING ALTITUDE

8 **When** leaving cruise altitude for landing:

LDG ALT selector Push off

9 **Checklist Complete Except Deferred Items**

▼ Continued on next page ▼



▼ FIRE CARGO AFT continued ▼

Deferred Items

Descent Checklist

- Recall Checked
- Notes. Checked
- Autobrake ____
- Landing data VREF ____, Minimums ____
- Approach briefing Completed

Approach Checklist

- Altimeters ____

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

Landing Checklist

- Speedbrake ARMED
- Landing gear DOWN
- Flaps ____



[] FIRE CARGO FWD

Condition: Smoke is detected in the forward lower cargo compartment.

- 1 FWD CARGO FIRE ARM
switch Confirm. ARMED
- 2 CARGO FIRE DISCH switch Push and
hold for 1 second
- 3 Choose one:

◆ On the **ground**:

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



◆ In flight:

►► **Go to step 4**

- 4 LDG ALT selector PULL ON, set 8000
- 5 Plan to land at the nearest suitable airport.

Note: Equipment cooling normal mode is inoperative. After 30 minutes of operation at low altitude and low cabin differential pressure, electronic equipment and displays may fail.

▼ Continued on next page ▼



▼ FIRE CARGO FWD continued ▼

- 6 Do **not** accomplish the following checklists:
EQUIP COOLING OVRD
LANDING ALTITUDE
- 7 **When** leaving cruise altitude for landing:
LDG ALT selector Push off

8 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

- Recall Checked
- Notes. Checked
- Autobrake ____
- Landing data VREF ____, Minimums ____
- Approach briefing Completed

Approach Checklist

- Altimeters ____

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

▼ Continued on next page ▼

▼ FIRE CARGO FWD continued ▼**Landing Checklist**

Speedbrake ARMED

Landing gear DOWN

Flaps ____



[] FIRE WHEEL WELL

Condition: Fire is detected in a main wheel well.

- 1 Do not exceed the gear EXTEND limit speed (270K/.82M).
- 2 Landing gear lever DN

This attempts to remove and extinguish the fire source.

- 3 Plan to land at the nearest suitable airport.
- 4 Flight with the gear down increases fuel consumption and decreases climb performance. Refer to the Gear Down performance tables in the Performance Inflight chapter for flight planning.
- 5 Choose one:

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

▶▶ **Go to step 6**

◆ Gear can **stay extended**:



- 6 **When** the FIRE WHEEL WELL message blanks:

Wait 20 minutes. This ensures the fire is extinguished.

Landing gear lever UP





Intentionally
Blank

[] OVERHEAT ENG L, R

Condition: An overheat is detected in the engine.

- 1 ENG BLEED AIR switch
(affected side) Off
- 2 A/T ARM switch
(affected side) Confirm OFF
- 3 Thrust lever
(affected side) Confirm Retard
slowly until the
OVERHEAT ENG message
blanks or the thrust lever is at idle
- 4 Do **not** accomplish the following checklist:
AUTOTHROTTLE
BLEED OFF ENG
- 5 Choose one:

◆ OVERHEAT ENG message **blanks**:

Note: Run the engine at a thrust setting that keeps the OVERHEAT ENG message blank.

Do not use FMC performance predictions with an engine at reduced thrust.

▶▶▶ **Go to step 9**

◆ OVERHEAT ENG message **stays shown**:

▶▶▶ **Go to step 6**

▼ Continued on next page ▼

▼ OVERHEAT ENG L, R continued ▼

- 6 FUEL CONTROL switch
(affected side) Confirm. CUTOFF
- 7 APU selector
(if APU available) START, then ON
- 8 Plan to land at the nearest suitable airport.
- 9 Transponder mode selector TA ONLY

▼ Continued on next page ▼

▼ OVERHEAT ENG L, R continued ▼

10 Choose one:

◆ Landing using flaps **20**:

GND PROX FLAP OVRD switch OVRD

Note: Use flaps 20 and VREF 20 for landing and flaps 5 for go-around.

Check the Non-Normal
Configuration Landing Distance
tables for ENG SHUTDOWN L, R in
the Performance Inflight-QRH
chapter or other approved source.

▶▶ **Go to step 11**◆ Landing using flaps **30 (if performance allows)**:**Note:** Use flaps 30 and VREF 30 for landing and flaps 20 for go-around.

Check the Non-Normal
Configuration Landing Distance
tables for ENG SHUTDOWN L, R in
the Performance Inflight-QRH
chapter or other approved source.

**11 Checklist Complete Except Deferred Items**

▼ Continued on next page ▼

▼ OVERHEAT ENG L, R continued ▼

Deferred Items

Descent Checklist

Recall Checked
Notes Checked
Autobrake ____
Landing data **VREF 20** ____, **Minimums** ____
Approach briefing Completed

Approach Checklist

Altimeters ____

Landing Checklist

Speedbrake ARMED
Landing gear DOWN
Flaps. **20**



[] SMOKE COMPT UPR DR 2**AP-BMS**

Condition: Smoke is detected in a compartment.

Objective: To coordinate with the cabin to locate and remove the source of the smoke.

- 1 Establish cabin communications.
- 2 Choose one:

◆ Smoke is **persistent**:

Plan to land at the nearest suitable airport.



◆ Smoke is **cleared**:



[] SMOKE COMPT UPR DR 4

AP-BMS

Condition: Smoke is detected in a compartment.

Objective: To coordinate with the cabin to locate and remove the source of the smoke.

- 1 Establish cabin communications.
- 2 Choose one:

◆ Smoke is **persistent**:

Plan to land at the nearest suitable airport.



◆ Smoke is **cleared**:



SMOKE CREW REST F/D

AP-BMG, AP-BMH

Condition: Smoke is detected in the crew rest area.



[] SMOKE CREW REST LWR

AP-BMG, AP-BMH

Condition: Smoke is detected in the crew rest area.

Objective: To coordinate with the cabin to locate and remove the source of the smoke.

- 1 Establish cabin communications.
- 2 Choose one:

◆ Smoke is **persistent**:

Plan to land at the nearest suitable airport.



◆ Smoke is **cleared**:



SMOKE LAVATORY

AP-BGY, AP-BGZ, AP-BMG - AP-BMS

Condition: Smoke is detected in one or more lavatories.



SMOKE LAV/COMPT

AP-BGJ - AP-BID, AP-BMS

Condition: Smoke is detected in one or more lavatories, or other enclosed area.





Intentionally
Blank

Smoke or Fumes Removal

Condition: Smoke or fumes removal is needed.

- 1 Do this checklist **only** when directed by the Smoke, Fire or Fumes checklist.
- 2 Do not delay landing in an attempt to complete the following steps.
- 3 Close the flight deck door.
- 4 EQUIP COOLING switch Off

Note: After 30 minutes of operation at low altitude and low cabin differential pressure, electronic equipment and displays may fail.

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

EQUIP COOLING OVRD

- 6 Choose one:

◆ Most smoke or fumes are in the cabin **forward** of mid-wing:

▶▶▶ **Go to step 7**

◆ Most smoke or fumes are in the cabin **aft** of mid-wing:

▶▶▶ **Go to step 10**

- 7 AFT OUTFLOW VALVE switch MAN
- 8 AFT OUTFLOW VALVE
MANUAL switch Hold in CLOSE until
the AFT outflow valve
indication shows fully closed

▼ Continued on next page ▼

▼ Smoke or Fumes Removal continued ▼

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

OUTFLOW VALVE AFT

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



10 FWD OUTFLOW VALVE switch. MAN

11 FWD OUTFLOW VALVE

MANUAL switch Hold in CLOSE until
the FWD outflow valve
indication shows fully closed

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

OUTFLOW VALVE FWD

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



[] SMOKE REST UPR DR 1**AP-BGY, AP-BGZ, AP-BMS**

Condition: Smoke is detected in the crew rest area.

Objective: To coordinate with the cabin to locate and remove the source of the smoke.

- 1 Establish cabin communications.
- 2 Choose one:

◆ Smoke is **persistent**:

Plan to land at the nearest suitable airport.



◆ Smoke is **cleared**:

►► **Go to step 3**

- 3 Instruct a cabin crew member to push and hold the door 1 crew rest main control panel AIRFLOW / SMOKE RESET switch for 2 seconds. This resets airflow to the crew rest area.



[] SMOKE REST UPR DR 3

AP-BGY, AP-BGZ

Condition: Smoke is detected in the crew rest area.

Objective: To coordinate with the cabin to locate and remove the source of the smoke.

- 1 Establish cabin communications.
- 2 Choose one:

◆ Smoke is **persistent**:

Plan to land at the nearest suitable airport.



◆ Smoke is **cleared**:

▶ ▶ **Go to step 3**

- 3 Instruct a cabin crew member to push and hold the door 3 crew rest main control panel AIRFLOW / SMOKE RESET switch for 2 seconds. This resets airflow to the crew rest area.



[] SMOKE REST UPR DR 5**AP-BMS**

Condition: Smoke is detected in the crew rest area.

Objective: To coordinate with the cabin to locate and remove the source of the smoke.

- 1 Establish cabin communications.
- 2 Choose one:

◆ Smoke is **persistent**:

Plan to land at the nearest suitable airport.



◆ Smoke is **cleared**:

►► **Go to step 3**

- 3 Instruct a cabin crew member to push and hold the door 5 crew rest main control panel AIRFLOW / SMOKE RESET switch for 2 seconds. This resets airflow to the crew rest area.





Non-Normal Checklists

Chapter NNC

Flight Controls

Section 9

Table of Contents

STABILIZER	9.1

AUTO SPEEDBRAKE	9.3
FLAPS DRIVE	9.4
FLAPS PRIMARY FAIL	9.6
FLAP/SLAT CONTROL	9.8
FLIGHT CONTROL MODE	9.10
FLIGHT CONTROLS	9.14
FLT CONTROL VALVE	9.15
Jammed Flight Controls	9.16
PITCH DOWN AUTHORITY	9.18
PITCH UP AUTHORITY	9.20
PRI FLIGHT COMPUTERS	9.23
SLATS DRIVE	9.26
SLATS PRIMARY FAIL	9.28
SPEEDBRAKE EXTENDED	9.28
SPOILERS	9.29
STAB GREENBAND	9.30
STABILIZER	9.1
STABILIZER C	9.30
STABILIZER CUTOUT	9.31
STABILIZER R	9.31
THRUST ASYM COMP	9.31



Table of Contents

Intentionally
Blank

[] STABILIZER

Condition: One of these occurs:

- Stabilizer movement without a signal to trim
- The stabilizer is failed

1 STAB cutout switches (both) CUTOUT

2 Do not exceed the current airspeed.

3 The stabilizer is inoperative. Pitch trim is available in the normal flight control mode.

4 GND PROX FLAP OVRD switch OVRD

Note: Use flaps 20 and VREF 30 + 20 for landing. This gives sufficient elevator authority for landing.

Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter or other approved source.

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

FLIGHT CONTROLS

6 **Checklist Complete Except Deferred Items**

▼ Continued on next page ▼



▼STABILIZER continued▼

Deferred Items

Descent Checklist

- Recall Checked
- Notes. Checked
- Autobrake ____
- Landing data **VREF 30 + 20** ____,
Minimums ____
- Approach briefing Completed

Approach Checklist

- Altimeters ____

Landing Checklist

- Speedbrake ARMED
- Landing gear DOWN
- Flaps **.20**



[] AUTO SPEEDBRAKE

Condition: An automatic speedbrake fault occurs.

Note: Do not arm the speedbrake lever. This prevents inadvertent in-flight speedbrake extension.

Manually extend the speedbrakes after landing.

1 Checklist Complete Except Deferred Items

Deferred Items

Descent Checklist

Recall Checked
 Notes Checked
 Autobrake ____
 Landing data VREF ____, Minimums ____
 Approach briefing Completed

Approach Checklist

Altimeters ____

Landing Checklist

Speedbrake **DOWN**
 Landing gear DOWN
 Flaps ____



[] FLAPS DRIVE

Condition: The flap drive mechanism is failed.

- 1 Do not use alternate flaps. Asymmetry and uncommanded motion protection is not provided in the alternate mode.
- 2 GND PROX FLAP OVRD switch OVRD

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

- 3 Choose one:

◆ Flap position is **5 or less**:

Note: Move the FLAP lever to 1 and use VREF 30 + 40 for landing. This ensures the slats are extended.

►► **Go to step 4**

◆ Flap position is **between 5 and 20**:

Note: Use current flaps and VREF 30 + 20 for landing.

►► **Go to step 4**

◆ Flap position is **20 or greater**:

Note: Use current flaps and VREF 20 for landing.

►► **Go to step 4**

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

FLAPS PRIMARY FAIL

▼ **Continued on next page** ▼

▼ FLAPS DRIVE continued ▼

Note: Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter or other approved source.

5 Checklist Complete Except Deferred Items

Deferred Items

Descent Checklist

Recall Checked
 Notes Checked
 Autobrake ____
 Landing data **VREF as directed by
 checklist, Minimums** ____
 Approach briefing Completed

Approach Checklist

Altimeters ____

Landing Checklist

Speedbrake ARMED
 Landing gear DOWN
 Flaps. **As directed by checklist**





[] **FLAPS PRIMARY FAIL**

Condition: The flaps primary mode is failed.

1 GND PROX FLAP OVRD switch OVRD

Note: Plan more time for slower flap operation.

Use flaps 20 and VREF 20 for landing. This gives improved go-around performance.

Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter or other approved source.

2 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Recall Checked

Notes. Checked

Autobrake ____

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

Approach briefing Completed

Approach Checklist

Altimeters ____

Landing Checklist

Speedbrake ARMED

Landing gear DOWN

▼ Continued on next page ▼

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▼FLAPS PRIMARY FAIL continued▼

Flaps. **20**





[] **FLAP/SLAT CONTROL**

Condition: The flap/slat electronics units are failed.

1 **If** flap retraction is needed:

FLAP lever UP

This allows the maximum speed indication on the PFD to increase to Vmo/Mmo after the flaps are fully retracted.

ALTN FLAPS ARM switch ALTN

Alternate flaps selector RET

Monitor airspeed during retraction.

2 GND PROX FLAP OVRD switch OVRD

Note: Plan to reduce gross weight to less than Maximum Landing Weight before extending flaps. Maneuver margin can be limited while flaps are extending from UP to 5.

Plan more time for alternate slat and flap extension.

Use flaps 20 and VREF 20 for landing. The alternate mode is limited to a maximum of flaps 20.

Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter or other approved source.

3 **Checklist Complete Except Deferred Items**

▼ Continued on next page ▼

▼ FLAP/SLAT CONTROL continued ▼

Deferred Items

Descent Checklist

Recall Checked
Notes Checked
Autobrake ____
Landing data **VREF 20** ____, **Minimums** ____
Approach briefing Completed

Approach Checklist

Altimeters ____

Alternate flaps extension

ALTN FLAPS ARM switch. ALTN
Alternate flaps selector EXT
Monitor airspeed during extension.

Landing Checklist

Speedbrake ARMED
Landing gear DOWN
Flaps. **20**



[] FLIGHT CONTROL MODE

Condition: The flight control system is in the secondary mode.

- 1 PRIMARY FLIGHT COMPUTERS
disconnect switch DISC, then AUTO
- 2 Choose one:
 - ◆ FLIGHT CONTROL MODE message **blanks**:


 - ◆ FLIGHT CONTROL MODE message **stays shown**:

▶▶ Go to step 3
- 3 Avoid abrupt control inputs. The airplane response is changed by simplified elevator feel and rudder ratio systems.
- 4 GND PROX FLAP OVRD switch OVRD

Note: Inoperative Items

Autopilot inop

Envelope protection functions inop

▼ Continued on next page ▼

▼ FLIGHT CONTROL MODE continued ▼

Note: The yaw damper is degraded.

Manual control inputs are needed to compensate for asymmetrical thrust conditions.

Use flaps 20 and VREF 20 for landing. This ensures sufficient pitch trim capability for landing

Do not arm the speedbrake lever. This prevents inadvertent in-flight speedbrake extension.

Manually extend the speedbrakes after landing.

Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter or other approved source.

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

AUTO SPEEDBRAKE

THRUST ASYM COMP

6 **Checklist Complete Except Deferred Items**

▼ Continued on next page ▼



▼FLIGHT CONTROL MODE continued ▼

Deferred Items

Descent Checklist

- Recall Checked
- Notes. Checked
- Autobrake ____
- Landing data **VREF 20 ____**, **Minimums ____**
- Approach briefing Completed

Approach Checklist

- Altimeters ____

Landing Checklist

- Speedbrake **DOWN**
- Landing gear DOWN
- Flaps. **.20**





Intentionally
Blank

[] FLIGHT CONTROLS

Condition: One or more of these occur:

- Two or more flight control surfaces are inoperative
- Other faults in the flight control system are detected

- 1 Handling qualities are degraded. Pitch and roll control capability is reduced with fewer operating control surfaces.
- 2 Plan to land at the nearest suitable airport.
- 3 GND PROX FLAP OVRD switch OVRD

Note: Use flaps 20 and VREF 30 + 20 for landing. Higher approach speeds improve airplane maneuvering characteristics.

Crosswind limit for landing is 20 knots.

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

Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter or other approved source.

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

5 Checklist Complete Except Deferred Items

▼ Continued on next page ▼

▼ FLIGHT CONTROLS continued ▼

Deferred Items

Descent Checklist

Recall Checked
Notes Checked
Autobrake ____
Landing data **VREF 30 + 20** ____,
Minimums ____
Approach briefing Completed

Approach Checklist

Altimeters ____

Landing Checklist

Speedbrake ARMED
Landing gear DOWN
Flaps **20**



FLT CONTROL VALVE

Condition: One or more of these occur:

- One or more flight control shutoff valves are failed closed
- One or more flight control shutoff switches are in shutoff





Jammed Flight Controls

Condition: Flight controls are jammed or restricted in roll, pitch, or yaw.

- 1 Autopilot disconnect switch Push
- 2 Autothrottle disconnect switch Push
- 3 Overpower the jammed or restricted system.

Use maximum force as needed, including a combined effort of both pilots in the same direction. A maximum two-pilot effort on the controls will not damage the flight controls.

▼ Continued on next page ▼

▼ Jammed Flight Controls continued ▼

4 Choose one:

◆ Controls are **normal**:

►► **Go to step 5**

◆ Controls stay **jammed or restricted**:

Note: Control may be limited to one pilot.

If the aileron controls are jammed, use the rudder and rudder trim to counter the effect of the jam.

Note: If elevator controls are jammed, use pitch trim to counter the effect of the jam. If more pitch trim authority is needed, select DISC on the primary flight computers disconnect switch. This puts the flight control system in direct mode. In direct mode, pitch trim moves slower than in normal mode.

If the rudder controls are jammed, use aileron and aileron trim to counter the effect of the jam.

Do not make abrupt thrust changes.

Extend or retract speedbrake slowly and smoothly.

Limit bank angle to 15 degrees.

The autopilot and autothrottle may be available to control the airplane.

Do not use autoland.

If the rudder controls are jammed, differential braking may be required for landing.

►► **Go to step 5**

5 Plan to land at the nearest suitable airport.





[] PITCH DOWN AUTHORITY

Condition: Pitch down authority is restricted.

Note: Slower airspeeds assist nose down pitch control. The airplane is approaching its nose down pitch control limit.

Avoid speedbrake use and rapid thrust increases in flight. Only limited elevator authority is available to counter nose up pitch.

Do not arm the speedbrake lever.

Slowly extend the speedbrakes after landing.

Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter or other approved source.

1 Checklist Complete Except Deferred Items

Deferred Items

Descent Checklist

- Recall Checked
- Notes. Checked
- Autobrake ____
- Landing data VREF ____, Minimums ____
- Approach briefing Completed

▼ Continued on next page ▼

▼ PITCH DOWN AUTHORITY continued ▼

Approach Checklist

Altimeters _____

Landing ChecklistSpeedbrake **DOWN**

Landing gear DOWN

Flaps _____





[] PITCH UP AUTHORITY

Condition: Pitch up and flare authority are restricted.

- 1 Do not extend the flaps any further until on approach. The airplane is approaching its nose up pitch control limit.
- 2 GND PROX FLAP OVRD switch OVRD

Note: Do not use autoland.

▼ Continued on next page ▼

▼ **PITCH UP AUTHORITY** continued ▼

3 Choose one:

◆ Flap position is **15 or less**:

Note: Use flaps 5 and VREF 30 + 40 for landing and flaps 5 for go-around. Higher approach speeds give better pitch up control authority.

Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter or other approved source.

►► **Go to step 4**

◆ Flap position is **20 or greater**:

Note: Use flaps 20 and VREF 30 + 20 for landing. Higher approach speeds give better pitch up control authority.

Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter or other approved source.

►► **Go to step 4**

4 **Checklist Complete Except Deferred Items**

▼ Continued on next page ▼



▼PITCH UP AUTHORITY continued ▼

Deferred Items

Descent Checklist

- Recall Checked
- Notes. Checked
- Autobrake ____
- Landing data **VREF 30 + 40 ____ or**
VREF 30 + 20 ____,
Minimums ____
- Approach briefing Completed

Approach Checklist

- Altimeters ____

Landing Checklist

- Speedbrake ARMED
- Landing gear DOWN
- Flaps. **5 or 20**



[] PRI FLIGHT COMPUTERS

Condition: The flight control system is operating in the direct mode.

Do **not** accomplish this step if direct mode is desired.

- 1  PRIMARY FLIGHT COMPUTERS disconnect switch DISC, then AUTO
- 2 Choose one:
 - ◆ PRI FLIGHT COMPUTERS message **blanks**:

■ ■ ■ ■
 - ◆ PRI FLIGHT COMPUTERS message **stays shown**:

▶ ▶ Go to step 3
- 3 Avoid abrupt control inputs. The airplane response is changed by simplified elevator feel and rudder ratio systems.
- 4 GND PROX FLAP OVRD switch OVRD

Note: Inoperative Items

Autopilot inop

Envelope protection functions inop

Yaw damping inop

Rudder manual trim cancel switch inop

▼ Continued on next page ▼



▼PRI FLIGHT COMPUTERS continued▼

Note: Manual control inputs are needed to compensate for asymmetrical thrust conditions.

Pitch trim moves slower than in normal mode.

Use flaps 20 and VREF 20 for landing. This ensures sufficient pitch trim capability for landing.

Do not arm the speedbrake lever. This prevents inadvertent in-flight speedbrake extension.

Manually extend the speedbrakes after landing.

Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter or other approved source.

- 5 Do **not** accomplish the following checklists:
 AUTO SPEEDBRAKE
 THRUST ASYM COMP

6 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Recall Checked

Notes. Checked

Autobrake _____

▼ Continued on next page ▼

▼ PRI FLIGHT COMPUTERS continued ▼Landing data **VREF 20** ____, **Minimums** ____

Approach briefing Completed

Approach Checklist

Altimeters ____

Landing ChecklistSpeedbrake **DOWN**

Landing gear DOWN

Flaps. **20**

[] SLATS DRIVE

Condition: The slat drive mechanism is failed.

- 1 Do not use alternate flaps. Asymmetry and uncommanded motion protection are not provided in alternate mode.
- 2 GND PROX FLAP OVRD switch OVRD

Note: Do not use FMC performance predictions with slats extended.
Do not use autoland.
Use flaps 20 and VREF 30 + 30 for landing. This gives better handling qualities when the slats are not fully extended.
Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter or other approved source.

- 3 Do **not** accomplish the following checklist:
SLATS PRIMARY FAIL

4 Checklist Complete Except Deferred Items

Deferred Items

Descent Checklist

Recall Checked
Notes. Checked
Autobrake ____
Landing data **VREF 30 + 30** ____,
Minimums ____

▼ Continued on next page ▼

▼ SLATS DRIVE continued ▼

Approach briefing Completed

Approach Checklist

Altimeters _____

Landing Checklist

Speedbrake ARMED

Landing gear DOWN

Flaps. **20**



[] SLATS PRIMARY FAIL

Condition: The slats primary mode is failed.

Note: Plan more time for slower slat operation.

AP-BGJ - AP-BGL, AP-BHX, AP-BMG, AP-BMH

Note: The slats will extend beyond midrange when the airspeed is below 239 knots. For go-around, do not exceed 239 knots until the slats retract to midrange.



AP-BGY - AP-BHW, AP-BID, AP-BMS

Note: The slats will extend beyond midrange when the airspeed is below 256 knots. For go-around, do not exceed 256 knots until the slats retract to midrange.

**SPEEDBRAKE EXTENDED**

Condition: The speedbrakes are extended and one or more of these occur:

- The radio altitude is between 15 and 800 feet
- The flap lever is in a landing setting
- A thrust lever is not at idle



[] SPOILERS

Condition: One or more spoiler pairs are failed.

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

Roll tendencies, yaw tendencies, or airframe buffet can indicate a spoiler failed in the extended position.

Do not use FMC performance predictions with a spoiler panel extended.

Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter or other approved source



[] STAB GREENBAND

Condition: The nose gear pressure sensor disagrees with the computed stabilizer greenband and all doors are closed.

Objective: To verify the stabilizer greenband and airplane loading are correct.

- 1 Verify that takeoff thrust, takeoff flaps, gross weight, and CG are entered correctly.
- 2 Reset stab trim, if needed.
- 3 Choose one:

◆ STAB GREENBAND message **blanks**:



◆ STAB GREENBAND message **stays shown**:

▶▶ **Go to step 4**

- 4 Verify airplane loading.



[] STABILIZER C

Condition: The center stabilizer control path is failed.

- 1 C STAB cutout switch CUTOUT

Note: The captain's control wheel pitch trim switches may be inoperative.



STABILIZER CUTOUT

Condition: Both stabilizer cutout switches are in CUTOUT.



[] STABILIZER R

Condition: The right stabilizer control path is failed.

- 1 R STAB cutout switch CUTOUT

Note: The first officer's control wheel pitch trim switches may be inoperative.



[] THRUST ASYM COMP

Condition: Thrust asymmetry compensation is failed or off.

- 1 THRUST ASYM COMP switch. . . . Off, then AUTO
- 2 Choose one:

◆ THRUST ASYM COMP message **blanks**:



◆ THRUST ASYM COMP message **stays shown**:

Note: Manual control inputs are needed to compensate for asymmetric thrust conditions.





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Table of Contents

Airspeed Unreliable..... 10.1

Airspeed Unreliable..... 10.1

ALTN ATTITUDE 10.8

BARO SET DISAGREE..... 10.8

CHKL INCOMPLETE NORM 10.8

CHKL NON-NORMAL 10.8

DISPLAY SELECT PNL..... 10.9

EFIS CONTROL PNL L, R..... 10.9

SGL SOURCE AIR DATA..... 10.9

SGL SOURCE DISPLAYS 10.10

SGL SOURCE RAD ALT 10.10

SINGLE SOURCE F/D 10.10



Table of Contents

Intentionally
Blank

Airspeed Unreliable

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

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

- 1 Autopilot disconnect switch Push
 - 2 A/T ARM switches (both) OFF
 - 3 F/D switches (both) OFF
 - 4 Set the following gear up pitch attitude and thrust:
 - Flaps extended 10 degrees and 85% N1
 - Flaps up 4 degrees and 70% N1
-
- 5 **If** the airplane **cannot** be trimmed to the desired pitch attitude:
 - PRIMARY FLIGHT COMPUTERS
 - disconnect switch DISC

Note: If, at anytime, the airplane cannot be trimmed to the desired pitch attitude, disconnect the PRIMARY FLIGHT COMPUTERS.

▼ Continued on next page ▼

▼ **Airspeed Unreliable continued** ▼6 The following are **reliable**:

Attitude

N1

Ground speed

Radio altitude

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

Note: The flight path vector, and pitch limit indicator are 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.

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 .03 Mach from the airspeed shown in the table should be considered **unreliable**.

▼ **Continued on next page** ▼

▼ **Airspeed Unreliable continued** ▼

9 Choose one:

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

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

►► **Go to step 11**

◆ Reliable airspeed indication **cannot** be determined:

►► **Go to step 10**

10 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.

11 GND PROX FLAP OVRD switch OVRD

▼ **Continued on next page** ▼



▼ Airspeed Unreliable continued ▼

Note: Maintain visual conditions if possible.

Plan to reduce gross weight to less than Maximum Landing Weight before extending flaps. Maneuver margin can be limited while flaps are extending from UP to 5.

Plan more time for alternate slat and flap extension.

Use flaps 20 and VREF 20 for landing. The alternate mode is limited to a maximum of flaps 20.

Establish landing configuration early.

Radio altitude reference is available below 2,500 feet AGL.

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

Do not use the autopilot, autothrottle, or flight directors.

Do not use TO/GA for a go-around or missed approach.

Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter or other approved source.

12 Transponder mode selector TA ONLY

▼ Continued on next page ▼

▼ **Airspeed Unreliable continued** ▼

AP-BGJ - AP-BID

13 Choose one:

◆ Altitude is reliable:

▶▶ **Go to step 15**

◆ Altitude is unreliable:

Transponder mode selector ALT OFF

▶▶ **Go to step 15**
AP-BMG - AP-BMS

14 Choose one:

◆ Altitude is reliable:

▶▶ **Go to step 15**

◆ Altitude is unreliable:

Transponder Mode
selector ALT RPTG OFF

▶▶ **Go to step 15**
15 Checklist Complete Except Deferred Items

▼ **Continued on next page** ▼



▼ Airspeed Unreliable continued ▼

Deferred Items

Descent Checklist

- Recall Checked
- Notes. Checked
- Autobrake ____
- Landing data **VREF 20 ____**, **Minimums ____**
- Approach briefing Completed

Approach Checklist

- Altimeters ____

Alternate flaps extension

- ALTN FLAPS ARM switch ALTN
- Alternate flaps selector EXT
- Do **not** accomplish the following checklist:
 FLAP/SLAT CONTROL

Landing Checklist

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



▼ Continued on next page ▼

▼ Airspeed Unreliable continued ▼**Additional Information**

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

- Speed/altitude information not consistent with pitch attitude and thrust setting
- Airspeed or Mach failure flags
- PFD current airspeed box amber
- An amber line through one or more PFD flight mode annunciations
- Blank or fluctuating airspeed display
- Variation between captain and first officer airspeed displays
- Radome damage or loss
- Overspeed warning
- Simultaneous overspeed and stall warnings

One or more of the following EICAS messages may show:

AIRSPEED LOW

GND PROX SYS

HEAT PITOT C

HEAT PITOT L

HEAT PITOT R

HEAT PITOT L+C+R

OVERSPEED

SGL SOURCE AIR DATA

SGL SOURCE DISPLAYS

WINDSHEAR SYS

AIR DATA SYS



[] ALTN ATTITUDE

Condition: Both pilots’ AIR DATA/ATT source switches are in ALTN.

Note: Both PFDs show the SAARU attitude information.



BARO SET DISAGREE

Condition: The captain's and first officer's barometric settings disagree.



[] CHKL INCOMPLETE NORM

Condition: A normal checklist needs to be completed.



[] CHKL NON-NORMAL

Condition: There is a hidden non-normal checklist. All of these occur:

- A non-normal checklist is not complete
- The ECL is not displayed
- The related EICAS message is not shown



DISPLAY SELECT PNL

Condition: Left, center, or right CDU control of the display select panel is used.



[] EFIS CONTROL PNL L, R

Condition: One of these occurs:

- The EFIS control panel is failed
- CDU control of the EFIS is used

Note: Backup control of the EFIS is accessed from the CDU menu page.



SGL SOURCE AIR DATA

Condition: Both PFDs use the same air data source.





[] SGL SOURCE DISPLAYS

Condition: Some or all display units use a single source of display data.

Note: Both PFDs and NDs or just both NDs show information generated from a single source. The lower center display unit may be blank or may not be capable of showing all normal formats. The left EFIS control panel controls either the right PFD and ND or the right ND only.



[] SGL SOURCE RAD ALT

Condition: Both PFDs use the same radio altimeter source.

Note: Autothrottle retard during flare is inoperative.



SINGLE SOURCE F/D

Condition: Both PFDs use the same flight director source.





Non-Normal Checklists

Chapter NNC

Flight Management, Navigation

Section 11

Table of Contents

ADS-B Failure	11.1
ADS-B OUT L	11.1
ADS-B OUT R	11.2
AIR DATA SYS	11.2
FMC	11.6
FMC MESSAGE	11.7
GPS	11.7
GPS L	11.7
GPS R	11.8
GPS Data Unreliable	11.10
ILS ANTENNA	11.14
INSUFFICIENT FUEL	11.14
NAV ADIRU INERTIAL	11.16
NAV UNABLE RNP	11.20
SINGLE SOURCE ILS	11.21
TRANSPONDER L, R	11.21
VNAV STEP CLIMB	11.22



Table of Contents

Intentionally
Blank

ADS-B Failure

(AP-BGL ; Before SB installs AIMS BP v16 or later and DO-260B compliant transponders)

Condition: One or more of these occur:

- ATC reports ADS-B Out is lost or degraded
- On the CDU POS REF 3/3 page, the GPS L line is blank and the left transponder is selected
- On the CDU POS REF 3/3 page, the GPS R line is blank and the right transponder is selected

1 Transponder selector. Select opposite transponder



[] ADS-B OUT L

**AP-BGJ, AP-BGK, AP-BGY - AP-BMS
(AP-BGL ; SB installs AIMS BP v16 or later and DO-260B compliant transponders)**

Condition: Position data is not available to the left transponder.

Note: If ADS-B operation is needed, select the right transponder.



[] ADS-B OUT R

**AP-BGJ, AP-BGK, AP-BGY - AP-BMS
(AP-BGL ; SB installs AIMS BP v16 or later and DO-260B
compliant transponders)**

Condition: Position data is not available to the right transponder.

Note: If ADS-B operation is needed, select the left transponder.



[] AIR DATA SYS

Condition: The three air data sources disagree.

- 1 Avoid abrupt control inputs. Airplane response is changed by simplified elevator feel and rudder ratio systems.
- 2 Crosscheck airspeed and altitude on the PFDs and standby flight instruments for accuracy. Each display is receiving data from an independent source.

Note: Normal pitch attitude and thrust settings are available in the Flight With Unreliable Airspeed table in the Performance Inflight chapter.

Select alternate air data/attitude source if airspeed or altitude on respective PFD is determined to be in error and airspeed or altitude on opposite side PFD is verified to be correct.

▼ Continued on next page ▼

▼ AIR DATA SYS continued ▼

3 GND PROX FLAP OVRD switch OVRD

Note: Inoperative Items
Envelope protection functions inop
Autopilot inop
Flight directors inop
Autothrottles inop
PFD flap maneuvering speeds inop

Refer to the Flap Maneuver Speed table below:

FLAP POSITION	MANEUVER SPEED
FLAPS UP	VREF30 + 80
FLAPS 1	VREF30 + 60
FLAPS 5	VREF30 + 40
FLAPS 15	VREF30 + 20
FLAPS 20	VREF30 + 20
FLAPS 25	VREF25
FLAPS 30	VREF30

▼ Continued on next page ▼

▼ AIR DATA SYS continued ▼

Note: Yaw damper is degraded.

Manual control inputs are needed to compensate for asymmetric thrust conditions.

Do **not** use the flight path vector.

Use flaps 20 and VREF 20 for landing. This ensures sufficient pitch control for landing.

Do not arm speedbrake lever. This prevents inadvertent in-flight speedbrake extension.

Manually extend the speedbrakes after landing.

Some or all ground proximity alerts are not available. Ground proximity alerts that occur are valid.

Some or all windshear alerts are not available. Windshear alerts that occur are valid.

Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter or other approved source.

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

AUTO SPEEDBRAKE

FLIGHT CONTROL MODE

THRUST ASYM COMP

WINDSHEAR SYS

▼ Continued on next page ▼

▼ AIR DATA SYS continued ▼**GND PROX SYS****5 Checklist Complete Except Deferred Items****Deferred Items****Descent Checklist**

Recall Checked
Notes Checked
Autobrake ____
Landing data **VREF 20** ____, **Minimums** ____
Approach briefing Completed

Approach Checklist

Altimeters ____

Landing Checklist

Speedbrake **DOWN**
Landing gear DOWN
Flaps. **20**





[] FMC

- Condition: One of these occurs:
- The FMC selector is in L and the left FMC is failed
 - The FMC selector is in R and the right FMC is failed
 - Both FMCs are failed

1 LNAV and VNAV modes are inoperative. Select different autopilot roll and pitch modes.

Note: LNAV can be re-engaged. Plan to enter new waypoints by latitude and longitude into any CDU.

Manually tune navigation radios through the CDUs.

Refer to the Flap Maneuver Speed table below:

FLAP POSITION	MANEUVER SPEED
FLAPS UP	VREF30 + 80
FLAPS 1	VREF30 + 60
FLAPS 5	VREF30 + 40
FLAPS 15	VREF30 + 20
FLAPS 20	VREF30 + 20
FLAPS 25	VREF25
FLAPS 30	VREF30

- 2 LDG ALT selector PULL ON, set manually
- 3 Do **not** accomplish the following checklist:

LANDING ALTITUDE



FMC MESSAGE

Condition: An alerting message is in the FMC scratchpad.



[] GPS

Condition: Both GPS receivers are failed.

Note: The FMC uses inertial inputs only, unless radio updating is enabled.

ADS-B is inoperative.

If radio updating is allowed:

- Select the FMC REF NAV DATA page
- Select OFF for RAD NAV INHIBIT



[] GPS L

**AP-BGJ - AP-BHV, AP-BHX - AP-BMS
(AP-BHW ; SB adds AIMS V17A software)**

Condition: The left GPS receiver is failed.

AP-BGJ - AP-BID

1 XPNDR switch RIGHT

AP-BMG - AP-BMS

2 XPNDR selector R



[] GPS R

AP-BGJ - AP-BHV, AP-BHX - AP-BMS
(AP-BHW ; SB adds AIMS V17A software)

Condition: The right GPS receiver is failed.

AP-BGJ - AP-BID

- ```
1 XPNDR switch LEFT
```

## AP-BMG - AP-BMS

- 2 XPNDR selector . . . . . L







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**GPS Data Unreliable**

Condition: Erroneous or invalid GPS data is suspected.

**Caution! GPS interference can alter the airplane flight path without obvious flight deck indications or effects.**

- 1 If at any time, any of these messages show, do the checklist, then return to this checklist:

GPS

GPS L

GPS R

- 2 Choose one:

◆ On the **ground**:

Use Supplementary Procedures or operator-originated standard operating procedures for intentional operations in areas of known GPS interference.



◆ In **flight**:

►► **Go to step 3**

▼ Continued on next page ▼

**▼ GPS Data Unreliable continued ▼****3 One or more of the following can indicate unreliable GPS data:**

PULL UP alert that occurs with sufficient, immediately verifiable terrain clearance

Slow increase in ANP

VERIFY POSITION scratchpad message

Change in terrain data on the ND that does not match aeronautical charts

FMC position status on the ND changes to DME-DME or INERTIAL

Inaccurate UTC TIME/DATE and FMC-generated ETA

Excessive lateral deviation when intercepting the localizer or final approach course

Unable to log on to ATC datalink with inaccurate UTC TIME/DATE

Inaccurate fuel predictions

**4 The following alerts can occur and must be considered valid:**

ADIRU/GPS DISAGREE

ADS-B OUT

GND PROX SYS

NAV UNABLE RNP

TERR POS

**▼ Continued on next page ▼**



▼GPS Data Unreliable continued ▼

- 5 Choose one:

◆Indications of unreliable GPS data **occur**:

▶▶Go to step 6

◆Indications of unreliable GPS data do **not** occur:

■ ■ ■ ■
- 6 GPS FMC position updating and GPWS terrain look-ahead functions can be temporarily inhibited.
- 7 Choose one:

◆GPS FMC position updating inhibit is **needed**:

▶▶Go to step 8

◆GPS FMC position updating inhibit is **not** needed:

▶▶Go to step 16
- 8 INIT REF key . . . . .Select
- 9 INDEX key . . . . .Select
- 10 POS . . . . .Select
- 11 POS REF page 3 . . . . .Select
- 12 GPS NAV . . . . . OFF
- 13 On the CDU, go to the REF NAV DATA page.
- 14 RAD NAV INHIBIT . . . . . OFF

▼ Continued on next page ▼

## ▼ GPS Data Unreliable continued ▼

15 Monitor GPS FMC position updating for recovery.

**Note:** GPS data recovery can be indicated by verifying both of these after selecting POS REF page 3:

- GPS data shows for GPS L or GPS R.
- Distance shown for GPS L or GPS R is less than current ANP, based on INERTIAL or RADIO FMC position update status.

If GPS data appears to recover, turn GPS NAV ON at Captain's discretion.

16 Choose one:

◆ GPWS terrain look-ahead function inhibit is **needed**:

▶▶ **Go to step 17**

◆ GPWS terrain look-ahead function inhibit is **not** needed:

▶▶ **Go to step 18**

17 GND PROX TERR OVRD switch . . . . . OVRD

**Note:** GPWS alerts that occur are valid.

**Note:** Erroneous GPWS alerts can occur for the rest of the flight if TERR OVRD is selected off after flying through areas of unreliable GPS data.

18 Advise ATC of suspected GPS interference and degraded navigation and satellite communication capability.



**[I] ILS ANTENNA**

Condition: Two or more ILS receivers do not use the correct antenna.

**Note:** AFDS may have difficulty capturing or tracking localizer or glideslope. The airplane path may be lower than indicated by the glideslope pointer.

**[F] INSUFFICIENT FUEL**

Condition: FMC estimated fuel at the destination is less than the entered RESERVES fuel.

- 1 The INSUFFICIENT FUEL message may be caused by a fuel leak.
- 2 A fuel leak should be suspected if one or more of the following are true:

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

An engine has excessive fuel flow.

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

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

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

▼ Continued on next page ▼

**▼ INSUFFICIENT FUEL continued ▼**

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

Fuel used is calculated using the engine fuel flow sensors.

3 **If** a fuel leak is suspected:

▶▶ **Go to the Fuel Leak checklist on page 12.18**

4 Verify that the active route and FMC data are correct.

5 Verify that there is sufficient fuel to complete the flight.





**[ ] NAV ADIRU INERTIAL**

Condition: The ADIRU cannot supply correct attitude, position, heading, track, and groundspeed data.

- 1 Heading information shows for 3 minutes after the NAV ADIRU INERTIAL message shows. If the airplane is in the polar region, heading information is removed immediately.
- 2 GPS continues to give position and track information.

**AP-BMS**

- 3 ND map display orientation changes from heading up to track up.

**AP-BMG - AP-BMS**

- 4 Transponder ALT SOURCE selector . . . . . ALTN

**AP-BGJ - AP-BID**

- 5 XPNDR switch . . . . . RIGHT

**Note: Inoperative Items**

**FMC VNAV pages inop**

**FMC performance predictions inop**

**ND wind direction/speed and wind arrow inop**

**Autobrake inop**

**PFD flap maneuvering speeds inop**  
Refer to the Flap Maneuver Speed table below:

▼ Continued on next page ▼



## ▼ NAV ADIRU INERTIAL continued ▼

| FLAP POSITION | MANEUVER SPEED |
|---------------|----------------|
| FLAPS UP      | VREF30 + 80    |
| FLAPS 1       | VREF30 + 60    |
| FLAPS 5       | VREF30 + 40    |
| FLAPS 15      | VREF30 + 20    |
| FLAPS 20      | VREF30 + 20    |
| FLAPS 25      | VREF25         |
| FLAPS 30      | VREF30         |

**Note: Inoperative AFDS Modes**

- LNAV
- VNAV
- TO/GA
- LOC
- GS
- FPA
- TRK HOLD/SEL

6 **When** the heading blanks and the SET HDG line shows on POS INIT page 1:

Enter the heading.

Re-engage the autopilot.

▼ Continued on next page ▼



▼ NAV ADIRU INERTIAL continued ▼

**Note:** Crosscheck heading periodically for drift with the magnetic compass and update heading as necessary. If magnetic compass information is unreliable or unavailable, track information may be used.

VOR course deviation is available in the ND VOR mode. ILS localizer and glideslope deviation raw data is available on both the PFD and the ND.

- Note:** If GPS is not available, the following additional items are inoperative:
- ND map mode
  - active leg course and distance
  - direct to waypoint function
  - alternate page DIVERT NOW function
  - navigation radio autotuning

7 Checklist Complete Except Deferred Items

Deferred Items

Descent Checklist

Recall . . . . . Checked

Notes. . . . . Checked

Autobrake . . . . . **OFF**

Landing data . . . . . VREF \_\_\_\_, Minimums \_\_\_\_

Approach briefing . . . . . Completed

▼ Continued on next page ▼

**▼ NAV ADIRU INERTIAL continued ▼**

---

**Approach Checklist**

Altimeters . . . . . \_\_\_\_\_

---

**Landing Checklist**

Speedbrake . . . . . ARMED

Landing gear . . . . . DOWN

Flaps . . . . . \_\_\_\_\_



**[ ] NAV UNABLE RNP**

Condition: The actual navigational performance is not sufficient.

1 Choose one:

◆ On the **ground**:

Message may show with GPS disabled.



◆ In **flight**:

▶▶ **Go to step 2**

2 Choose one:

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

▶▶ **Go to step 3**

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

▶▶ **Go to step 4**

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

**Note:** The FMC uses inertial inputs only, unless radio updating is enabled.

If radio updating is allowed, consider doing the following steps:

Select the FMC REF NAV DATA page

Select OFF for RAD NAV INHIBIT

▼ **Continued on next page** ▼

## ▼ NAV UNABLE RNP continued ▼



#### 4 Verify Position.

**Note:** The FMC uses inertial inputs only, unless radio updating is enabled.

If radio updating is allowed, consider doing the following steps:

Select the FMC REF NAV DATA page

Select OFF for RAD NAV INHIBIT



### SINGLE SOURCE ILS

Condition: Both pilots' displays use the same ILS source.



### TRANSPONDER L, R

Condition: A transponder fault occurs.



## [] VNAV STEP CLIMB

**Condition:** An FMC-predicted or manually-entered VNAV step climb point has sequenced and a climb has not started.

**Objective:** To update the VNAV profile so the FMC fuel and ETA predictions are accurate.

### 1 Choose one:

◆ Current altitude is the **final** cruise altitude:

Enter a step size of 0 on the VNAV CRZ page and delete all planned step climb altitudes from the RTE LEGS page.

▶▶ **Go to step 2**

◆ Step climb is needed **now**:

Start a step climb.



◆ Step climb is needed **later**:

Enter a planned step climb altitude on the RTE LEGS page.

▶▶ **Go to step 2**

### 2 Enter the current altitude as the cruise altitude on the VNAV CRZ page, even if it is already shown. This step updates the FMC predictions.





## Non-Normal Checklists

## Chapter NNC

### Fuel

### Section 12

#### Table of Contents

|                             |       |
|-----------------------------|-------|
| FUEL AUTO JETTISON .....    | 12.1  |
| FUEL CROSSFEED AFT .....    | 12.4  |
| FUEL CROSSFEED FWD .....    | 12.4  |
| FUEL DISAGREE .....         | 12.6  |
| FUEL FLOW ENG L, R .....    | 12.8  |
| FUEL IMBALANCE .....        | 12.13 |
| FUEL IN CENTER .....        | 12.15 |
| FUEL JETT NOZZLE L, R ..... | 12.15 |
| Fuel Jettison .....         | 12.16 |
| FUEL JETTISON MAIN .....    | 12.17 |
| FUEL JETTISON SYS .....     | 12.17 |
| Fuel Leak .....             | 12.18 |
| FUEL LOW CENTER .....       | 12.27 |
| FUEL PRESS ENG L, R .....   | 12.28 |
| FUEL PRESS ENG L+R .....    | 12.29 |
| FUEL PUMP CENTER L, R ..... | 12.30 |
| FUEL PUMP L AFT, FWD .....  | 12.30 |
| FUEL PUMP R AFT, FWD .....  | 12.30 |
| FUEL QTY LOW .....          | 12.31 |
| FUEL SCAVENGE SYS .....     | 12.34 |
| FUEL TEMP LOW .....         | 12.35 |
| FUEL VALVE APU .....        | 12.35 |



## Table of Contents

Intentionally  
Blank



## [ ] FUEL AUTO JETTISON

Condition: One of these occurs:

- The total fuel quantity is less than or equal to the fuel to remain and a jettison nozzle valve is open
- The fuel jettison automatic shutoff is failed

Objective: To manually close the fuel jettison nozzle valves when fuel jettison is complete.

1 Choose one:

- ◆ The total fuel quantity is **less than or equal to** the FUEL to REMAIN:

FUEL JETTISON NOZZLE

valve switches (both) . . . . . Off

FUEL JETTISON ARM switch . . . . . Off



- ◆ The total fuel quantity is **greater than** the FUEL to REMAIN:

►► **Go to step 2**

▼ Continued on next page ▼



▼ FUEL AUTO JETTISON continued ▼

2 Choose one:

◆ One or more tank quantity displays are **blank**:

Determine the approximate jettison time using the following rates:

Fuel in center tank: 2500 kgs/minute

Center tank empty: 1400 kgs/minute

▶▶ **Go to step 3**

◆ All tank quantity displays **stay shown**:

▶▶ **Go to step 3**

3 FUEL JETTISON NOZZLE  
valve switches (both) . . . . . ON

4 **When** fuel jettison is complete:  
FUEL JETTISON NOZZLE  
valve switches (both) . . . . . Off  
FUEL JETTISON ARM switch . . . . . Off

▼ Continued on next page ▼

▼ **FUEL AUTO JETTISON continued** ▼

5 Choose one:

◆ FUEL line on PERF INIT page is **blank**:

**Wait** 5 minutes. Manual entry of fuel quantity is not possible until 5 minutes after jettison is complete.

Enter the current estimated total fuel in the FUEL line box prompts on the PERF INIT page. This gives gross weight data for FMC performance calculations and allows VNAV to be re-engaged.

►► **Go to step 6**

◆ FUEL line on PERF INIT page **shows a fuel quantity**:

►► **Go to step 6**

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

Fuel Jettison





**[ ] FUEL CROSSFEED AFT**

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

1 Choose one:

- ◆ AFT FUEL CROSSFEED switch is **on**:  
FWD FUEL CROSSFEED switch . . . . . On  
■ ■ ■ ■
- ◆ AFT FUEL CROSSFEED switch is **off**:  
■ ■ ■ ■

**[ ] FUEL CROSSFEED FWD**

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

1 Choose one:

- ◆ FWD FUEL CROSSFEED switch is **on**:  
AFT FUEL CROSSFEED switch . . . . . On  
■ ■ ■ ■
- ◆ FWD FUEL CROSSFEED switch is **off**:  
■ ■ ■ ■



Intentionally  
Blank

**[ ] FUEL DISAGREE**

Condition: The totalizer fuel quantity and the FMC calculated fuel quantity disagree.

Objective: To decide if a fuel leak is suspected. To select the most accurate fuel value if a fuel leak is not suspected.

- 1 The FUEL DISAGREE message may be caused by a fuel leak.
- 2 A fuel leak should be suspected if one or more of the following are true:

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

An engine has excessive fuel flow.

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

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

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

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

Fuel used is calculated using the engine fuel flow sensors.

▼ Continued on next page ▼

## ▼ FUEL DISAGREE continued ▼

3 **If** a fuel leak is suspected:

►► **Go to the Fuel Leak checklist on page 12.18**

4 Select PROGRESS page 2.

Select TOTALIZER unless it is inaccurate.

5  TOTALIZER or  
CALCULATED . . . . . Select the  
most accurate value





**[ ] FUEL FLOW ENG L, R**

Condition: Engine fuel flow is abnormally high.

Objective: To confirm if there is an engine fuel leak. If confirmed, to shut down the engine.

- 1 A diversion may be needed.
  - 2 Fuel L PUMPS and R PUMPS switches (all) . . . . . ON
  - 3 FUEL CROSSFEED switches (both) . . . . . Off
  - 4 Fuel CENTER PUMPS switches (both). . . . . Off
- The FUEL IN CENTER message may show.

**5 The following steps check for an engine fuel leak**

- 6 Record the main tank fuel quantities and the current time.
- 7 An engine fuel leak is confirmed if one or both of the following are true:
  - Fuel spray is observed from an engine
  - A change in fuel imbalance of 500 kgs within 30 minutes or less

▼ Continued on next page ▼



## ▼ FUEL FLOW ENG L, R continued ▼

8 Choose one:

◆ Engine fuel leak is **confirmed**:

► ► **Go to step 9**

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

Resume normal fuel management.



**9 The following steps shut down the engine to stop an engine fuel leak**

10 A/T ARM switch  
(affected engine) . . . . . Confirm . . . . . OFF

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

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

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

13 APU selector  
(if APU available) . . . . . START, then ON

14 Transponder mode selector . . . . . TA ONLY

▼ Continued on next page ▼

## ▼ FUEL FLOW ENG L, R continued ▼

15 Choose one:

◆ FUEL IN CENTER message **shows**:Fuel CENTER PUMPS  
switches (both) . . . . . ON▶▶ **Go to step 16**◆ FUEL IN CENTER message **is blank**:▶▶ **Go to step 16**

16 Plan to land at the nearest suitable airport.

**Note:** Do **not** accomplish the Fuel Leak checklist.

All remaining fuel can be used for the running engine. Use normal fuel management. When the FUEL IMBALANCE message shows, do the FUEL IMBALANCE checklist.

The engine fuel leak indicated by the FUEL FLOW ENG message is a leak after the fuel flow sensors. The FUEL DISAGREE message will not show.

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

Fuel Leak

AUTOTHROTTLE

▼ Continued on next page ▼

## ▼ FUEL FLOW ENG L, R continued ▼

18 Choose one:

◆ Landing using flaps **20**:

GND PROX FLAP OVRD switch . . . . . OVRD

**Note:** Use flaps 20 and VREF 20 for landing and flaps 5 for go-around.

Check the Non-Normal Configuration Landing Distance tables for ENG SHUTDOWN L, R in the Performance Inflight-QRH chapter or other approved source.

▶▶ **Go to step 19**

◆ Landing using flaps **30 (if performance allows)**:

**Note:** Use flaps 30 and VREF 30 for landing and flaps 20 for go-around.

Check the Non-Normal Configuration Landing Distance tables for ENG SHUTDOWN L, R in the Performance Inflight-QRH chapter or other approved source.


19 **Checklist Complete Except Deferred Items**

▼ Continued on next page ▼



▼ FUEL FLOW ENG L, R continued ▼

Deferred Items

Descent Checklist

- Recall . . . . . Checked
- Notes. . . . . Checked
- Autobrake . . . . . \_\_\_\_
- Landing data . . . . . **VREF 20 \_\_\_\_**, **Minimums \_\_\_\_**
- Approach briefing . . . . . Completed

Approach Checklist

- Altimeters . . . . . \_\_\_\_

Landing Checklist

- Speedbrake . . . . . ARMED
- Landing gear . . . . . DOWN
- Flaps . . . . . **.20**



**[ ] FUEL IMBALANCE**

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 FUEL IMBALANCE message may show due to an engine malfunction instead of a fuel leak.
- 2 The FUEL IMBALANCE message may be caused by a fuel leak or fuel imbalance.
- 3 A fuel leak should be suspected if one or more of the following are true:

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

An engine has excessive fuel flow.

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

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

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

Fuel used is calculated using the engine fuel flow sensors.

▼ Continued on next page ▼



▼ FUEL IMBALANCE continued ▼

4 **If** a fuel leak is suspected:

▶▶ **Go to the Fuel Leak checklist on page 12.18**

5 FUEL CROSSFEED switch (either) . . . . . On

6 Choose one:

◆ **Left** main tank quantity is low:

L fuel PUMPS FWD and AFT  
switches (both) . . . . . Off

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

Do **not** accomplish the following checklists:

FUEL PUMP L AFT  
FUEL PUMP L FWD

▶▶ **Go to step 9**

◆ **Right** main tank quantity is low:

▶▶ **Go to step 7**

7 R fuel PUMPS FWD and AFT  
switches (both) . . . . . Off

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

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

FUEL PUMP R AFT

▼ Continued on next page ▼

▼ **FUEL IMBALANCE continued** ▼

**FUEL PUMP R FWD**

9 **When** fuel balancing is complete:

Fuel PUMPS FWD and AFT  
switches (all) . . . . . ON

FUEL CROSSFEED switches (both) . . . . . Off


**FUEL IN CENTER**

Condition: The center tank fuel quantity is at the level where the pump switches must be ON.


**FUEL JETT NOZZLE L, R**

Condition: A jettison nozzle valve is not in the commanded position.





Fuel Jettison

Condition: Fuel jettison is needed.

- 1 FUEL JETTISON ARM switch . . . . .ARMED

2 Choose one:

◆ FUEL TO REMAIN is **acceptable**:

▶▶ **Go to step 4**

◆ FUEL TO REMAIN must be **changed**:

▶▶ **Go to step 3**

3 FUEL TO REMAIN selector . . . . .PULL ON, set manually

4 FUEL JETTISON NOZZLE valve switches (both) . . . . .ON

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

FUEL PUMP CENTER L

FUEL PUMP CENTER R

FUEL SCAVENGE SYS

6 **When** fuel jettison is complete:

FUEL JETTISON NOZZLE valve switches (both) . . . . .Off

FUEL JETTISON ARM switch . . . . .Off

■ ■ ■ ■
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- 12.16
- D632W001-PIA
- December 15, 2014



## [ ] FUEL JETTISON MAIN

Condition: The main tank fuel jettison system is failed.

- 1 Fuel jettison can occur only from the center tank.
- 2 Do **not** accomplish the following checklist:  

Fuel Jettison
- 3 **When** the center fuel tank is empty or the FUEL TO REMAIN quantity is reached:  

FUEL JETTISON NOZZLE  
valve switches (both) . . . . . Off

FUEL JETTISON ARM switch . . . . . Off

■ ■ ■ ■

## [ ] FUEL JETTISON SYS

Condition: The fuel jettison system is failed.

- 1 FUEL JETTISON NOZZLE  
valve switches (both) . . . . . Off
- 2 FUEL JETTISON ARM switch . . . . . Off
- 3 Do **not** accomplish the following checklist:  

Fuel Jettison

■ ■ ■ ■



Fuel Leak

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

Objective: To confirm there is a fuel leak. If confirmed, to isolate the leak to one of the following:

- engine
- main tank
- center tank

- 1 A diversion may be needed.
- 2 Fuel L PUMPS and R PUMPS switches (all) . . . . .ON
- 3 FUEL CROSSFEED switches (both) . . . . .Off
- 4 Fuel CENTER PUMPS switches (both). . . . .Off
- The FUEL IN CENTER message may show.

- 5 **The following steps check for an engine or main tank leak**
- 6 Record the main tank fuel quantities and the current time.
- 7 An engine/main tank leak is confirmed if one or both of the following are true:

Fuel spray is observed from an engine, strut, or wing

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

▼ Continued on next page ▼

## ▼ Fuel Leak continued ▼

8 Choose one:

◆ Engine/main tank leak is **confirmed**:

▶▶ **Go to step 19**

◆ Engine/main tank leak is **not** confirmed:

▶▶ **Go to step 9**

9 Choose one:

◆ FUEL IN CENTER message is **blank**:

Resume normal fuel management.



◆ FUEL IN CENTER message **shows**:

▶▶ **Go to step 10**

**10 The following steps check for a center tank leak**

11 Fuel CENTER PUMPS

switches (both) . . . . . ON

12 Select PROGRESS page 2.

13 Record the totalizer and calculated fuel quantities, and the current time.

14 A center tank leak is confirmed if the difference between calculated and totalizer increases by 500 kgs within 30 minutes or less.

▼ Continued on next page ▼

▼ Fuel Leak continued ▼

15 Choose one:

◆ Center tank leak is **confirmed**:

▶▶ **Go to step 16**

◆ Center tank leak is **not** confirmed:

Resume normal fuel management.



16 Continue to use all center tank fuel.

17 Verify that sufficient fuel is available in the left and right main tanks to complete the flight.

**Note:** If the FUEL DISAGREE message shows at any time, go to PROGRESS page 2 and select the TOTALIZER fuel quantity.

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

FUEL DISAGREE



19 **An engine/main tank leak is confirmed. The following steps shut down the engine to stop an engine fuel leak**

20 The affected engine is on the side where the fuel quantity decreased faster.

21 A/T ARM switch  
(affected engine) . . . . . Confirm . . . . . OFF

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

▼ Continued on next page ▼

## ▼ Fuel Leak continued ▼

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

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

24 APU selector  
(if APU available) . . . . . START, then ON

25 Transponder mode selector . . . . . TA ONLY

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

AUTOTHROTTLE

FUEL DISAGREE

27 Choose one:

◆ FUEL QTY LOW message **shows**:

FUEL CROSSFEED

switch (either) . . . . . On

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

►► **Go to step 28**

◆ FUEL QTY LOW message **is blank**:

►► **Go to step 28**

▼ Continued on next page ▼



▼ Fuel Leak continued ▼

28 Choose one:

- ◆ FUEL IN CENTER message **shows:**  
Fuel CENTER PUMP  
switch (**on side with  
running engine**) . . . . .ON  
▶▶ **Go to step 29**
- ◆ FUEL IN CENTER message **is blank:**  
▶▶ **Go to step 29**

29 Plan to land at the nearest suitable airport.

▼ Continued on next page ▼

## ▼ Fuel Leak continued ▼

30 Choose one:

◆ Landing using flaps **20**:

GND PROX FLAP OVRD switch . . . . . OVRD

**Note:** Use flaps 20 and VREF 20 for landing and flaps 5 for go-around.

Check the Non-Normal Configuration Landing Distance tables for ENG SHUTDOWN L, R in the Performance Inflight-QRH chapter or other approved source.

►► **Go to step 31**

◆ Landing using flaps **30 (if performance allows)**:

**Note:** Use flaps 30 and VREF 30 for landing and flaps 20 for go-around.

Check the Non-Normal Configuration Landing Distance tables for ENG SHUTDOWN L, R in the Performance Inflight-QRH chapter or other approved source.

►► **Go to step 31**

**31 The following steps check for a main tank leak**

32 Select PROGRESS page 2.

▼ Continued on next page ▼

## ▼ Fuel Leak continued ▼

33 Record the totalizer and calculated fuel quantities, and the current time.

34 A main tank leak is confirmed if the difference between calculated and totalizer increases by 500 kgs within 30 minutes or less.

35 Choose one:

◆ Main tank leak is **confirmed**:

▶▶ **Go to step 36**

◆ Main tank leak is **not** confirmed:

▶▶ **Go to step 39**

36 The leak is not an engine fuel leak. The engine may be re-started.

37 For a long diversion, range may be improved by re-starting the engine and climbing.

**Note:** Do **not** balance fuel.

If the FUEL QTY LOW message shows at any time, do the FUEL QTY LOW checklist.

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

FUEL IMBALANCE

**Note:** If the FUEL DISAGREE message shows at any time, go to PROGRESS page 2 and select the TOTALIZER fuel quantity.

▶▶ **Go to step 40**

## ▼ Continued on next page ▼



**▼ Fuel Leak continued ▼**

39 The leak was an engine fuel leak.

**Note:** All remaining fuel can be used for the running engine. Use normal fuel management. When the FUEL IMBALANCE message shows, do the FUEL IMBALANCE checklist.

**Note:** If the FUEL DISAGREE message shows at any time, go to PROGRESS page 2 and select the TOTALIZER fuel quantity.

#### 40 **Checklist Complete Except Deferred Items**

**▼ Continued on next page ▼**



▼Fuel Leak continued▼

Deferred Items

Descent Checklist

- Recall . . . . . Checked
- Notes. . . . . Checked
- Autobrake . . . . . \_\_\_\_
- Landing data . . . . . **VREF 20 \_\_\_\_ or  
VREF 30 \_\_\_\_, Minimums \_\_\_\_**
- Approach briefing . . . . . Completed

Approach Checklist

- Altimeters . . . . . \_\_\_\_

Landing Checklist

- Speedbrake . . . . . ARMED
- Landing gear . . . . . DOWN
- Flaps. . . . . **20 or 30**



Additional Information

- Reasons that a 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 DISAGREE message shows on EICAS
  - The FUEL IMBALANCE message shows on EICAS
  - The FUEL QTY LOW message shows on EICAS
  - The INSUFFICIENT FUEL message shows on EICAS

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**FUEL LOW CENTER**

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Condition: The center tank fuel quantity is at the level where the pump switches must be off.



**[ ] FUEL PRESS ENG L, R**

Condition: The affected engine is on suction feed.

Objective: To fly at an altitude that ensures a sufficient supply of fuel to the engine.

1 Choose one:

◆ Airplane altitude is **at or below** 38,000 feet:

▶▶ **Go to step 6**

◆ Airplane altitude is **above** 38,000 feet:

▶▶ **Go to step 2**

2 FUEL CROSSFEED switch (either) . . . . . On

This allows fuel from the operative pump side to feed both engines.

3 Descend to 38,000 feet or lower.

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

FUEL PUMP AFT

FUEL PUMP FWD

5 **When** airplane altitude is at or below 38,000 feet:

▶▶ **Go to step 6**

6 FUEL CROSSFEED switches (both) . . . . . Off

This restores main tank-to-engine fuel feed. The FUEL PRESS ENG message may show again.

▼ **Continued on next page** ▼

▼ **FUEL PRESS ENG L, R continued** ▼

**Note:** Do not climb above 38,000 feet for the rest of the flight.

Continue suction feed. Do not open the crossfeed valves unless an engine restart is needed.

If engine flameout occurs at any time, immediately open a fuel crossfeed valve. Close the crossfeed valves when the engine is operating normally.

Do not balance fuel.

**Note:** 200 kgs of fuel in the affected main tank is unusable.

- 7 Select the PERF INIT page.
- 8 Add 200 kgs to the required RESERVES.
- 9 Do **not** accomplish the following checklist:

### FUEL IMBALANCE



## FUEL PRESS ENG L+R

Condition: Fuel pressure to both engines is low on the ground with the engines shut down.





**[ ] FUEL PUMP CENTER L, R**

Condition: The center fuel pump pressure is low.

- 1 FUEL CROSSFEED switch (either) . . . . . On
- 2 Fuel CENTER PUMP switch (affected pump) . . . Off
- 3 Choose one:

◆ **At least one** center fuel pump output pressure is **normal**:



◆ **Both** center fuel pump output pressures are **low**:

►► **Go to step 4**

- 4 FUEL CROSSFEED switches (both) . . . . . Off
- 5 Check that available left and right main tank quantity is sufficient for the planned flight. The center tank fuel is not available.



**[ ] FUEL PUMP L AFT, FWD**

Condition: The left fuel pump pressure is low.

- 1 Fuel PUMP switch (affected pump) . . . . . Off



**[ ] FUEL PUMP R AFT, FWD**

Condition: The right fuel pump pressure is low.

- 1 Fuel PUMP switch (affected pump) . . . . . Off



## [ ] FUEL QTY 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 if a fuel leak is not suspected.

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

- 1 The FUEL QTY LOW message 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 on EICAS is less than the planned fuel remaining.

An engine has excessive fuel flow.

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

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

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

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

Fuel used is calculated using the engine fuel flow sensors.

▼ Continued on next page ▼



▼ FUEL QTY LOW continued ▼

- 3 **If** a fuel leak is suspected:
  - ▶▶ **Go to the Fuel Leak checklist on page 12.18, then finish this checklist.**
- 4 FUEL CROSSFEED switch (either) . . . . . On  
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.
- 7 GND PROX FLAP OVRD switch . . . . . OVRD

**Note:** Use flaps 20 and VREF 20 for landing. Increased speed gives improved elevator control for landing flare in the event of a dual engine flameout.

8 **Checklist Complete Except Deferred Items**

**Deferred Items**

**Descent Checklist**

- Recall . . . . . Checked
- Notes. . . . . Checked
- Autobrake . . . . . \_\_\_\_
- Landing data . . . . . **VREF 20** \_\_\_\_, **Minimums** \_\_\_\_
- Approach briefing . . . . . Completed

▼ Continued on next page ▼



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**▼ FUEL QTY LOW continued ▼**

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---

**Approach Checklist**

Altimeters . . . . . \_\_\_\_\_

---

**Landing Checklist**

Speedbrake . . . . . ARMED

Landing gear . . . . . DOWN

Flaps. . . . . **20**

**[ ] FUEL SCAVENGE SYS**

Condition: The fuel scavenge system is failed.

1 Choose one:

◆ Center tank fuel quantity indication is **available**:

Select the PERF INIT page.

Add the center tank fuel quantity to the required RESERVES

►► **Go to step 5**

◆ Center tank fuel quantity indication is **unavailable**:

►► **Go to step 2**

2 Select the PERF INIT page.

**AP-BGJ - AP-BGL, AP-BHX, AP-BMG, AP-BMH**

3 Add 1,100 kgs to the required RESERVES.

**AP-BGY - AP-BHW, AP-BID, AP-BMS**

4 Add 1,300 kgs to the required RESERVES.

5 Select the PROGRESS page.

6 Check the DESTINATION FUEL ESTIMATE. Verify that adequate fuel is available in the left and right main tanks to complete the flight.

**Note:** Remaining center tank fuel is unusable.



## [] FUEL TEMP LOW

Condition: Fuel temperature is near the minimum.

- 1 Increase airspeed, change altitude or deviate to a warmer air mass to achieve a TAT equal to or higher than the fuel temperature limit (3 degrees C above the fuel freeze point).
- 2 TAT increases approximately 0.5 to 0.7 degrees C for each .01 Mach increase in airspeed. In extreme conditions it may be necessary to descend as low as 25,000 feet.



## [] FUEL VALVE APU

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

- 1 Do not start the APU.

This prevents a potential fire hazard.

**Note:** The APU is not available for the rest of the flight.

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

APU SHUTDOWN



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## Non-Normal Checklists

## Chapter NNC

### Hydraulics

### Section 13

#### Table of Contents

|                                    |       |
|------------------------------------|-------|
| HYD AUTO CONTROL C .....           | 13.1  |
| HYD AUTO CONTROL L, R.....         | 13.1  |
| HYD OVERHEAT DEM C1, C2, L, R..... | 13.1  |
| HYD OVERHEAT PRI C1, C2 .....      | 13.2  |
| HYD OVERHEAT PRI L .....           | 13.2  |
| HYD OVERHEAT PRI R.....            | 13.3  |
| HYD PRESS DEM C1, C2, L, R.....    | 13.4  |
| HYD PRESS PRI C1, C2 .....         | 13.4  |
| HYD PRESS PRI L .....              | 13.4  |
| HYD PRESS PRI R.....               | 13.5  |
| HYD PRESS SYS C .....              | 13.6  |
| HYD PRESS SYS L .....              | 13.10 |
| HYD PRESS SYS L+C .....            | 13.11 |
| HYD PRESS SYS L+C+R .....          | 13.15 |
| HYD PRESS SYS L+R .....            | 13.16 |
| HYD PRESS SYS R .....              | 13.20 |
| HYD PRESS SYS R+C.....             | 13.22 |
| HYD QTY LOW C.....                 | 13.27 |
| HYD QTY LOW L, R .....             | 13.27 |
| HYD QTY LOW L+C.....               | 13.27 |
| HYD QTY LOW L+C+R.....             | 13.28 |
| HYD QTY LOW L+R.....               | 13.28 |
| HYD QTY LOW R+C .....              | 13.29 |
| RAT UNLOCKED .....                 | 13.31 |



---

Table of Contents

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## [ ] HYD AUTO CONTROL C

Condition: Both of the following occur:

- Automatic control of both center demand pumps fails
- System indications fail

1 C1 AIR DEMAND pump selector . . . . . ON



## [ ] HYD AUTO CONTROL L, R

Condition: Both of the following occur:

- Automatic control of demand pump fails
- System indications fail

1 ELEC DEMAND pump selector  
(affected system) . . . . . ON



## [ ] HYD OVERHEAT DEM C1, C2, L, R

Condition: The pump temperature is high.

1 DEMAND pump selector  
(affected pump) . . . . . OFF

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

HYD PRESS DEM





[ ] HYD OVERHEAT PRI C1, C2

Condition: The pump temperature is high.

- 1 ELEC PRIMARY pump switch  
(affected pump) . . . . . Off
- 2 Do **not** accomplish the following checklist:  
HYD PRESS PRI  
■ ■ ■ ■

[ ] HYD OVERHEAT PRI L

Condition: The left pump temperature is high.

- 1 L ENG PRIMARY pump switch . . . . . Off
- Note:** Left thrust reverser may be inoperative.
- 2 Do **not** accomplish the following checklist:  
HYD PRESS PRI L  
■ ■ ■ ■



## [ ] HYD OVERHEAT PRI R

Condition: The right pump temperature is high.

- 1 R ENG PRIMARY pump switch . . . . . Off
- 2 The right hydraulic demand pump may not provide sufficient pressure for all systems during the landing phase.

**Note:** Right thrust reverser may be inoperative.

Autobrake may be inoperative. Manual braking is available.

Normal brakes may be inoperative. Alternate brakes are available.

Speedbrake effectiveness may be reduced during landing.

Check the Non-Normal Configuration Landing Distance tables for HYD PRESS SYS R in the Performance Inflight-QRH chapter or other approved source.

- 3 Do **not** accomplish the following checklist:  
HYD PRESS PRI R





**[ ] HYD PRESS DEM C1, C2, L, R**

Condition: The demand pump output pressure is low when commanded on.

1 DEMAND pump selector  
(affected pump) . . . . . ON

2 Choose one:

◆ HYD PRESS DEM message **blanks**:



◆ HYD PRESS DEM message **stays shown**:

DEMAND pump selector  
(affected pump). . . . . OFF



**[ ] HYD PRESS PRI C1, C2**

Condition: The pump pressure is low.

1 ELEC PRIMARY pump switch  
(affected pump) . . . . . Off



**[ ] HYD PRESS PRI L**

Condition: The left primary pump pressure is low.

1 L ENG PRIMARY pump switch . . . . . Off

**Note:** Left thrust reverser may be inoperative.



**[ ] HYD PRESS PRI R**

Condition: The right primary pump pressure is low.

- 1 R ENG PRIMARY pump switch . . . . . Off
- 2 The right hydraulic demand pump may not provide sufficient pressure for all systems during the landing phase.

**Note:** Right thrust reverser may be inoperative.

Autobrake may be inoperative. Manual braking is available.

Normal brakes may be inoperative. Alternate brakes are available.

Speedbrake effectiveness may be reduced during landing.

Check the Non-Normal Configuration Landing Distance tables for HYD PRESS SYS R in the Performance Inflight-QRH chapter or other approved source.





**[ ] HYD PRESS SYS C**

Condition: The center hydraulic system pressure is low.

Objective: To restore system pressure and configure for landing using alternate systems, if needed.

- 1 C1 or C2 AIR DEMAND pump selector . . . . .ON
- 2 Choose one:
  - ◆HYD PRESS SYS C message **blanks**:  
                                            ■ ■ ■ ■
  - ◆HYD PRESS SYS C message **stays shown**:  
                    ▶▶ **Go to step 3**
- 3 C2 ELEC PRIMARY pump switch . . . . .Off
- 4 C1 and C2 AIR DEMAND pump selectors . . . . OFF
- 5 GND PROX FLAP OVRD switch . . . . .OVRD
- 6 Do **not** accomplish the following checklists:
  - AUTO SPEEDBRAKE
  - SPOILERS

**Note: Inoperative Items**

**Primary flap and slat operation inop**  
Plan more time for slower flap and slat operation.

**Main landing gear hydraulic operation inop**  
Alternate gear extension is needed.

**Main gear steering inop**  
Tires may scrub during turns.

▼ Continued on next page ▼

▼ **HYD PRESS SYS C continued** ▼

**AP-BGJ - AP-BGL, AP-BHX, AP-BMG, AP-BMH**

**Note:** The slats will extend beyond midrange when the airspeed is below 239 knots. For go-around, do not exceed 239 knots until the slats retract to midrange.

**AP-BGY - AP-BHW, AP-BID, AP-BMS**

**Note:** The slats will extend beyond midrange when the airspeed is below 256 knots. For go-around, do not exceed 256 knots until the slats retract to midrange.

**Note:** Use flaps 20 and VREF 20 for landing. This ensures adequate go-around performance due to slower slat/flap operation in secondary mode.

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

Do not arm the speedbrake lever. This prevents inadvertent in-flight speedbrake extension.

Manually extend the speedbrakes after landing.

For go-around, do not exceed the gear EXTEND limit speed (270K/.82M).

Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter or other approved source.

▼ **Continued on next page** ▼



▼ HYD PRESS SYS C continued ▼

7 Checklist Complete Except Deferred Items

Deferred Items

Descent Checklist

- Recall . . . . . Checked
- Notes. . . . . Checked
- Autobrake . . . . . \_\_\_\_
- Landing data . . . . . **VREF 20 \_\_\_\_**, **Minimums \_\_\_\_**
- Approach briefing . . . . . Completed

Approach Checklist

- Altimeters . . . . . \_\_\_\_

Flap extension

- Start flap extension as needed.
- Do **not** accomplish the following checklists:
  - FLAPS PRIMARY FAIL
  - SLATS PRIMARY FAIL

Alternate gear extension

- Landing gear lever . . . . . DN
- ALTN GEAR
  - extend switch . . . . . Push to DOWN and hold until all gear show down or in transit

▼ Continued on next page ▼

**▼HYD PRESS SYS C continued▼**

A reduction of airspeed to below 240 knots may be necessary for the landing gear to lock down.

Do **not** accomplish the following checklist:

GEAR DOOR

---

**Landing Checklist**

Speedbrake . . . . . **DOWN**

Landing gear . . . . . DOWN

Flaps. . . . . **20**





**[ ] HYD PRESS SYS L**

Condition: The left hydraulic system pressure is low.

1 L ELEC DEMAND pump selector . . . . . ON

2 Choose one:

◆ HYD PRESS SYS L message **blanks**:



◆ HYD PRESS SYS L message **stays shown**:

►► **Go to step 3**

3 L ENG PRIMARY pump switch . . . . . Off

4 L ELEC DEMAND pump selector . . . . . OFF

**Note:** The left thrust reverser is inoperative.

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

Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter or other approved source.

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

SPOILERS





## [ ] HYD PRESS SYS L+C

**Condition:** The left and center hydraulic system pressures are low.

**Objective:** To restore system pressure and configure for landing using alternate systems, if needed.

- 1 L ELEC DEMAND pump selector . . . . . ON
- 2 C1 or C2 AIR DEMAND pump selector . . . . . ON
- 3 Choose one:

◆ HYD PRESS SYS L+C message **blanks**:



◆ HYD PRESS SYS L+C message **stays shown**:

▶▶ **Go to step 4**

- 4 L ENG PRIMARY pump switch . . . . . Off
- 5 C2 ELEC PRIMARY pump switch . . . . . Off
- 6 L ELEC DEMAND pump selector . . . . . OFF
- 7 C1 and C2 AIR DEMAND pump selectors . . . . OFF
- 8 Handling qualities are degraded. Pitch and roll control capability is reduced with fewer operating control surfaces.
- 9 Plan to land at the nearest suitable airport.
- 10 GND PROX FLAP OVRD switch . . . . . OVRD

▼ Continued on next page ▼

▼ **HYD PRESS SYS L+C continued** ▼

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

AUTO SPEEDBRAKE

FLIGHT CONTROLS

SPOILERS

**Note: Inoperative Items****Multiple flight control surfaces inop**

Handling qualities are degraded.

**Primary flap and slat operation inop**

Plan more time for slower flap and slat operation.

**Main landing gear hydraulic operation inop**

Alternate gear extension is needed.

**Left thrust reverser inop**

Right thrust reverser is available.

**Main gear steering inop**

Tires may scrub during turns.

**AP-BGJ - AP-BGL, AP-BHX, AP-BMG, AP-BMH**

**Note:** The slats will extend beyond midrange when the airspeed is below 239 knots. For go-around, do not exceed 239 knots until the slats retract to midrange.

**AP-BGY - AP-BHW, AP-BID, AP-BMS**

**Note:** The slats will extend beyond midrange when the airspeed is below 256 knots. For go-around, do not exceed 256 knots until the slats retract to midrange.

▼ **Continued on next page** ▼

▼ **HYD PRESS SYS L+C continued** ▼

**Note:** Use flaps 20 and VREF 30 + 20 for landing. Higher approach speeds improve airplane maneuvering characteristics.

Crosswind limit for landing is 20 knots.

Roll rate may be reduced in flight.

Speedbrake effectiveness may be reduced in flight and during landing.

Do not arm the speedbrake lever. This prevents inadvertent in-flight speedbrake extension.

Manually extend the speedbrakes after landing.

For go-around, do not exceed the gear EXTEND limit speed (270K/.82M).

Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter or other approved source.

## 12 Checklist Complete Except Deferred Items

### Deferred Items

#### Descent Checklist

Recall . . . . . Checked

Notes . . . . . Checked

Autobrake . . . . . \_\_\_\_\_

Landing data . . . . . **VREF 30 + 20** \_\_\_\_\_,  
**Minimums** \_\_\_\_\_

▼ Continued on next page ▼



▼HYD PRESS SYS L+C continued▼

Approach briefing . . . . . Completed

Approach Checklist

Altimeters . . . . . \_\_\_\_\_

Flap extension

- Start flap extension as needed.
- Do **not** accomplish the following checklists:
  - FLAPS PRIMARY FAIL
  - SLATS PRIMARY FAIL

Alternate gear extension

- Landing gear lever . . . . .DN
- ALTN GEAR
  - extend switch . . . . .Push to DOWN  
and hold until all gear  
show down or in transit
- Reduction of airspeed to below 240 knots may be necessary for landing gear to lock down.
- Do **not** accomplish the following checklist:
  - GEAR DOOR

Landing Checklist

- Speedbrake . . . . . **DOWN**
- Landing gear . . . . . DOWN

▼ Continued on next page ▼

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**▼ HYD PRESS SYS L+C continued ▼**Flaps. . . . . **20****HYD PRESS SYS L+C+R**

Condition: All hydraulic system pressures are low.





[ ] **HYD PRESS SYS L+R**

Condition: The left and right hydraulic system pressures are low.

Objective: To restore system pressure and configure for landing using alternate systems, if needed.

**AP-BGY - AP-BHW, AP-BID, AP-BMS**

- 1 Do not exceed .87 Mach. This ensures sufficient roll control.
- 2 L ELEC DEMAND pump selector . . . . .ON
- 3 R ELEC DEMAND pump selector . . . . .ON
- 4 Choose one:
  - ◆HYD PRESS SYS L+R message **blanks**:

■ ■ ■ ■
  - ◆HYD PRESS SYS L+R message **stays shown**:

▶▶ **Go to step 5**
- 5 L ENG PRIMARY pump switch . . . . .Off
- 6 R ENG PRIMARY pump switch. . . . .Off
- 7 L ELEC DEMAND pump selector . . . . . OFF
- 8 R ELEC DEMAND pump selector . . . . . OFF
- 9 Handling qualities are degraded. Pitch and roll control capability is reduced with fewer operating control surfaces.
- 10 Plan to land at the nearest suitable airport.
- 11 GND PROX FLAP OVRD switch . . . . .OVRD

▼ **Continued on next page** ▼

## ▼ HYD PRESS SYS L+R continued ▼

**Note: Inoperative Items**
**Multiple flight control surfaces inop**

Handling qualities are degraded.

**Left and right thrust reversers inop**

Manual braking is available.

**Autobrake inop**

Manual braking is available.

**Normal brakes inop**

Alternate brakes are available.

**Note:** Use flaps 20 and VREF 30 + 20 for landing.  
Higher approach speeds improve airplane  
maneuvering characteristics.

Crosswind limit for landing is 20 knots.

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

Check the Non-Normal Configuration  
Landing Distance tables in the Performance  
Inflight-QRH chapter or other approved  
source.

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

FLIGHT CONTROLS

SPOILERS

**13 Checklist Complete Except Deferred Items**
**Deferred Items**
**Descent Checklist**

Recall . . . . . Checked

▼ Continued on next page ▼

▼HYD PRESS SYS L+R continued▼

Notes . . . . . Checked

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

Landing data . . . . . **VREF 30 + 20** \_\_\_\_,  
**Minimums** \_\_\_\_

Approach briefing . . . . . Completed

## Approach Checklist

Altimeters . . . . .

## Landing Checklist

Speedbrake . . . . . ARMED  
Landing gear . . . . . DOWN  
Flaps . . . . . **20**







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[ ] **HYD PRESS SYS R**

Condition: The right hydraulic system pressure is low.

1 R ELEC DEMAND pump selector . . . . . ON

2 Choose one:

◆ HYD PRESS SYS R message **blanks**:



◆ HYD PRESS SYS R message **stays shown**:

►► **Go to step 3**

3 R ENG PRIMARY pump switch. . . . . Off

4 R ELEC DEMAND pump selector . . . . . OFF

**Note: Inoperative Items**

**Right thrust reverser inop**  
Left thrust reverser is available.

**Autobrake inop**  
Manual braking is available.

**Normal brakes inop**  
Alternate brakes is available.

**Note:** Roll rate may be reduced in flight.  
Speedbrake effectiveness may be reduced in flight and during landing.  
  
Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter or other approved source.

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

▼ **Continued on next page** ▼

**▼ HYD PRESS SYS R continued ▼****6 Checklist Complete Except Deferred Items**

---

**Deferred Items**

---

**Descent Checklist**

Recall . . . . . Checked  
Notes . . . . . Checked  
Autobrake . . . . . **OFF**  
Landing data . . . . . VREF \_\_\_\_, Minimums \_\_\_\_  
Approach briefing . . . . . Completed

---

**Approach Checklist**

Altimeters . . . . . \_\_\_\_

---

**Landing Checklist**

Speedbrake . . . . . ARMED  
Landing gear . . . . . DOWN  
Flaps . . . . . \_\_\_\_





[ ] **HYD PRESS SYS R+C**

Condition: The right and center hydraulic system pressures are low.

Objective: To restore system pressure and configure for landing using alternate systems, if needed.

**AP-BGY - AP-BHW, AP-BID, AP-BMS**

- 1 Do not exceed .87 Mach. This ensures sufficient roll control.
- 2 C1 or C2 AIR DEMAND pump selector . . . . .ON
- 3 R ELEC DEMAND pump selector . . . . .ON
- 4 Choose one:
  - ◆HYD PRESS SYS R+C message **blanks**:

■ ■ ■ ■
  - ◆HYD PRESS SYS R+C message **stays shown**:

▶▶ **Go to step 5**
- 5 STAB cutout switches (both) . . . . . CUTOUT  
This keeps the STABILIZER message blank.
- 6 Do not exceed current airspeed. Nose down elevator authority is limited.
- 7 C2 ELEC PRIMARY pump switch . . . . . Off
- 8 R ENG PRIMARY pump switch. . . . . Off
- 9 C1 and C2 AIR DEMAND pump selectors . . . . OFF
- 10 R ELEC DEMAND pump selector . . . . . OFF

▼ Continued on next page ▼

**▼HYD PRESS SYS R+C continued▼**

- 11 Handling qualities are degraded. Pitch and roll control capability is reduced with fewer operating control surfaces.
- 12 Plan to land at the nearest suitable airport.
- 13 GND PROX FLAP OVRD switch . . . . . OVRD
- 14 Do **not** accomplish the following checklists:
  - AUTO SPEEDBRAKE
  - FLIGHT CONTROLS
  - SPOILERS

**▼ Continued on next page ▼**

## ▼ HYD PRESS SYS R+C continued ▼

**Note: Inoperative Items****Multiple flight control surfaces inop**

Handling qualities are degraded.

**Stabilizer inop**

Pitch trim is available in the normal flight control mode.

**Primary flap and slat operation inop**

Plan more time for slower flap and slat operation.

**Main landing gear hydraulic operation inop**

Alternate gear extension is needed.

**Right thrust reverser inop**

Left thrust reverser is available.

**Autobrake inop**

Manual braking is available.

**Normal brakes and alternate brakes from center hydraulic source are inop**

Alternate brakes from the reserve hydraulic source are available.

**Main gear steering inop**

Tires may scrub during turns.

**AP-BGJ - AP-BGL, AP-BHX, AP-BMG, AP-BMH**

**Note:** The slats will extend beyond midrange when the airspeed is below 239 knots. For go-around, do not exceed 239 knots until the slats retract to midrange.

**AP-BGY - AP-BHW, AP-BID, AP-BMS**

**Note:** The slats will extend beyond midrange when the airspeed is below 256 knots. For go-around, do not exceed 256 knots until the slats retract to midrange.

▼ Continued on next page ▼

## ▼HYD PRESS SYS R+C continued▼

**Note:** Use flaps 20 and VREF 30 + 20 for landing. Higher approach speeds improve airplane maneuvering characteristics.

Crosswind limit for landing is 20 knots.

Roll rate may be reduced in flight.

Speedbrake effectiveness may be reduced in flight and during landing.

Do not arm the speedbrake lever. This prevents inadvertent in-flight speedbrake extension.

Manually extend the speedbrakes after landing.

For go-around, do not exceed the gear EXTEND limit speed (270K/.82M).

Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter or other approved source.

## 15 Checklist Complete Except Deferred Items

### Deferred Items

#### Descent Checklist

Recall . . . . . Checked

Notes . . . . . Checked

Autobrake . . . . . **OFF**

Landing data . . . . . **VREF 30 + 20** \_\_\_\_,  
**Minimums** \_\_\_\_

▼ Continued on next page ▼



▼HYD PRESS SYS R+C continued▼

Approach briefing . . . . . Completed

Approach Checklist

Altimeters . . . . . \_\_\_\_\_

Flap extension

- Start flap extension as needed.
- Do **not** accomplish the following checklists:
  - FLAPS PRIMARY FAIL
  - SLATS PRIMARY FAIL

Alternate gear extension

- Landing gear lever . . . . .DN
- ALTN GEAR
  - extend switch . . . . .Push to DOWN  
and hold until all gear  
show down or in transit
- Reduction of airspeed to below 240 knots may be necessary for landing gear to lock down.
- Do **not** accomplish the following checklist:
  - GEAR DOOR

Landing Checklist

- Speedbrake . . . . . **DOWN**
- Landing gear . . . . . DOWN

▼ Continued on next page ▼

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## ▼HYD PRESS SYS R+C continued▼

Flaps. .... 20



[ ] HYD QTY LOW C

Condition: The center hydraulic quantity is low.

**Note:** Nose wheel steering may be slow to react. Excessive force on the nose wheel steering tiller may cause abrupt tiller movement in the opposite direction.



HYD QTY LOW L, R

Condition: The hydraulic quantity is low.



[ ] HYD QTY LOW L+C

Condition: The left and center hydraulic quantities are low.

1 Plan to land at the nearest suitable airport.

**Note:** Nose wheel steering may be slow to react. Excessive force on the nose wheel steering tiller may cause abrupt tiller movement in the opposite direction.



**[ ] HYD QTY LOW L+C+R**

Condition: All three hydraulic quantities are low.

- 1 Plan to land at the nearest suitable airport.

**Note:** Nose wheel steering may be slow to react. Excessive force on the nose wheel steering tiller may cause abrupt tiller movement in the opposite direction.

**[ ] HYD QTY LOW L+R**

Condition: The left and right hydraulic quantities are low.

- 1 Plan to land at the nearest suitable airport.



## [ ] HYD QTY LOW R+C

**Condition:** The right and center hydraulic quantities are low.

**Objective:** To prevent fluid loss through the brake system.

- 1 C1 ELEC PRIMARY pump switch . . . . . Off
- 2 Plan to land at the nearest suitable airport.

**Note:** Nose wheel steering may be slow to react. Excessive force on the nose wheel steering tiller may cause abrupt tiller movement in the opposite direction.

Do not taxi with loss of steering.

- 3 Do **not** accomplish the following checklists:  
RESERVE BRAKES/STRG

### **Note: Inoperative Items**

**Nose landing gear hydraulic operation inop**  
Alternate gear extension is needed.

- 4 **Checklist Complete Except Deferred Items**

## Deferred Items

### **Descent Checklist**

Recall . . . . . Checked

Notes . . . . . Checked

Autobrake . . . . . \_\_\_\_

Landing data . . . . . VREF \_\_\_\_, Minimums \_\_\_\_

▼ Continued on next page ▼



▼HYD QTY LOW R+C continued▼

Approach briefing . . . . . Completed

Approach Checklist

Altimeters . . . . . \_\_\_\_\_

Alternate gear extension

Landing gear lever . . . . .DN

ALTN GEAR  
extend switch . . . . .Push to DOWN  
and hold until all gear  
show down or in transit

Reduction of airspeed to below 240 knots may be  
necessary for landing gear to lock down.

Do **not** accomplish the following checklist:

GEAR DOOR

Landing Checklist

Speedbrake . . . . .ARMED

Landing gear . . . . .DOWN

Flaps . . . . . \_\_\_\_\_

▼ Continued on next page ▼

## ▼HYD QTY LOW R+C continued▼

## Before landing

C1 ELEC PRIMARY pump switch . . . . . ON

This step restores alternate brakes from the reserve hydraulic source and may restore steering.

**Note:** In the event of a go-around or missed approach, consider turning off the C1 ELEC PRIMARY pump.



## [ ] RAT UNLOCKED

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

**Note:** The RAT provides hydraulic and electrical power for the rest of the flight.

**Note:** The battery is not being discharged while the RAT is providing electrical power.

**Note:** Fuel burn rate increases up to 2% with the RAT deployed. Verify sufficient fuel is available to complete the flight.

**Note:** Do not use FMC performance predictions with the RAT deployed.



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**Non-Normal Checklists**

**Chapter NNC**

**Landing Gear**

**Section 14**

**Table of Contents**

|                             |       |
|-----------------------------|-------|
| ANTISKID .....              | 14.1  |
| AUTOBRAKE .....             | 14.2  |
| BRAKE SOURCE .....          | 14.3  |
| BRAKE TEMP.....             | 14.4  |
| GEAR DISAGREE .....         | 14.6  |
| GEAR DOOR .....             | 14.9  |
| Gear Lever Locked Down..... | 14.9  |
| MAIN GEAR BRACE L, R .....  | 14.10 |
| MAIN GEAR STEERING .....    | 14.11 |
| RESERVE BRAKES/STRG .....   | 14.11 |
| TAIL SKID .....             | 14.12 |
| TIRE PRESS.....             | 14.12 |



## Table of Contents

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**[ ] ANTISKID**

Condition: An antiskid system fault occurs.

1 AUTOBRAKE selector. . . . . OFF

**Note:** The autobrake system is inoperative.

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

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

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

Check the Non-Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter or other approved source.

2 **Checklist Complete Except Deferred Items**

▼ Continued on next page ▼

▼ ANTISKID continued ▼

Deferred Items

Descent Checklist

- Recall . . . . . Checked
- Notes. . . . . Checked
- Autobrake . . . . . **.OFF**
- Landing data . . . . . VREF \_\_\_\_, Minimums \_\_
- Approach briefing . . . . . Completed

Approach Checklist

- Altimeters . . . . .

Landing Checklist

- Speedbrake . . . . . ARMED
- Landing gear . . . . . DOWN
- Flaps . . . . .



AUTOBRAKE

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



---

**[ ] BRAKE SOURCE**

---

Condition: Normal and alternate brake system pressures are low, and reserve hydraulic source for alternate brake system is low.

**Note:** Only accumulator pressure is available for braking. During landing rollout, apply steady, increasing brake pressure and hold to a full stop. Do not taxi.



[ ] BRAKE TEMP

Condition: One or more brake temperatures are high.

- 1 Choose one:

◆ On the **ground**:

▶▶ Go to step 2

◆ In **flight**:

▶▶ Go to step 6
- 2 Minimize taxiing.
- 3 Unless needed, do not set the parking brake.
- 4 Wheel fuse plugs can melt.
- 5 Refer to the Recommended Brake Cooling Schedule table in the Performance Inflight chapter for the needed cooling time and precautions.

■ ■ ■ ■
- 6 Do not exceed the gear EXTEND limit speed (270K/.82M).
- 7 Landing gear lever . . . . . DN
- 8 **When** the BRAKE TEMP message blanks:

Wait 8 minutes.

Landing gear lever . . . . . UP

■ ■ ■ ■



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**[ ] GEAR DISAGREE**

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

Objective: To extend the gear using alternate gear extension, or land on the available gear.

**Note:** Do not exceed the gear EXTEND limit speed (270K/.82M).

1 Choose one:

◆ Landing gear lever **UP**:

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

Do **not** accomplish the following checklists:

AUTO SPEEDBRAKE

GEAR DOOR



◆ Landing gear lever **DN**:

▶▶ **Go to step 2**

2 **ALTN GEAR**  
extend switch. . . . . Push to **DOWN**  
and hold until all gear  
show down or in transit

▼ **Continued on next page** ▼

▼ **GEAR DISAGREE** continued ▼

3 Reduction of airspeed to below 240 knots may be necessary for the gear to lock down.

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

GEAR DOOR

5 **Wait** 30 seconds.

6 Choose one:

◆ **All** gear indicate **DN**:



◆ **Any** gear indicate **UP or in transit**:

►► **Go to step 7**

7 Plan to land on the available gear.

8 GND PROX GEAR OVRD switch . . . . . OVRD

**Note:** Use flaps 30 for landing. This gives the slowest landing speed.

Do not arm the speedbrake lever.

When stopping distance is critical, extend the speedbrakes after all gear, or the nose, or the engine nacelle have contacted the runway.

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

9 **Checklist Complete Except Deferred Items**

▼ Continued on next page ▼



▼GEAR DISAGREE continued▼

Deferred Items

Descent Checklist

- Recall . . . . . Checked
- Notes. . . . . Checked
- Autobrake . . . . . \_\_\_\_
- Landing data . . . . .**VREF 30 \_\_\_\_**, **Minimums \_\_\_\_**
- Approach briefing . . . . . Completed

Approach Checklist

- Altimeters . . . . . \_\_\_\_

At pattern altitude

- OUTFLOW VALVE switches (both) . . . . .MAN

Use momentary actuation of the outflow valve manual switches to avoid large and rapid pressurization changes. Valves can take up to 6 seconds to move the first time.



OUTFLOW VALVES MANUAL

- switches (both) . . . . . Move to OPEN until the outflow valve indications show fully open to depressurize the airplane

- Fuel PUMPS switches (all) . . . . . Off

Do **not** accomplish the following checklists:

CABIN ALTITUDE AUTO

FUEL PRESS ENG L

▼ Continued on next page ▼



▼ **GEAR DISAGREE** continued ▼

**FUEL PRESS ENG R**


---

**Landing Checklist**

Speedbrake . . . . . **DOWN**  
 Landing gear . . . . . DOWN  
 Flaps . . . . . **30**




---

**[ ] GEAR DOOR**

---

Condition: One or more gear doors are not closed.

**Note:** Do not exceed the gear EXTEND limit speed (270K/.82M).




---

**Gear Lever Locked Down**

---

Condition: The landing gear lever cannot move to UP.

- 1 Landing gear lever  
LOCK OVRD switch . . . . . Push and hold
- 2 Landing gear lever . . . . . UP





[ ] MAIN GEAR BRACE L, R

Condition: The main gear is down with one brace unlocked.

1 GND PROX GEAR OVRD switch . . . . .OVRD

**Note:** Use flaps 30 for landing. This gives the slowest landing speed.  
Do not arm the speedbrake lever.  
Manually extend the speedbrakes after landing.

2 Checklist Complete Except Deferred Items

Deferred Items

Descent Checklist

Recall . . . . . Checked  
Notes. . . . . Checked  
Autobrake . . . . . \_\_\_\_  
Landing data . . . . .**VREF 30** \_\_\_\_, **Minimums** \_\_\_\_  
Approach briefing . . . . . Completed

Approach Checklist

Altimeters . . . . . \_\_\_\_

At pattern altitude

Fuel PUMPS switches (all) . . . . . Off  
Do **not** accomplish the following checklists:  
FUEL PRESS ENG L

▼ Continued on next page ▼

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▼ **MAIN GEAR BRACE L, R continued** ▼

FUEL PRESS ENG R

## Landing Checklist

Speedbrake . . . . . **DOWN**  
 Landing gear . . . . . DOWN  
 Flaps. . . . . **30**



## MAIN GEAR STEERING

Condition: Main gear steering does not lock.



## [ ] RESERVE BRAKES/STRG

Condition: One or more of these are possibly not available:

- Alternate brakes from the reserve hydraulic source
- Normal nose gear extension
- Nose wheel steering

**Note:** Plan for possible alternate gear extension.  
 Do not taxi with loss of steering.



**TAIL SKID****AP-BHV, AP-BHW, AP-BID, AP-BMS**

Condition: The tailskid is not in the commanded position.

**[ ] TIRE PRESS**

Condition: One or more tire pressures are not normal.

**Note:** If it can be determined that a main gear tire is flat, do not use the autobrake.





## Non-Normal Checklists

## Chapter NNC

### Warning Systems

### Section 15

#### Table of Contents

|                            |      |
|----------------------------|------|
| AIRSPEED LOW .....         | 15.1 |
| ALTITUDE ALERT .....       | 15.1 |
| ALTITUDE CALLOUTS .....    | 15.1 |
| CONFIG DOORS .....         | 15.1 |
| CONFIG FLAPS .....         | 15.1 |
| CONFIG GEAR .....          | 15.2 |
| CONFIG GEAR STEERING ..... | 15.2 |
| CONFIG PARKING BRAKE ..... | 15.2 |
| CONFIG RUDDER .....        | 15.2 |
| CONFIG SPOILERS .....      | 15.3 |
| CONFIG STABILIZER .....    | 15.3 |
| CONFIG WARNING SYS .....   | 15.3 |
| GND PROX SYS .....         | 15.3 |
| OVERSPEED .....            | 15.4 |
| PILOT RESPONSE .....       | 15.4 |
| TAIL STRIKE .....          | 15.4 |
| Tail Strike .....          | 15.5 |
| TCAS .....                 | 15.6 |
| TCAS OFF .....             | 15.6 |
| TCAS RA CAPTAIN, F/O ..... | 15.6 |
| TERR OVRD .....            | 15.6 |
| TERR POS .....             | 15.6 |
| WINDSHEAR SYS .....        | 15.7 |



## Table of Contents

Intentionally  
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**AIRSPPEED LOW**

---

Condition: Airspeed is less than minimum maneuvering speed.



---

**ALTITUDE ALERT**

---

Condition: A deviation from the MCP set altitude occurs.



---

**ALTITUDE CALLOUTS**

---

Condition: Altitude and minimums voice callouts during approach are not available.



---

**CONFIG DOORS**

---

Condition: An entry, forward cargo, or aft cargo door is not closed and latched and locked during takeoff.



---

**CONFIG FLAPS**

---

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



---

**CONFIG GEAR**

---

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

- Below 800 feet radio altitude and a thrust lever is at or near idle
- The flaps are in a landing position



---

**CONFIG GEAR STEERING**

---

Condition: Main gear steering is not locked during takeoff.



---

**CONFIG PARKING BRAKE**

---

Condition: The parking brake is set during takeoff.



---

**CONFIG RUDDER**

---

Condition: Rudder trim is not centered during takeoff.





## CONFIG SPOILERS

Condition: One of these occurs:

- The speedbrake lever is not down during takeoff
- The speedbrake lever is extended beyond ARMED in flight with climb thrust or greater



## CONFIG STABILIZER

Condition: The stabilizer is not in the greenband during takeoff.



## [ ] CONFIG WARNING SYS

Condition: A configuration warning system fault occurs.

**Note:** Radio altitude voice callouts and other aural alerts may not be available.



## [ ] GND PROX SYS

Condition: A ground proximity warning system fault occurs.

**Note:** Some or all ground proximity alerts are not available. Ground proximity alerts that occur are valid.



OVERSPEED

Condition: Airspeed is more than Vmo/Mmo.



PILOT RESPONSE

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



[ ] TAIL STRIKE

Condition: The tail hits the runway.

**Caution! Continued pressurization of the airplane can cause further structural damage.**

1    OUTFLOW VALVE switches (both) . . . . .MAN

Use momentary actuation of the outflow valves manual switches to avoid large and rapid pressurization changes. Valves can take up to 6 seconds to move the first time.

2     OUTFLOW VALVES MANUAL switches (both) . . . . . Move to OPEN until the outflow valve indications show fully open to depressurize the airplane

3    Plan to land at the nearest suitable airport.

▼ Continued on next page ▼

## ▼TAIL STRIKE continued▼

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

CABIN ALTITUDE AUTO



## Tail Strike

Condition: A tail strike is suspected or confirmed.

**Caution! Continued pressurization of the airplane can cause further structural damage.**

- 1 OUTFLOW VALVE switches (both) . . . . . MAN

Use momentary actuation of the outflow valves manual switches to avoid large and rapid pressurization changes. Valves can take up to 6 seconds to move the first time.

- 2  OUTFLOW VALVES MANUAL switches (both) . . . . . Move to OPEN until the outflow valve indications show fully open to depressurize the airplane

- 3 Plan to land at the nearest suitable airport.

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

CABIN ALTITUDE AUTO



**TCAS**

Condition: TCAS is failed.

**TCAS OFF**

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

**TCAS RA CAPTAIN, F/O**

Condition: TCAS cannot show RA guidance on the PFD.

**TERR OVRD**

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

**[ ] TERR POS**

Condition: Terrain position data is lost.

**Note:** Position data for the ND terrain map and look-ahead terrain alerts are lost. Ground proximity alerts that occur are valid.



**[ ] WINDSHEAR SYS**

Condition: A windshear system fault occurs.

**Note:** Some or all windshear alerts are not available. Windshear alerts that occur are valid.



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777 Flight Crew Operations Manual

Operational Information

Chapter OI

Table of Contents

Section TOC

|                       |             |
|-----------------------|-------------|
| <b>Ops Info</b> ..... | <b>OI.1</b> |
| Introduction .....    | OI.1.1      |



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## **Introduction**

**This Section Reserved For Operator-Developed Information**

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# Operational Information

# Chapter 01

## Non -Normal Procedure

## BOMB ON BOARD Checklist

## Section 1A

**Condition: Specific threat that is bomb on board and confirmed by Situation Room / ATC or suspected or confirmed bomb on board.**

Choose one:

- ◆ Aircraft on ground
  - ▶▶ Go to step 22
- ◆ Aircraft in Flight
  - ▶▶ Go to step 1

1. AIRCRAFT (if climbing) ..... LEVEL OFF
2. EMERGENCY ..... DECLARE

**Note: Declare emergency with ATC**

3. TRANSPONDER ..... SQUAWK 7700
4. CABIN CREW ..... NOTIFY
5. CABIN SIGNS ..... ON
6. LANDING ALT SELECTOR ..... PULL, SET MANUALLY

**Note: Set to current cabin altitude. Do not raise cabin altitude.**

7. Plan to land at the nearest suitable airport. If no specific instruction given by situation room or ATC, land as soon as possible.
8. DESCENT ..... INITIATE

**Note: Reduce cabin pressure to zero by descending to indicated cabin altitude as soon as practical below 10000 ft observing MSAs. Avoid abrupt/sharp maneuvers and turbulence as much as possible to prevent the bomb from moving.**

9. SPEED ..... DETERMINE

**Note: Select the most appropriate speed, taking into account the time to destination, the fuel consumption and the fact that low speed could reduce the consequence of possible structural damage, if the bomb explodes. Turbulence penetration speed is more appropriate if distance to landing is in question.**

10. FUEL QUANTITY ..... CHECK

**Note: Determine fuel reserves. The detonation could damage the landing systems. Therefore, if fuel permits, configure the aircraft for landing as soon as possible. Flying with flaps and landing gear extended will increase fuel consumption with incorrect fuel prediction by the FMC.**

11. CABIN CREW ..... BRIEF

12. Choose one :

- ◆ **If on-board search is required:**  
Use the BOMB SEARCH procedure available in the SEP. Make passenger announcement as per SEP manual.  
▶▶ Go to step 13
- ◆ **If on-board search is not required:**  
▶▶ Go to step 14

13. If a suspected device is found or confirmed:

Cabin crew to use the Cabin Procedures mention in SEP.

Announce the initials only on PA for any Bomb Disposal (BD) or Explosive Ordinance Disposal (EOD) personnel.

14. **When cabin differential pressure is zero:**

OUTFLOW VALUE switches (Both) ..... MAN

OUTFLOW VALUE MANUAL switches (Both) ..... OPEN

**Note: Position outflow valves fully open to depressurize airplane.**

15. If fuel quantity permits:

FLAPS ..... EXTEND

**Note: Use normal configuration for landing**

LANDING GEAR (Except for flight over water) ..... DOWN

**Note:** The detonation could damage the landing system. If fuel permits configure the aircraft for landing as soon as possible. Consider reducing airspeed and establishing landing configuration early. Fuel prediction by the FMC is unreliable.

16. EVACUATION PROCEDURE ..... ESTABLISH

**Note:**

◆ Item found:

Aircraft to be parked as soon as possible at a location agreed with ATC. Disembark passengers using escape slides on the side of the aircraft away from LRBL (Least bomb risk location). Do not use the exit just opposite the bomb location.

◆ Nothing found:

Request for steps and ground power unit to be made available at the designated parking bay. Disembark all passengers and crew with their hand baggage by steps or jetties. Only in extreme emergencies should escape slides be used.

17. CABIN CREW ..... BRIEF

18. Situation room.....ADVISE

19. ATC ..... NOTIFY

**Note: Check the designated parking area from ATC**

20. Do not accomplish the following checklists:

CABIN ALTITUDE AUTO

LANDING ALTITUDE

21. Checklist Complete Except Deferred Items

Deferred Items

Aircraft on Ground

22. Choose one:

◆ After pushback or after landing

Proceed to designated parking area as directed by ATC.

▶▶ Go to step 23

◆ Before pushback

Remain at present position

▶▶ Go to step 23

23. PARKING BRAKE..... SET

24. CABIN CREW / ATC / ENGINEERING .....NOTIFY

25. Choose one:

◆ If ground power is available:

GROUND POWER ..... CONNECT

**Note: It is preferable that Ground Power is used**

▶▶ Go to step 26

◆ If ground power is not available

APU (if available) .....START

▶▶ Go to step 26

26. ENGINES ..... SHUTDOWN

27. EVACUATION PROCEDURE ..... ESTABLISH

**Note:**

◆ Item found:

Aircraft to be parked as soon as possible at a location agreed with ATC and passengers disembarked using escape slides on the side of the aircraft away from LRBL. Do not use the exit just opposite the bomb location.

◆ Nothing found:

Request for steps and ground power unit, to be made available at the designated parking bay. Disembark all passengers and crew with their hand baggage by steps or jetties. Only in extreme emergencies should escape slides be used.

28. PASSENGERS..... EVACUATE or DISEMBARK



777 Flight Crew Operations Manual

**Performance Inflight - QRH**

**Chapter PI-QRH**

**Table of Contents**

**Section TOC**

**777-200ER GE90-94B KG M FAA**

**TO1-10 TO2-20 ----- PI-QRH.10.1**

**777-200LR GE90-110B1L KG M FAA**

**TO1-10 TO2-20 ----- PI-QRH.20.1**

**777-300ER GE90-115BL KG M FAA TO1-10**

**TO2-20 PCC2 ----- PI-QRH.30.1**

**777-300ER GE90-115BL KG M JAA PAX GAS TO-10**

**TO2-20 ----- PI-QRH.40.1**



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**Performance Inflight - QRH****Chapter PI-QRH****Table of Contents****Section 10****777-200ER GE90-94B KG M FAA TO1-10 TO2-20****Pkg Model Identification ..... PI-QRH.ModID.10.1****General ..... PI-QRH.10.1**

Flight With Unreliable Airspeed / Turbulent Air

Penetration ..... PI-QRH.10.1

Max Climb %N1 ..... PI-QRH.10.4

Go-around %N1 ..... PI-QRH.10.5

VREF ..... PI-QRH.10.6

**Advisory Information..... PI-QRH.11.1**

Normal Configuration Landing Distance ..... PI-QRH.11.1

Non-Normal Configuration Landing Distance ..... PI-QRH.11.4

ADIRU/GPS DISAGREE (Flaps 25) ..... PI-QRH.11.4

ADIRU/GPS DISAGREE (Flaps 30) ..... PI-QRH.11.5

AIR DATA SYS (Flaps 20) ..... PI-QRH.11.6

Airspeed Unreliable (Flaps 20) ..... PI-QRH.11.7

ANTISKID (Flaps 25)..... PI-QRH.11.8

ANTISKID (Flaps 30)..... PI-QRH.11.9

ENG SHUTDOWN L, R (Flaps 20) ..... PI-QRH.11.10

ENG SHUTDOWN L, R (Flaps 30) ..... PI-QRH.11.11

FLAP / SLAT CONTROL (Flaps 20) ..... PI-QRH.11.12

FLAPS DRIVE (Flaps  $\leq 5$ ) ..... PI-QRH.11.13FLAPS DRIVE ( $5 < \text{Flaps} < 20$ ) ..... PI-QRH.11.14FLAPS DRIVE (Flaps  $\geq 20$ ) ..... PI-QRH.11.15

FLAPS PRIMARY FAIL (Flaps 20) ..... PI-QRH.11.16

FLIGHT CONTROL MODE (Flaps 20)..... PI-QRH.11.17

FLIGHT CONTROLS (Flaps 20) ..... PI-QRH.11.18

HYD PRESS SYS C (Flaps 20) ..... PI-QRH.11.19

HYD PRESS SYS L (Flaps 25)..... PI-QRH.11.20

HYD PRESS SYS L (Flaps 30)..... PI-QRH.11.21



|                                               |              |
|-----------------------------------------------|--------------|
| HYD PRESS SYS L+C (Flaps 20) .....            | PI-QRH.11.22 |
| HYD PRESS SYS L+R (Flaps 20) .....            | PI-QRH.11.23 |
| HYD PRESS SYS R (Flaps 25).....               | PI-QRH.11.24 |
| HYD PRESS SYS R (Flaps 30).....               | PI-QRH.11.25 |
| HYD PRESS SYS R+C (Flaps 20) .....            | PI-QRH.11.26 |
| NAV AIR DATA SYS (Flaps 20).....              | PI-QRH.11.27 |
| PITCH DOWN AUTHORITY (Flaps 25).....          | PI-QRH.11.28 |
| PITCH DOWN AUTHORITY (Flaps 30).....          | PI-QRH.11.29 |
| PITCH UP AUTHORITY (Flaps ≤ 15) .....         | PI-QRH.11.30 |
| PITCH UP AUTHORITY (Flaps ≥ 20) .....         | PI-QRH.11.31 |
| PRI FLIGHT COMPUTERS (Flaps 20) .....         | PI-QRH.11.32 |
| SLATS DRIVE (Flaps 20).....                   | PI-QRH.11.33 |
| SPOILERS (Flaps 25) .....                     | PI-QRH.11.34 |
| SPOILERS (Flaps 30) .....                     | PI-QRH.11.35 |
| STABILIZER (Flaps 20) .....                   | PI-QRH.11.36 |
| Recommended Brake Cooling Schedule. ....      | PI-QRH.11.37 |
| Approach or Landing Climb Limited Weight..... | PI-QRH.11.39 |

## **Engine Inoperative .....PI-QRH.12.1**

|                                                 |              |
|-------------------------------------------------|--------------|
| Initial Max Continuous %N1 .....                | PI-QRH.12.1  |
| Max Continuous %N1.....                         | PI-QRH.12.2  |
| Driftdown Speed/Level Off Altitude.....         | PI-QRH.12.5  |
| Driftdown/LRC Cruise Range Capability.....      | PI-QRH.12.6  |
| Long Range Cruise Altitude Capability .....     | PI-QRH.12.7  |
| Long Range Cruise Control .....                 | PI-QRH.12.8  |
| Long Range Cruise Diversion Fuel and Time.....  | PI-QRH.12.9  |
| Holding .....                                   | PI-QRH.12.10 |
| Gear Down Landing Rate of Climb Available ..... | PI-QRH.12.11 |

## **Gear Down.....PI-QRH.13.1**

|                                               |             |
|-----------------------------------------------|-------------|
| 220 KIAS Max Climb %N1 .....                  | PI-QRH.13.1 |
| Long Range Cruise Altitude Capability .....   | PI-QRH.13.1 |
| Long Range Cruise Control .....               | PI-QRH.13.2 |
| Long Range Cruise Enroute Fuel and Time ..... | PI-QRH.13.3 |





777 Flight Crew Operations Manual

---

|                                                 |                    |
|-------------------------------------------------|--------------------|
| Descent at VREF30 + 80 .....                    | PI-QRH.13.4        |
| Holding .....                                   | PI-QRH.13.5        |
| <b>Gear Down, Engine Inoperative .....</b>      | <b>PI-QRH.14.1</b> |
| Driftdown Speed/Level Off Altitude .....        | PI-QRH.14.1        |
| Long Range Cruise Altitude Capability .....     | PI-QRH.14.1        |
| Long Range Cruise Control .....                 | PI-QRH.14.2        |
| Long Range Cruise Diversion Fuel and Time ..... | PI-QRH.14.3        |
| Holding .....                                   | PI-QRH.14.5        |
| <b>Text .....</b>                               | <b>PI-QRH.15.1</b> |
| Introduction .....                              | PI-QRH.15.1        |
| General .....                                   | PI-QRH.15.1        |
| Advisory Information .....                      | PI-QRH.15.2        |
| Engine Inoperative .....                        | PI-QRH.15.4        |
| Gear Down .....                                 | PI-QRH.15.6        |



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**Performance Inflight - QRH**  
**Pkg Model Identification****Chapter PI-QRH**  
**Section 10****General**

The table below shows the airplanes that have been identified with the following performance package. Note, some airplanes may be identified with more than one performance package. This configuration table information reflects the Boeing delivered configuration updated for service bulletin incorporations in conformance with the policy stated in the introduction section of the FCOM. The performance data is prepared for the owner/operator named on the title page. The intent of this information is to assist flight crews and airlines in knowing which performance package is applicable to a given airplane. The performance package model identification information is based on Boeing's knowledge of the airline's fleet at a point in time approximately three months prior to the page date. Notice of Errata (NOE) will not be provided to airlines to identify airplanes that are moved between performance packages within this manual or airplanes added to the airline's fleet whose performance packages are already represented in this manual. These types of changes will be updated in the next block revision. Owners/operators are responsible for ensuring the operational documentation they are using is complete and matches the current configuration of their airplanes, and the accuracy and validity of all information furnished by the owner/operator or any other party. Owners/operators receiving active revision service are responsible to ensure that any modifications to the listed airplanes are properly reflected in this manual.

Airplane number is supplied by the operator. Registry number is supplied by the national regulatory agency. Serial and tabulation numbers are supplied by Boeing.

| <b>Airplane Number</b> | <b>Registry Number</b> | <b>Serial Number</b> | <b>Tabulation Number</b> |
|------------------------|------------------------|----------------------|--------------------------|
| 001                    | AP-BGJ                 | 33775                | WC446                    |
| 002                    | AP-BGK                 | 33776                | WC447                    |
| 003                    | AP-BGL                 | 33777                | WC448                    |
| 212                    | AP-BHX                 | 35296                | WC449                    |
| 208                    | AP-BMG                 | 32716                | WC363                    |
| 209                    | AP-BMH                 | 32717                | WC364                    |

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## Performance Inflight - QRH

## Chapter PI-QRH

## General

## Section 10

**Flight With Unreliable Airspeed / Turbulent Air Penetration**

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

**Climb****Flaps Up, Set Max Climb Thrust**

| PRESSURE ALTITUDE (FT)<br>(SPEED) |                                  | WEIGHT (1000 KG)    |                     |                     |                    |
|-----------------------------------|----------------------------------|---------------------|---------------------|---------------------|--------------------|
|                                   |                                  | 160                 | 200                 | 240                 | 280                |
| 40000<br>(.82M)                   | <b>PITCH ATT</b><br>V/S (FT/MIN) | <b>4.0</b><br>1600  | <b>3.5</b><br>900   |                     |                    |
| 30000<br>(280 KIAS)               | <b>PITCH ATT</b><br>V/S (FT/MIN) | <b>4.5</b><br>2400  | <b>4.5</b><br>1800  | <b>4.5</b><br>1300  | <b>4.5</b><br>800  |
| 20000<br>(270 KIAS)               | <b>PITCH ATT</b><br>V/S (FT/MIN) | <b>7.0</b><br>3500  | <b>6.5</b><br>2600  | <b>6.5</b><br>2000  | <b>6.5</b><br>1500 |
| 10000<br>(270 KIAS)               | <b>PITCH ATT</b><br>V/S (FT/MIN) | <b>10.0</b><br>4500 | <b>8.5</b><br>3500  | <b>8.0</b><br>2700  | <b>8.0</b><br>2200 |
| SEA LEVEL<br>(270 KIAS)           | <b>PITCH ATT</b><br>V/S (FT/MIN) | <b>13.0</b><br>5400 | <b>11.0</b><br>4200 | <b>10.0</b><br>3400 | <b>9.5</b><br>2700 |

**Cruise****Flaps Up, %N1 for Level Flight**

| PRESSURE ALTITUDE (FT)<br>(SPEED) |                         | WEIGHT (1000 KG)   |                    |                    |                    |
|-----------------------------------|-------------------------|--------------------|--------------------|--------------------|--------------------|
|                                   |                         | 160                | 200                | 240                | 280                |
| 40000<br>(.82M)                   | <b>PITCH ATT</b><br>%N1 | <b>2.0</b><br>87.2 | <b>2.5</b><br>91.2 |                    |                    |
| 35000<br>(280 KIAS)               | <b>PITCH ATT</b><br>%N1 | <b>1.5</b><br>84.3 | <b>2.0</b><br>86.7 | <b>2.5</b><br>89.8 | <b>3.0</b><br>94.7 |
| 30000<br>(280 KIAS)               | <b>PITCH ATT</b><br>%N1 | <b>1.5</b><br>79.7 | <b>2.0</b><br>82.3 | <b>3.0</b><br>85.5 | <b>3.5</b><br>89.3 |
| 25000<br>(280 KIAS)               | <b>PITCH ATT</b><br>%N1 | <b>1.5</b><br>75.5 | <b>2.0</b><br>77.9 | <b>3.0</b><br>80.7 | <b>3.5</b><br>84.3 |
| 20000<br>(270 KIAS)               | <b>PITCH ATT</b><br>%N1 | <b>2.0</b><br>70.5 | <b>2.5</b><br>72.9 | <b>3.0</b><br>75.9 | <b>4.0</b><br>79.2 |
| 15000<br>(270 KIAS)               | <b>PITCH ATT</b><br>%N1 | <b>1.5</b><br>66.2 | <b>2.5</b><br>68.5 | <b>3.0</b><br>71.3 | <b>4.0</b><br>74.5 |

**Descent****Flaps Up, Set Idle Thrust**

| PRESSURE ALTITUDE (FT)<br>(SPEED) |                                  | WEIGHT (1000 KG)     |                      |                     |                     |
|-----------------------------------|----------------------------------|----------------------|----------------------|---------------------|---------------------|
|                                   |                                  | 160                  | 200                  | 240                 | 280                 |
| 40000<br>(.82M)                   | <b>PITCH ATT</b><br>V/S (FT/MIN) | <b>-1.5</b><br>-2700 | <b>-0.5</b><br>-2600 |                     |                     |
| 30000<br>(280 KIAS)               | <b>PITCH ATT</b><br>V/S (FT/MIN) | <b>-1.5</b><br>-2200 | <b>-0.5</b><br>-2000 | <b>0.5</b><br>-1900 | <b>1.0</b><br>-1900 |
| 20000<br>(270 KIAS)               | <b>PITCH ATT</b><br>V/S (FT/MIN) | <b>-1.0</b><br>-1800 | <b>0.0</b><br>-1600  | <b>1.0</b><br>-1600 | <b>1.5</b><br>-1500 |
| 10000<br>(270 KIAS)               | <b>PITCH ATT</b><br>V/S (FT/MIN) | <b>-1.5</b><br>-1700 | <b>-0.5</b><br>-1500 | <b>0.5</b><br>-1400 | <b>1.5</b><br>-1400 |
| SEA LEVEL<br>(270 KIAS)           | <b>PITCH ATT</b><br>V/S (FT/MIN) | <b>-1.5</b><br>-1400 | <b>0.0</b><br>-1200  | <b>0.5</b><br>-1200 | <b>1.5</b><br>-1200 |

**Flight With Unreliable Airspeed / Turbulent Air Penetration**

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

**Holding**

**Flaps Up, Set Thrust for Level Flight**

| PRESSURE ALTITUDE (FT) |                  | WEIGHT (1000 KG) |            |            |            |
|------------------------|------------------|------------------|------------|------------|------------|
|                        |                  | 160              | 200        | 240        | 280        |
| 10000                  | <b>PITCH ATT</b> | <b>4.0</b>       | <b>4.5</b> | <b>5.0</b> | <b>5.0</b> |
|                        | %N1              | 55.2             | 60.4       | 65.1       | 69.5       |
|                        | KIAS             | 201              | 215        | 229        | 247        |
| 5000                   | <b>PITCH ATT</b> | <b>4.0</b>       | <b>4.5</b> | <b>5.0</b> | <b>5.0</b> |
|                        | %N1              | 52.1             | 56.9       | 61.5       | 65.7       |
|                        | KIAS             | 201              | 215        | 229        | 246        |

**Terminal Area (5000 FT)**

**%N1 for Level Flight**

| FLAP POSITION<br>(VREF + INCREMENT)  |                  | WEIGHT (1000 KG) |            |            |            |            |
|--------------------------------------|------------------|------------------|------------|------------|------------|------------|
|                                      |                  | 160              | 200        | 240        | 280        | 300        |
| FLAPS UP<br>GEAR UP<br>(VREF30+80)   | <b>PITCH ATT</b> | <b>4.0</b>       | <b>5.0</b> | <b>5.5</b> | <b>5.5</b> | <b>6.0</b> |
|                                      | %N1              | 52.4             | 57.2       | 61.9       | 66.3       | 68.3       |
|                                      | KIAS             | 209              | 215        | 228        | 240        | 247        |
| FLAPS 1<br>GEAR UP<br>(VREF30+60)    | <b>PITCH ATT</b> | <b>5.0</b>       | <b>6.5</b> | <b>7.0</b> | <b>7.0</b> | <b>7.5</b> |
|                                      | %N1              | 52.7             | 57.8       | 62.8       | 67.3       | 69.4       |
|                                      | KIAS             | 189              | 195        | 208        | 220        | 227        |
| FLAPS 5<br>GEAR UP<br>(VREF30+40)    | <b>PITCH ATT</b> | <b>4.0</b>       | <b>5.5</b> | <b>5.5</b> | <b>6.0</b> | <b>6.0</b> |
|                                      | %N1              | 53.8             | 59.2       | 64.4       | 68.9       | 71.0       |
|                                      | KIAS             | 169              | 175        | 188        | 200        | 207        |
| FLAPS 15<br>GEAR UP<br>(VREF30+20)   | <b>PITCH ATT</b> | <b>4.5</b>       | <b>6.0</b> | <b>6.5</b> | <b>6.5</b> | <b>6.5</b> |
|                                      | %N1              | 54.0             | 60.5       | 65.9       | 70.7       | 72.9       |
|                                      | KIAS             | 149              | 155        | 168        | 180        | 187        |
| FLAPS 20<br>GEAR DOWN<br>(VREF30+20) | <b>PITCH ATT</b> | <b>3.0</b>       | <b>4.5</b> | <b>5.0</b> | <b>5.0</b> | <b>5.0</b> |
|                                      | %N1              | 61.3             | 67.1       | 72.6       | 77.5       | 79.6       |
|                                      | KIAS             | 149              | 155        | 168        | 180        | 187        |

**Final Approach (1500 FT)**

**Gear Down, %N1 for 3° Glideslope**

| FLAP POSITION<br>(VREF + INCREMENT) |                  | WEIGHT (1000 KG) |            |            |            |            |
|-------------------------------------|------------------|------------------|------------|------------|------------|------------|
|                                     |                  | 160              | 200        | 240        | 280        | 300        |
| FLAPS 20<br>(VREF20+10)             | <b>PITCH ATT</b> | <b>1.0</b>       | <b>1.5</b> | <b>1.5</b> | <b>1.5</b> | <b>1.5</b> |
|                                     | %N1              | 41.4             | 46.0       | 50.2       | 53.8       | 55.4       |
|                                     | KIAS             | 141              | 157        | 171        | 184        | 190        |
| FLAPS 25<br>(VREF25+10)             | <b>PITCH ATT</b> | <b>1.0</b>       | <b>1.0</b> | <b>1.0</b> | <b>1.0</b> | <b>1.0</b> |
|                                     | %N1              | 53.4             | 56.6       | 60.8       | 64.8       | 66.7       |
|                                     | KIAS             | 139              | 152        | 165        | 178        | 184        |
| FLAPS 30<br>(VREF30+10)             | <b>PITCH ATT</b> | <b>0.5</b>       | <b>1.0</b> | <b>1.0</b> | <b>1.0</b> | <b>1.0</b> |
|                                     | %N1              | 59.6             | 61.4       | 66.1       | 70.6       | 72.6       |
|                                     | KIAS             | 139              | 145        | 158        | 170        | 176        |

**Flight With Unreliable Airspeed / Turbulent Air Penetration**

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

**Go-Around****Flaps 20, Gear Up, Set Go-Around Thrust**

| PRESSURE ALTITUDE (FT) |                  | WEIGHT (1000 KG) |             |             |             |             |
|------------------------|------------------|------------------|-------------|-------------|-------------|-------------|
|                        |                  | 160              | 200         | 240         | 280         | 300         |
| 10000                  | <b>PITCH ATT</b> | <b>17.0</b>      | <b>13.5</b> | <b>11.5</b> | <b>10.0</b> | <b>9.0</b>  |
|                        | V/S (FT/MIN)     | 3700             | 2900        | 2300        | 1800        | 1600        |
|                        | KIAS             | 141              | 155         | 169         | 181         | 187         |
| 5000                   | <b>PITCH ATT</b> | <b>20.5</b>      | <b>16.5</b> | <b>14.0</b> | <b>12.0</b> | <b>11.0</b> |
|                        | V/S (FT/MIN)     | 4600             | 3600        | 2900        | 2400        | 2100        |
|                        | KIAS             | 143              | 155         | 168         | 180         | 187         |
| SEA LEVEL              | <b>PITCH ATT</b> | <b>22.5</b>      | <b>19.0</b> | <b>16.0</b> | <b>13.5</b> | <b>12.5</b> |
|                        | V/S (FT/MIN)     | 5300             | 4100        | 3300        | 2800        | 2500        |
|                        | KIAS             | 149              | 155         | 168         | 180         | 186         |

## Max Climb %N1

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

| TAT |     | PRESSURE ALTITUDE (FT) SPEED (IAS/MACH) |         |         |         |         |         |         |         |         |         |
|-----|-----|-----------------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
|     |     | 0                                       | 5000    | 10000   | 15000   | 20000   | 25000   | 30000   | 35000   | 40000   | 43000   |
| °C  | °F  | 310/.47                                 | 310/.51 | 310/.56 | 310/.61 | 310/.67 | 310/.74 | 310/.81 | 287/.84 | 256/.84 | 239/.84 |
| 60  | 140 | 89.7                                    | 89.4    | 91.2    | 93.6    | 96.4    | 98.9    | 102.2   | 106.0   | 106.0   | 104.7   |
| 50  | 122 | 91.4                                    | 91.0    | 91.1    | 92.2    | 94.9    | 97.4    | 100.6   | 104.4   | 104.4   | 103.1   |
| 40  | 104 | 93.4                                    | 93.4    | 93.3    | 93.3    | 93.7    | 95.9    | 99.1    | 102.8   | 102.7   | 101.5   |
| 30  | 86  | 92.5                                    | 95.2    | 95.2    | 95.2    | 95.4    | 96.1    | 97.6    | 101.2   | 101.1   | 99.8    |
| 20  | 68  | 91.0                                    | 93.6    | 96.2    | 97.0    | 97.3    | 97.6    | 98.9    | 99.9    | 99.4    | 98.2    |
| 15  | 59  | 90.2                                    | 92.8    | 95.3    | 97.7    | 97.9    | 98.2    | 99.4    | 100.4   | 99.9    | 99.5    |
| 10  | 50  | 89.4                                    | 92.0    | 94.5    | 96.9    | 98.4    | 98.8    | 99.9    | 100.8   | 100.4   | 100.2   |
| 5   | 41  | 88.6                                    | 91.2    | 93.7    | 96.0    | 97.9    | 99.3    | 100.4   | 101.4   | 100.9   | 100.6   |
| 0   | 32  | 87.8                                    | 90.3    | 92.8    | 95.1    | 97.0    | 99.1    | 101.1   | 102.4   | 101.6   | 101.2   |
| -5  | 23  | 87.0                                    | 89.5    | 92.0    | 94.3    | 96.1    | 98.2    | 101.2   | 103.5   | 102.6   | 102.1   |
| -10 | 14  | 86.2                                    | 88.7    | 91.1    | 93.4    | 95.2    | 97.3    | 100.3   | 104.3   | 103.5   | 103.0   |
| -15 | 5   | 85.4                                    | 87.8    | 90.2    | 92.5    | 94.3    | 96.3    | 99.3    | 103.9   | 103.9   | 103.9   |
| -20 | -4  | 84.6                                    | 87.0    | 89.4    | 91.6    | 93.4    | 95.4    | 98.3    | 102.9   | 102.9   | 102.8   |
| -25 | -13 | 83.7                                    | 86.1    | 88.5    | 90.7    | 92.4    | 94.4    | 97.4    | 101.9   | 101.9   | 101.8   |
| -30 | -22 | 82.9                                    | 85.2    | 87.6    | 89.8    | 91.5    | 93.5    | 96.4    | 100.9   | 100.9   | 100.8   |
| -35 | -31 | 82.0                                    | 84.4    | 86.7    | 88.8    | 90.6    | 92.5    | 95.4    | 99.8    | 99.8    | 99.7    |
| -40 | -40 | 81.2                                    | 83.5    | 85.8    | 87.9    | 89.6    | 91.5    | 94.4    | 98.8    | 98.8    | 98.7    |

## %N1 Adjustments for Engine Bleed

| BLEED CONFIGURATION           | AIRPORT PRESSURE ALTITUDE (1000 FT) |      |      |      |      |      |      |      |      |      |
|-------------------------------|-------------------------------------|------|------|------|------|------|------|------|------|------|
|                               | 0                                   | 5    | 10   | 15   | 20   | 25   | 30   | 35   | 40   | 43   |
| 2 PACKS ON - 1 BLEED SOURCE   | -0.4                                | -0.4 | -0.5 | -0.5 | -0.4 | -0.4 | -0.3 | -0.3 | -0.3 | -0.3 |
| 1 PACK ON - 2 BLEED SOURCE    | -0.4                                | -0.4 | -0.5 | -0.5 | -0.4 | -0.4 | -0.4 | -0.3 | -0.3 | -0.3 |
| 1 PACK ON - 1 BLEED SOURCES   | -0.4                                | -0.4 | -0.5 | -0.5 | -0.4 | -0.4 | -0.3 | -0.3 | -0.3 | -0.3 |
| ENGINE ANTI-ICE ON            | -0.2                                | -0.3 | -0.3 | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 |
| ENGINE AND WING ANTI-ICE ON*  | -0.3                                | -0.4 | -0.4 | -0.4 | -0.3 | -0.3 | -0.3 | -0.3 | -0.3 | -0.3 |
| ENGINE AND WING ANTI-ICE ON** | -0.3                                | -0.5 | -0.5 | -0.5 | -0.5 | -0.5 | -0.4 | -0.4 | -0.4 | -0.4 |

\*Packs on, or packs off with 2 bleed sources.

\*\*Packs off with 1 bleed source.



**Go-around %N1****Based on engine bleed for packs on, engine anti-ice on or off, and wing anti-ice off**

| REPORTED OAT |     | TAT | AIRPORT PRESSURE ALTITUDE (FT) |       |       |       |       |       |       |       |       |       |       |       |       |
|--------------|-----|-----|--------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| °C           | °F  | °C  | -2000                          | -1000 | 0     | 1000  | 2000  | 3000  | 4000  | 5000  | 6000  | 7000  | 8000  | 9000  | 10000 |
| 66           | 150 | 70  | 95.3                           | 95.5  | 95.7  | 95.7  | 95.8  | 95.9  | 96.0  | 96.0  | 96.1  | 96.1  | 95.8  | 94.6  | 93.4  |
| 56           | 133 | 60  | 98.1                           | 98.3  | 98.5  | 98.6  | 98.6  | 98.7  | 98.8  | 98.8  | 98.9  | 99.0  | 98.6  | 97.5  | 96.3  |
| 51           | 124 | 55  | 99.5                           | 99.7  | 99.9  | 100.0 | 99.9  | 100.1 | 100.2 | 100.2 | 100.3 | 100.3 | 100.0 | 98.8  | 97.7  |
| 46           | 115 | 50  | 100.9                          | 101.2 | 101.4 | 101.4 | 101.4 | 101.4 | 101.5 | 101.5 | 101.6 | 101.6 | 101.3 | 100.2 | 99.0  |
| 41           | 106 | 45  | 102.0                          | 102.6 | 102.9 | 102.8 | 102.9 | 102.8 | 102.9 | 102.9 | 102.9 | 102.9 | 102.6 | 101.5 | 100.3 |
| 36           | 97  | 40  | 102.7                          | 103.5 | 104.1 | 104.1 | 104.1 | 104.0 | 104.0 | 103.9 | 104.1 | 104.1 | 103.5 | 102.6 | 101.6 |
| 31           | 88  | 35  | 102.5                          | 103.8 | 104.7 | 104.7 | 104.6 | 104.7 | 104.7 | 104.7 | 104.7 | 104.7 | 104.1 | 103.2 | 102.4 |
| 26           | 79  | 30  | 101.7                          | 103.0 | 104.2 | 104.8 | 105.3 | 105.3 | 105.5 | 105.6 | 105.7 | 105.5 | 104.9 | 103.8 | 102.9 |
| 21           | 70  | 25  | 100.9                          | 102.1 | 103.3 | 103.9 | 104.5 | 105.1 | 105.9 | 106.3 | 106.7 | 107.0 | 106.3 | 104.9 | 103.8 |
| 16           | 61  | 20  | 100.0                          | 101.2 | 102.5 | 103.1 | 103.7 | 104.3 | 105.0 | 105.8 | 106.7 | 107.5 | 107.1 | 106.2 | 105.0 |
| 11           | 53  | 15  | 99.2                           | 100.4 | 101.6 | 102.2 | 102.8 | 103.4 | 104.1 | 104.9 | 105.8 | 106.6 | 106.8 | 106.2 | 105.4 |
| 7            | 44  | 10  | 98.3                           | 99.5  | 100.7 | 101.3 | 101.9 | 102.5 | 103.2 | 104.0 | 104.9 | 105.7 | 105.8 | 105.3 | 104.7 |
| 2            | 35  | 5   | 97.4                           | 98.6  | 99.8  | 100.4 | 101.0 | 101.6 | 102.3 | 103.1 | 104.0 | 104.7 | 104.9 | 104.3 | 103.8 |
| -3           | 26  | 0   | 96.5                           | 97.7  | 98.9  | 99.5  | 100.1 | 100.6 | 101.4 | 102.1 | 103.0 | 103.8 | 103.9 | 103.4 | 102.9 |
| -13          | 8   | -10 | 94.8                           | 95.9  | 97.1  | 97.7  | 98.2  | 98.8  | 99.5  | 100.2 | 101.1 | 101.9 | 102.0 | 101.5 | 101.0 |
| -23          | -10 | -20 | 92.9                           | 94.1  | 95.2  | 95.8  | 96.3  | 96.9  | 97.6  | 98.3  | 99.2  | 99.9  | 100.1 | 99.5  | 99.0  |
| -33          | -27 | -30 | 91.1                           | 92.2  | 93.3  | 93.9  | 94.4  | 95.0  | 95.6  | 96.4  | 97.2  | 97.9  | 98.1  | 97.6  | 97.0  |
| -43          | -45 | -40 | 89.2                           | 90.3  | 91.4  | 91.9  | 92.4  | 93.0  | 93.6  | 94.4  | 95.2  | 95.9  | 96.0  | 95.5  | 95.0  |
| -53          | -63 | -50 | 87.3                           | 88.3  | 89.4  | 89.9  | 90.4  | 91.0  | 91.6  | 92.3  | 93.1  | 93.8  | 94.0  | 93.5  | 93.0  |

**%N1 Adjustments for Engine Bleed**

| BLEED CONFIGURATION | AIRPORT PRESSURE ALTITUDE(FT) |       |      |      |      |      |      |      |      |      |      |      |       |
|---------------------|-------------------------------|-------|------|------|------|------|------|------|------|------|------|------|-------|
|                     | -2000                         | -1000 | 0    | 1000 | 2000 | 3000 | 4000 | 5000 | 6000 | 7000 | 8000 | 9000 | 10000 |
| PACKS OFF           | 0.3                           | 0.3   | 0.3  | 0.3  | 0.3  | 0.4  | 0.4  | 0.4  | 0.4  | 0.4  | 0.4  | 0.5  | 0.5   |
| 1 PACK ON           | -0.3                          | -0.3  | -0.3 | -0.3 | -0.3 | -0.4 | -0.4 | -0.4 | -0.4 | -0.4 | -0.4 | -0.5 | -0.5  |
| WING ANTI-ICE ON    | -0.2                          | -0.2  | -0.2 | -0.2 | -0.2 | -0.2 | -0.3 | -0.3 | -0.3 | -0.3 | -0.3 | -0.3 | -0.3  |

777 Flight Crew Operations Manual

**VREF**

**Flaps 30**

| WEIGHT<br>(1000 KG) | VREF (KIAS)            |      |      |      |      |       |
|---------------------|------------------------|------|------|------|------|-------|
|                     | PRESSURE ALTITUDE (FT) |      |      |      |      |       |
|                     | 0                      | 2000 | 4000 | 6000 | 8000 | 10000 |
| 300                 | 163                    | 163  | 163  | 164  | 164  | 165   |
| 280                 | 159                    | 159  | 159  | 160  | 160  | 161   |
| 260                 | 154                    | 154  | 154  | 154  | 154  | 155   |
| 240                 | 148                    | 148  | 148  | 148  | 148  | 149   |
| 220                 | 142                    | 142  | 142  | 142  | 142  | 142   |
| 200                 | 135                    | 135  | 135  | 135  | 135  | 135   |
| 180                 | 129                    | 128  | 128  | 128  | 128  | 128   |
| 160                 | 129                    | 127  | 124  | 122  | 121  | 121   |
| 140                 | 129                    | 127  | 124  | 122  | 119  | 116   |

**Flaps 25**

| WEIGHT<br>(1000 KG) | VREF (KIAS)            |      |      |      |      |       |
|---------------------|------------------------|------|------|------|------|-------|
|                     | PRESSURE ALTITUDE (FT) |      |      |      |      |       |
|                     | 0                      | 2000 | 4000 | 6000 | 8000 | 10000 |
| 300                 | 171                    | 171  | 171  | 171  | 172  | 172   |
| 280                 | 167                    | 167  | 167  | 167  | 167  | 168   |
| 260                 | 162                    | 162  | 162  | 162  | 162  | 162   |
| 240                 | 155                    | 155  | 156  | 156  | 156  | 156   |
| 220                 | 149                    | 149  | 149  | 149  | 149  | 149   |
| 200                 | 142                    | 142  | 142  | 142  | 142  | 142   |
| 180                 | 134                    | 134  | 134  | 135  | 135  | 135   |
| 160                 | 129                    | 127  | 127  | 127  | 127  | 127   |
| 140                 | 129                    | 127  | 124  | 122  | 119  | 118   |

**Flaps 20**

| WEIGHT<br>(1000 KG) | VREF (KIAS)            |      |      |      |      |       |
|---------------------|------------------------|------|------|------|------|-------|
|                     | PRESSURE ALTITUDE (FT) |      |      |      |      |       |
|                     | 0                      | 2000 | 4000 | 6000 | 8000 | 10000 |
| 300                 | 177                    | 177  | 177  | 178  | 178  | 179   |
| 280                 | 173                    | 173  | 173  | 173  | 173  | 174   |
| 260                 | 167                    | 167  | 168  | 168  | 168  | 168   |
| 240                 | 161                    | 161  | 161  | 161  | 161  | 161   |
| 220                 | 154                    | 154  | 154  | 154  | 154  | 154   |
| 200                 | 147                    | 147  | 147  | 147  | 147  | 147   |
| 180                 | 139                    | 139  | 139  | 139  | 139  | 139   |
| 160                 | 131                    | 131  | 131  | 131  | 131  | 131   |
| 140                 | 129                    | 127  | 124  | 123  | 123  | 123   |



# Performance Inflight - QRH

## Advisory Information

# Chapter PI-QRH

## Section 11

### ADVISORY INFORMATION

#### Normal Configuration Landing Distance

##### Flaps 30

|                          | LANDING DISTANCE AND ADJUSTMENT (M) |                                                   |                                         |                           |                        |                         |                                 |                          |           |
|--------------------------|-------------------------------------|---------------------------------------------------|-----------------------------------------|---------------------------|------------------------|-------------------------|---------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                         | WEIGHT<br>ADJ                                     | ALT<br>ADJ                              | WIND<br>ADJ PER<br>10 KTS | SLOPE<br>ADJ<br>PER 1% | TEMP<br>ADJ<br>PER 10°C | APP<br>SPD<br>ADJ               | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 200000 KG<br>LANDING<br>WT          | PER<br>5000 KG<br>ABOVE/<br>BELOW<br>200000<br>KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | HEAD/<br>TAIL<br>WIND     | DOWN/<br>UP<br>HILL    | ABOVE/<br>BELOW<br>ISA  | PER<br>5 KTS<br>ABOVE<br>VREF30 | ONE<br>REV               | NO<br>REV |

##### Dry Runway

|               |      |         |    |           |         |         |    |     |     |
|---------------|------|---------|----|-----------|---------|---------|----|-----|-----|
| MAX MANUAL    | 880  | +25/-5  | 20 | -35/+125  | +10/-10 | +20/-20 | 35 | 15  | 40  |
| AUTOBRAKE MAX | 1180 | +20/-5  | 25 | -50/+175  | 0/0     | +30/-30 | 65 | 0   | 0   |
| AUTOBRAKE 4   | 1455 | +25/-10 | 40 | -70/+245  | 0/-5    | +40/-40 | 80 | 0   | 0   |
| AUTOBRAKE 3   | 1740 | +30/-10 | 45 | -90/+305  | +10/-10 | +50/-50 | 95 | 0   | 0   |
| AUTOBRAKE 2   | 1935 | +40/-20 | 55 | -100/+350 | +20/-35 | +55/-55 | 85 | 20  | 20  |
| AUTOBRAKE 1   | 2060 | +45/-25 | 65 | -115/+395 | +45/-50 | +60/-60 | 90 | 120 | 120 |

##### Good Reported Braking Action

|               |      |         |    |           |         |         |    |     |     |
|---------------|------|---------|----|-----------|---------|---------|----|-----|-----|
| MAX MANUAL    | 1210 | +20/-10 | 30 | -60/+215  | +30/-25 | +30/-30 | 50 | 70  | 170 |
| AUTOBRAKE MAX | 1290 | +25/-10 | 35 | -60/+220  | +25/-20 | +30/-30 | 60 | 75  | 175 |
| AUTOBRAKE 4   | 1460 | +25/-5  | 40 | -70/+250  | +5/-5   | +40/-40 | 80 | 10  | 45  |
| AUTOBRAKE 3   | 1740 | +30/-10 | 45 | -90/+305  | +10/-10 | +50/-50 | 95 | 0   | 0   |
| AUTOBRAKE 2   | 1935 | +40/-20 | 55 | -100/+350 | +20/-35 | +55/-55 | 85 | 20  | 20  |
| AUTOBRAKE 1   | 2060 | +45/-25 | 65 | -115/+395 | +45/-50 | +60/-60 | 90 | 120 | 120 |

##### Medium Reported Braking Action

|               |      |         |    |           |         |         |    |     |     |
|---------------|------|---------|----|-----------|---------|---------|----|-----|-----|
| MAX MANUAL    | 1620 | +35/-20 | 50 | -95/+345  | +70/-60 | +40/-40 | 60 | 205 | 530 |
| AUTOBRAKE MAX | 1635 | +35/-15 | 50 | -95/+350  | +70/-55 | +40/-45 | 70 | 200 | 525 |
| AUTOBRAKE 4   | 1660 | +35/-15 | 50 | -95/+350  | +70/-50 | +45/-45 | 75 | 205 | 540 |
| AUTOBRAKE 3   | 1825 | +35/-15 | 50 | -100/+375 | +50/-35 | +50/-50 | 95 | 110 | 405 |
| AUTOBRAKE 2   | 1980 | +40/-20 | 55 | -110/+395 | +50/-50 | +55/-55 | 85 | 85  | 300 |
| AUTOBRAKE 1   | 2085 | +45/-25 | 65 | -115/+420 | +65/-60 | +60/-60 | 90 | 160 | 300 |

##### Poor Reported Braking Action

|               |      |         |    |           |           |         |    |     |      |
|---------------|------|---------|----|-----------|-----------|---------|----|-----|------|
| MAX MANUAL    | 2070 | +45/-30 | 70 | -135/+535 | +165/-110 | +55/-55 | 70 | 460 | 1410 |
| AUTOBRAKE MAX | 2075 | +50/-30 | 70 | -135/+540 | +170/-115 | +55/-55 | 70 | 465 | 1415 |
| AUTOBRAKE 4   | 2090 | +50/-30 | 70 | -140/+540 | +165/-115 | +55/-60 | 70 | 465 | 1425 |
| AUTOBRAKE 3   | 2120 | +45/-25 | 70 | -140/+545 | +160/-95  | +55/-60 | 90 | 445 | 1410 |
| AUTOBRAKE 2   | 2205 | +50/-30 | 70 | -145/+555 | +150/-105 | +60/-60 | 85 | 375 | 1320 |
| AUTOBRAKE 1   | 2260 | +50/-30 | 75 | -145/+565 | +155/-105 | +60/-65 | 85 | 405 | 1265 |

Reference distance is for sea level, standard day, no wind or slope, VREF30, 2 engine reverse thrust, and auto speedbrakes.

For Max Manual braking and manual speedbrakes, increase reference landing distance by 60 m.

For autobrake and manual speedbrakes, increase reference landing distance by 50 m.

Actual (unfactored) distances are shown.

Includes distance from 50 ft above threshold (305 meters of air distance).

## ADVISORY INFORMATION

### Normal Configuration Landing Distance

#### Flaps 25

|                          | LANDING DISTANCE AND ADJUSTMENT (M) |                                                   |                                         |                           |                        |                         |                                 |                          |           |
|--------------------------|-------------------------------------|---------------------------------------------------|-----------------------------------------|---------------------------|------------------------|-------------------------|---------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                         | WEIGHT<br>ADJ                                     | ALT<br>ADJ                              | WIND<br>ADJ PER<br>10 KTS | SLOPE<br>ADJ<br>PER 1% | TEMP<br>ADJ<br>PER 10°C | APP<br>SPD<br>ADJ               | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 200000 KG<br>LANDING<br>WT          | PER<br>5000 KG<br>ABOVE/<br>BELOW<br>200000<br>KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | HEAD/<br>TAIL<br>WIND     | DOWN/<br>UP<br>HILL    | ABOVE/<br>BELOW<br>ISA  | PER<br>5 KTS<br>ABOVE<br>VREF25 | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |      |         |    |           |         |         |    |     |     |
|---------------|------|---------|----|-----------|---------|---------|----|-----|-----|
| MAX MANUAL    | 925  | +25/-10 | 20 | -35/+130  | +10/-10 | +20/-20 | 35 | 20  | 45  |
| AUTOBRAKE MAX | 1260 | +20/-15 | 30 | -55/+180  | 0/0     | +30/-30 | 65 | 0   | 0   |
| AUTOBRAKE 4   | 1570 | +30/-20 | 40 | -75/+255  | 0/-5    | +40/-40 | 85 | 0   | 0   |
| AUTOBRAKE 3   | 1880 | +35/-25 | 50 | -95/+320  | +10/-15 | +55/-55 | 95 | 0   | 0   |
| AUTOBRAKE 2   | 2070 | +45/-35 | 60 | -105/+365 | +30/-45 | +60/-60 | 85 | 50  | 50  |
| AUTOBRAKE 1   | 2190 | +50/-40 | 70 | -115/+405 | +50/-55 | +60/-60 | 90 | 170 | 180 |

#### Good Reported Braking Action

|               |      |         |    |           |         |         |    |     |     |
|---------------|------|---------|----|-----------|---------|---------|----|-----|-----|
| MAX MANUAL    | 1275 | +25/-15 | 35 | -60/+220  | +30/-25 | +30/-30 | 50 | 80  | 195 |
| AUTOBRAKE MAX | 1360 | +25/-15 | 35 | -65/+225  | +25/-20 | +30/-35 | 60 | 85  | 205 |
| AUTOBRAKE 4   | 1570 | +30/-20 | 40 | -75/+260  | +5/-5   | +40/-40 | 85 | 10  | 45  |
| AUTOBRAKE 3   | 1880 | +35/-25 | 50 | -95/+320  | +10/-15 | +55/-55 | 95 | 0   | 0   |
| AUTOBRAKE 2   | 2070 | +45/-35 | 60 | -105/+365 | +30/-45 | +60/-60 | 85 | 50  | 50  |
| AUTOBRAKE 1   | 2190 | +50/-40 | 70 | -115/+405 | +50/-55 | +60/-60 | 90 | 170 | 180 |

#### Medium Reported Braking Action

|               |      |         |    |           |         |         |    |     |     |
|---------------|------|---------|----|-----------|---------|---------|----|-----|-----|
| MAX MANUAL    | 1705 | +35/-30 | 50 | -95/+355  | +75/-60 | +45/-45 | 60 | 230 | 605 |
| AUTOBRAKE MAX | 1720 | +35/-25 | 50 | -95/+355  | +75/-55 | +45/-45 | 70 | 225 | 595 |
| AUTOBRAKE 4   | 1760 | +35/-25 | 50 | -100/+360 | +65/-45 | +45/-50 | 80 | 215 | 600 |
| AUTOBRAKE 3   | 1965 | +40/-30 | 55 | -105/+385 | +45/-40 | +55/-55 | 95 | 110 | 430 |
| AUTOBRAKE 2   | 2115 | +45/-35 | 65 | -115/+410 | +55/-60 | +60/-60 | 85 | 115 | 345 |
| AUTOBRAKE 1   | 2215 | +50/-40 | 70 | -120/+430 | +75/-70 | +60/-65 | 90 | 210 | 370 |

#### Poor Reported Braking Action

|               |      |         |    |           |           |         |    |     |      |
|---------------|------|---------|----|-----------|-----------|---------|----|-----|------|
| MAX MANUAL    | 2170 | +50/-40 | 75 | -140/+545 | +165/-115 | +55/-60 | 70 | 510 | 1595 |
| AUTOBRAKE MAX | 2180 | +50/-40 | 75 | -140/+545 | +170/-115 | +55/-60 | 75 | 510 | 1600 |
| AUTOBRAKE 4   | 2195 | +50/-40 | 75 | -140/+550 | +165/-115 | +55/-60 | 70 | 515 | 1610 |
| AUTOBRAKE 3   | 2255 | +50/-40 | 75 | -145/+555 | +155/-100 | +60/-65 | 90 | 465 | 1565 |
| AUTOBRAKE 2   | 2335 | +55/-40 | 75 | -145/+565 | +155/-110 | +60/-65 | 80 | 415 | 1480 |
| AUTOBRAKE 1   | 2390 | +55/-45 | 80 | -150/+575 | +160/-110 | +65/-70 | 85 | 465 | 1430 |

Reference distance is for sea level, standard day, no wind or slope, VREF25, 2 engine reverse thrust, and auto speedbrakes.

For Max Manual braking and manual speedbrakes, increase reference landing distance by 60 m.

For autobrake and manual speedbrakes, increase reference landing distance by 55 m.

Actual (unfactored) distances are shown.

Includes distance from 50 ft above threshold (305 meters of air distance).

## ADVISORY INFORMATION

## Normal Configuration Landing Distance

## Flaps 20

|                          | LANDING DISTANCE AND ADJUSTMENT (M) |                                                   |                                         |                           |                        |                         |                                 |                          |           |
|--------------------------|-------------------------------------|---------------------------------------------------|-----------------------------------------|---------------------------|------------------------|-------------------------|---------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                         | WEIGHT<br>ADJ                                     | ALT<br>ADJ                              | WIND<br>ADJ PER<br>10 KTS | SLOPE<br>ADJ<br>PER 1% | TEMP<br>ADJ<br>PER 10°C | APP<br>SPD<br>ADJ               | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 200000 KG<br>LANDING<br>WT          | PER<br>5000 KG<br>ABOVE/<br>BELOW<br>200000<br>KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | HEAD/<br>TAIL<br>WIND     | DOWN/<br>UP<br>HILL    | ABOVE/<br>BELOW<br>ISA  | PER<br>5 KTS<br>ABOVE<br>VREF20 | ONE<br>REV               | NO<br>REV |

## Dry Runway

|               |      |         |    |           |         |         |     |     |     |
|---------------|------|---------|----|-----------|---------|---------|-----|-----|-----|
| MAX MANUAL    | 960  | +30/-15 | 20 | -40/+130  | +10/-10 | +20/-20 | 35  | 25  | 50  |
| AUTOBRAKE MAX | 1320 | +20/-20 | 30 | -55/+185  | 0/0     | +30/-30 | 65  | 0   | 0   |
| AUTOBRAKE 4   | 1655 | +30/-30 | 45 | -75/+260  | 0/0     | +45/-45 | 90  | 0   | 0   |
| AUTOBRAKE 3   | 2000 | +40/-35 | 55 | -95/+330  | +5/-15  | +55/-55 | 100 | 0   | 0   |
| AUTOBRAKE 2   | 2200 | +45/-45 | 65 | -110/+380 | +25/-45 | +60/-60 | 95  | 50  | 50  |
| AUTOBRAKE 1   | 2335 | +55/-50 | 75 | -120/+420 | +50/-60 | +65/-65 | 95  | 180 | 180 |

## Good Reported Braking Action

|               |      |         |    |           |         |         |     |     |     |
|---------------|------|---------|----|-----------|---------|---------|-----|-----|-----|
| MAX MANUAL    | 1340 | +25/-20 | 35 | -65/+225  | +35/-30 | +30/-35 | 50  | 95  | 220 |
| AUTOBRAKE MAX | 1420 | +25/-25 | 40 | -65/+230  | +30/-20 | +35/-35 | 65  | 95  | 230 |
| AUTOBRAKE 4   | 1655 | +30/-30 | 45 | -80/+265  | +5/-5   | +45/-45 | 90  | 10  | 50  |
| AUTOBRAKE 3   | 2000 | +40/-35 | 55 | -95/+330  | +5/-15  | +55/-55 | 100 | 0   | 0   |
| AUTOBRAKE 2   | 2200 | +45/-45 | 65 | -110/+380 | +25/-45 | +60/-60 | 95  | 50  | 50  |
| AUTOBRAKE 1   | 2335 | +55/-50 | 75 | -120/+420 | +50/-60 | +65/-65 | 95  | 180 | 180 |

## Medium Reported Braking Action

|               |      |         |    |           |         |         |     |     |     |
|---------------|------|---------|----|-----------|---------|---------|-----|-----|-----|
| MAX MANUAL    | 1805 | +40/-35 | 55 | -100/+365 | +80/-65 | +45/-50 | 65  | 260 | 700 |
| AUTOBRAKE MAX | 1815 | +40/-35 | 55 | -100/+365 | +80/-60 | +45/-50 | 70  | 255 | 690 |
| AUTOBRAKE 4   | 1855 | +40/-35 | 55 | -100/+370 | +70/-45 | +50/-50 | 85  | 245 | 695 |
| AUTOBRAKE 3   | 2080 | +40/-40 | 60 | -110/+395 | +45/-40 | +55/-60 | 100 | 125 | 510 |
| AUTOBRAKE 2   | 2250 | +45/-45 | 70 | -120/+425 | +55/-60 | +65/-65 | 95  | 115 | 395 |
| AUTOBRAKE 1   | 2355 | +55/-50 | 75 | -125/+445 | +75/-70 | +65/-70 | 95  | 220 | 400 |

## Poor Reported Braking Action

|               |      |         |    |           |           |         |    |     |      |
|---------------|------|---------|----|-----------|-----------|---------|----|-----|------|
| MAX MANUAL    | 2305 | +55/-50 | 80 | -145/+560 | +180/-120 | +60/-65 | 75 | 580 | 1860 |
| AUTOBRAKE MAX | 2310 | +55/-50 | 80 | -145/+560 | +180/-125 | +60/-65 | 75 | 580 | 1865 |
| AUTOBRAKE 4   | 2325 | +55/-50 | 80 | -145/+565 | +175/-120 | +60/-65 | 80 | 585 | 1870 |
| AUTOBRAKE 3   | 2390 | +55/-50 | 80 | -150/+570 | +160/-105 | +65/-70 | 95 | 535 | 1835 |
| AUTOBRAKE 2   | 2485 | +55/-50 | 80 | -150/+580 | +160/-115 | +65/-70 | 90 | 460 | 1730 |
| AUTOBRAKE 1   | 2540 | +60/-55 | 85 | -155/+595 | +170/-115 | +70/-70 | 90 | 505 | 1660 |

Reference distance is for sea level, standard day, no wind or slope, VREF20, 2 engine 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 55 m.

Actual (unfactored) distances are shown.

Includes distance from 50 ft above threshold (305 meters of air distance).

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**  
**ADIRU/GPS DISAGREE (Flaps 25)**

**VREF25**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                       |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|---------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                             | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 200000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BW<br>200000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |                       |        |    |         |        |        |    |    |     |
|---------------|-----------------------|--------|----|---------|--------|--------|----|----|-----|
| MAX MANUAL    | 1130                  | 35/-15 | 25 | -50/180 | 20/-20 | 25/-25 | 45 | 50 | 115 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |         |        |        |    |    |     |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |         |        |        |    |    |     |

**Good Reported Braking Action**

|               |                       |        |    |         |        |        |    |     |     |
|---------------|-----------------------|--------|----|---------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1535                  | 30/-25 | 45 | -80/295 | 55/-45 | 40/-40 | 55 | 160 | 405 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |         |        |        |    |     |     |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |         |        |        |    |     |     |

**Medium Reported Braking Action**

|               |                       |        |    |          |         |        |    |     |      |
|---------------|-----------------------|--------|----|----------|---------|--------|----|-----|------|
| MAX MANUAL    | 1945                  | 45/-35 | 60 | -120/445 | 115/-85 | 50/-50 | 65 | 355 | 1010 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |          |         |        |    |     |      |
| AUTOBRAKE 3   | Autobrake Inoperative |        |    |          |         |        |    |     |      |

**Poor Reported Braking Action**

|               |                       |        |    |          |          |        |    |     |      |
|---------------|-----------------------|--------|----|----------|----------|--------|----|-----|------|
| MAX MANUAL    | 2510                  | 60/-50 | 90 | -180/735 | 320/-170 | 65/-70 | 75 | 850 | 3600 |
| 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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### ADIRU/GPS DISAGREE (Flaps 30)

#### VREF30

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |
| BRAKING<br>CONFIGURATION | 200000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>200000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV<br>NO<br>REV  |

#### Dry Runway

|               |                       |       |    |         |        |        |    |    |     |
|---------------|-----------------------|-------|----|---------|--------|--------|----|----|-----|
| MAX MANUAL    | 1075                  | 30/-5 | 25 | -50/175 | 20/-20 | 25/-25 | 45 | 45 | 100 |
| AUTOBRAKE MAX | Autobrake Inoperative |       |    |         |        |        |    |    |     |
| AUTOBRAKE 2   | Autobrake Inoperative |       |    |         |        |        |    |    |     |

#### Good Reported Braking Action

|               |                       |        |    |         |        |        |    |     |     |
|---------------|-----------------------|--------|----|---------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1460                  | 30/-15 | 40 | -80/290 | 50/-45 | 35/-35 | 55 | 145 | 355 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |         |        |        |    |     |     |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |         |        |        |    |     |     |

#### Medium Reported Braking Action

|               |                       |        |    |          |         |        |    |     |     |
|---------------|-----------------------|--------|----|----------|---------|--------|----|-----|-----|
| MAX MANUAL    | 1850                  | 40/-25 | 60 | -115/435 | 110/-80 | 50/-50 | 65 | 320 | 885 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |          |         |        |    |     |     |
| AUTOBRAKE 3   | Autobrake Inoperative |        |    |          |         |        |    |     |     |

#### Poor Reported Braking Action

|               |                       |        |    |          |          |        |    |     |      |
|---------------|-----------------------|--------|----|----------|----------|--------|----|-----|------|
| MAX MANUAL    | 2395                  | 60/-40 | 85 | -175/725 | 315/-165 | 60/-70 | 75 | 780 | 3235 |
| 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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**AIR DATA SYS (Flaps 20)**

**VREF20**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 200000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>200000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |      |        |    |          |        |        |     |    |    |
|---------------|------|--------|----|----------|--------|--------|-----|----|----|
| MAX MANUAL    | 1105 | 25/-15 | 25 | -45/145  | 15/-15 | 25/-25 | 45  | 30 | 70 |
| AUTOBRAKE MAX | 1320 | 20/-20 | 30 | -55/185  | 0/0    | 30/-30 | 65  | 0  | 0  |
| AUTOBRAKE 2   | 2260 | 45/-45 | 65 | -115/385 | 0/-15  | 65/-65 | 125 | 0  | 0  |

**Good Reported Braking Action**

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1520 | 30/-25 | 40 | -70/245  | 40/-35 | 35/-35 | 65  | 125 | 300 |
| AUTOBRAKE MAX | 1510 | 30/-25 | 40 | -70/245  | 35/-30 | 40/-40 | 70  | 120 | 290 |
| AUTOBRAKE 2   | 2260 | 45/-45 | 65 | -115/385 | 0/-15  | 65/-65 | 125 | 0   | 0   |

**Medium Reported Braking Action**

|               |      |        |    |          |         |        |     |     |     |
|---------------|------|--------|----|----------|---------|--------|-----|-----|-----|
| MAX MANUAL    | 2030 | 45/-40 | 65 | -110/390 | 95/-75  | 50/-55 | 80  | 340 | 945 |
| AUTOBRAKE MAX | 2020 | 45/-40 | 65 | -110/390 | 100/-80 | 55/-55 | 85  | 335 | 940 |
| AUTOBRAKE 3   | 2140 | 45/-35 | 65 | -115/405 | 70/-35  | 60/-60 | 110 | 245 | 855 |

**Poor Reported Braking Action**

|               |      |        |    |          |          |        |     |     |      |
|---------------|------|--------|----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2570 | 60/-55 | 90 | -155/600 | 210/-140 | 65/-70 | 95  | 725 | 2515 |
| AUTOBRAKE MAX | 2580 | 65/-55 | 90 | -155/600 | 215/-145 | 70/-70 | 95  | 730 | 2525 |
| AUTOBRAKE 3   | 2585 | 65/-55 | 90 | -160/600 | 215/-130 | 70/-75 | 105 | 725 | 2520 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.



## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### Airspeed Unreliable (Flaps 20)

#### VREF20

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 200000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>200000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |      |        |    |          |        |        |     |    |    |
|---------------|------|--------|----|----------|--------|--------|-----|----|----|
| MAX MANUAL    | 1200 | 25/-15 | 30 | -45/155  | 15/-15 | 25/-25 | N/A | 40 | 80 |
| AUTOBRAKE MAX | 1450 | 25/-20 | 35 | -60/200  | 0/0    | 35/-35 | N/A | 0  | 0  |
| AUTOBRAKE 2   | 2505 | 50/-50 | 75 | -120/405 | 10/-30 | 75/-75 | N/A | 20 | 20 |

#### Good Reported Braking Action

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1650 | 30/-25 | 45 | -75/255  | 45/-40 | 40/-40 | N/A | 140 | 345 |
| AUTOBRAKE MAX | 1655 | 30/-30 | 45 | -75/255  | 40/-35 | 40/-40 | N/A | 140 | 335 |
| AUTOBRAKE 2   | 2505 | 50/-50 | 75 | -120/405 | 10/-30 | 75/-75 | N/A | 20  | 20  |

#### Medium Reported Braking Action

|               |      |        |    |          |         |        |     |     |      |
|---------------|------|--------|----|----------|---------|--------|-----|-----|------|
| MAX MANUAL    | 2195 | 45/-40 | 70 | -115/405 | 100/-80 | 60/-60 | N/A | 375 | 1045 |
| AUTOBRAKE MAX | 2190 | 45/-40 | 70 | -115/405 | 110/-85 | 60/-60 | N/A | 375 | 1040 |
| AUTOBRAKE 3   | 2360 | 45/-40 | 70 | -120/425 | 65/-35  | 65/-65 | N/A | 230 | 905  |

#### Poor Reported Braking Action

|               |      |        |     |          |          |        |     |     |      |
|---------------|------|--------|-----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2760 | 65/-60 | 100 | -160/615 | 215/-145 | 75/-75 | N/A | 785 | 2685 |
| AUTOBRAKE MAX | 2765 | 65/-60 | 100 | -165/615 | 225/-155 | 75/-80 | N/A | 785 | 2690 |
| AUTOBRAKE 3   | 2795 | 65/-55 | 100 | -165/615 | 210/-130 | 75/-80 | N/A | 765 | 2675 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**ANTISKID (Flaps 25)**

**VREF25**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 200000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>200000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |                       |        |    |         |        |        |    |     |     |
|---------------|-----------------------|--------|----|---------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1705                  | 35/-30 | 50 | -95/355 | 75/-60 | 45/-45 | 60 | 230 | 605 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |         |        |        |    |     |     |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |         |        |        |    |     |     |

**Good Reported Braking Action**

|               |                       |        |    |         |        |        |    |     |     |
|---------------|-----------------------|--------|----|---------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1705                  | 35/-30 | 50 | -95/355 | 75/-60 | 45/-45 | 60 | 230 | 605 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |         |        |        |    |     |     |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |         |        |        |    |     |     |

**Medium Reported Braking Action**

|               |                       |        |    |          |          |        |    |     |      |
|---------------|-----------------------|--------|----|----------|----------|--------|----|-----|------|
| MAX MANUAL    | 2170                  | 50/-40 | 75 | -140/545 | 165/-115 | 55/-60 | 70 | 510 | 1595 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |          |          |        |    |     |      |
| AUTOBRAKE 3   | Autobrake Inoperative |        |    |          |          |        |    |     |      |

**Poor Reported Braking Action**

|               |                       |        |     |           |          |        |    |      |      |
|---------------|-----------------------|--------|-----|-----------|----------|--------|----|------|------|
| MAX MANUAL    | 2930                  | 75/-60 | 110 | -235/1045 | 530/-260 | 75/-85 | 80 | 1790 | 3585 |
| 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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### ANTISKID (Flaps 30)

#### VREF30

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |
| BRAKING<br>CONFIGURATION | 200000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>200000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV<br>NO<br>REV  |

#### Dry Runway

|               |                       |        |    |         |        |        |    |     |     |
|---------------|-----------------------|--------|----|---------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1620                  | 35/-20 | 50 | -95/345 | 70/-60 | 40/-40 | 60 | 205 | 530 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |         |        |        |    |     |     |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |         |        |        |    |     |     |

#### Good Reported Braking Action

|               |                       |        |    |         |        |        |    |     |     |
|---------------|-----------------------|--------|----|---------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1620                  | 35/-20 | 50 | -95/345 | 70/-60 | 40/-40 | 60 | 205 | 530 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |         |        |        |    |     |     |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |         |        |        |    |     |     |

#### Medium Reported Braking Action

|               |                       |        |    |          |          |        |    |     |      |
|---------------|-----------------------|--------|----|----------|----------|--------|----|-----|------|
| MAX MANUAL    | 2070                  | 45/-30 | 70 | -135/535 | 165/-110 | 55/-55 | 70 | 460 | 1410 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |          |          |        |    |     |      |
| AUTOBRAKE 3   | Autobrake Inoperative |        |    |          |          |        |    |     |      |

#### Poor Reported Braking Action

|               |                       |        |     |           |          |        |    |      |      |
|---------------|-----------------------|--------|-----|-----------|----------|--------|----|------|------|
| MAX MANUAL    | 2805                  | 70/-50 | 100 | -230/1035 | 515/-255 | 70/-85 | 80 | 1675 | 3345 |
| 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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

ENG SHUTDOWN L, R (Flaps 20)

VREF20

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 200000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>200000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

Dry Runway

|               |      |        |    |          |        |        |     |   |    |
|---------------|------|--------|----|----------|--------|--------|-----|---|----|
| MAX MANUAL    | 970  | 30/-15 | 20 | -40/135  | 15/-10 | 20/-20 | 35  | 0 | 25 |
| AUTOBRAKE MAX | 1320 | 25/-20 | 30 | -55/185  | 0/0    | 30/-30 | 65  | 0 | 0  |
| AUTOBRAKE 2   | 2240 | 45/-40 | 65 | -110/385 | 10/-10 | 65/-65 | 125 | 0 | 0  |

Good Reported Braking Action

|               |      |        |    |          |        |        |     |   |     |
|---------------|------|--------|----|----------|--------|--------|-----|---|-----|
| MAX MANUAL    | 1400 | 25/-25 | 35 | -65/235  | 40/-35 | 35/-35 | 55  | 0 | 120 |
| AUTOBRAKE MAX | 1490 | 25/-25 | 40 | -70/245  | 35/-30 | 35/-40 | 65  | 0 | 125 |
| AUTOBRAKE 2   | 2240 | 45/-40 | 65 | -110/385 | 10/-10 | 65/-65 | 125 | 0 | 0   |

Medium Reported Braking Action

|               |      |        |    |          |         |        |     |   |     |
|---------------|------|--------|----|----------|---------|--------|-----|---|-----|
| MAX MANUAL    | 1980 | 40/-40 | 60 | -110/400 | 105/-80 | 55/-55 | 75  | 0 | 385 |
| AUTOBRAKE MAX | 1985 | 40/-40 | 60 | -110/400 | 105/-75 | 55/-55 | 85  | 0 | 380 |
| AUTOBRAKE 3   | 2135 | 45/-40 | 65 | -115/415 | 80/-50  | 60/-60 | 105 | 0 | 310 |

Poor Reported Braking Action

|               |      |        |    |          |          |        |    |   |      |
|---------------|------|--------|----|----------|----------|--------|----|---|------|
| MAX MANUAL    | 2665 | 60/-55 | 90 | -170/645 | 265/-170 | 75/-75 | 90 | 0 | 990  |
| AUTOBRAKE MAX | 2675 | 65/-60 | 90 | -170/645 | 270/-175 | 75/-80 | 90 | 0 | 995  |
| AUTOBRAKE 3   | 2705 | 65/-60 | 90 | -170/645 | 270/-170 | 75/-80 | 90 | 0 | 1005 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### ENG SHUTDOWN L, R (Flaps 30)

#### VREF30

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 200000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>200000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |      |        |    |          |        |        |     |   |    |
|---------------|------|--------|----|----------|--------|--------|-----|---|----|
| MAX MANUAL    | 890  | 25/-5  | 20 | -35/125  | 10/-10 | 20/-20 | 35  | 0 | 20 |
| AUTOBRAKE MAX | 1180 | 20/-5  | 25 | -50/175  | 0/0    | 30/-30 | 65  | 0 | 0  |
| AUTOBRAKE 2   | 1945 | 40/-15 | 55 | -105/355 | 10/-10 | 55/-55 | 115 | 0 | 0  |

#### Good Reported Braking Action

|               |      |        |    |          |        |        |     |   |    |
|---------------|------|--------|----|----------|--------|--------|-----|---|----|
| MAX MANUAL    | 1250 | 20/-10 | 30 | -65/220  | 35/-30 | 30/-30 | 55  | 0 | 85 |
| AUTOBRAKE MAX | 1340 | 25/-10 | 35 | -65/230  | 30/-25 | 35/-35 | 65  | 0 | 90 |
| AUTOBRAKE 2   | 1945 | 40/-15 | 55 | -105/355 | 10/-10 | 55/-55 | 115 | 0 | 0  |

#### Medium Reported Braking Action

|               |      |        |    |          |        |        |    |   |     |
|---------------|------|--------|----|----------|--------|--------|----|---|-----|
| MAX MANUAL    | 1750 | 35/-20 | 50 | -100/375 | 95/-70 | 45/-45 | 70 | 0 | 280 |
| AUTOBRAKE MAX | 1755 | 35/-15 | 50 | -105/375 | 90/-65 | 50/-50 | 80 | 0 | 280 |
| AUTOBRAKE 3   | 1875 | 35/-15 | 55 | -105/390 | 75/-45 | 50/-50 | 95 | 0 | 235 |

#### Poor Reported Braking Action

|               |      |        |    |          |          |        |    |   |     |
|---------------|------|--------|----|----------|----------|--------|----|---|-----|
| MAX MANUAL    | 2335 | 55/-35 | 75 | -160/605 | 235/-150 | 65/-65 | 85 | 0 | 725 |
| AUTOBRAKE MAX | 2340 | 55/-35 | 75 | -160/605 | 235/-150 | 65/-70 | 85 | 0 | 725 |
| AUTOBRAKE 3   | 2370 | 55/-35 | 75 | -160/610 | 240/-150 | 65/-70 | 85 | 0 | 735 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**FLAP / SLAT CONTROL (Flaps 20)**

**VREF20**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 200000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>200000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |      |        |    |          |        |        |    |    |    |
|---------------|------|--------|----|----------|--------|--------|----|----|----|
| MAX MANUAL    | 955  | 30/-15 | 20 | -40/130  | 10/-10 | 20/-20 | 35 | 20 | 50 |
| AUTOBRAKE MAX | 1320 | 25/-20 | 30 | -55/185  | 0/0    | 30/-30 | 65 | 0  | 0  |
| AUTOBRAKE 2   | 2180 | 45/-45 | 65 | -110/375 | 30/-45 | 60/-60 | 85 | 60 | 60 |

**Good Reported Braking Action**

|               |      |        |    |          |        |        |    |    |     |
|---------------|------|--------|----|----------|--------|--------|----|----|-----|
| MAX MANUAL    | 1325 | 25/-20 | 35 | -65/220  | 30/-30 | 30/-30 | 50 | 90 | 215 |
| AUTOBRAKE MAX | 1415 | 25/-25 | 35 | -65/230  | 25/-20 | 35/-35 | 65 | 95 | 220 |
| AUTOBRAKE 2   | 2180 | 45/-45 | 65 | -110/375 | 30/-45 | 60/-60 | 85 | 60 | 60  |

**Medium Reported Braking Action**

|               |      |        |    |          |        |        |    |     |     |
|---------------|------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1780 | 40/-35 | 55 | -100/360 | 75/-60 | 45/-45 | 65 | 250 | 670 |
| AUTOBRAKE MAX | 1795 | 40/-35 | 55 | -100/360 | 75/-55 | 45/-50 | 70 | 245 | 660 |
| AUTOBRAKE 3   | 2070 | 40/-40 | 60 | -110/395 | 45/-40 | 55/-60 | 95 | 115 | 470 |

**Poor Reported Braking Action**

|               |      |        |    |          |          |        |    |     |      |
|---------------|------|--------|----|----------|----------|--------|----|-----|------|
| MAX MANUAL    | 2270 | 55/-50 | 75 | -145/555 | 175/-115 | 60/-65 | 75 | 555 | 1765 |
| AUTOBRAKE MAX | 2275 | 55/-50 | 80 | -145/555 | 175/-120 | 60/-65 | 75 | 555 | 1770 |
| AUTOBRAKE 3   | 2365 | 55/-50 | 75 | -145/565 | 155/-105 | 65/-65 | 90 | 500 | 1725 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### FLAPS DRIVE (Flaps ≤ 5)

#### VREF30 + 40

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 200000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>200000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |      |        |    |          |        |        |    |     |     |
|---------------|------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1170 | 40/-10 | 30 | -45/150  | 15/-15 | 25/-25 | 40 | 40  | 90  |
| AUTOBRAKE MAX | 1710 | 25/-5  | 45 | -65/215  | 0/0    | 45/-45 | 75 | 0   | 0   |
| AUTOBRAKE 2   | 2840 | 55/-40 | 95 | -130/430 | 50/-70 | 85/-85 | 95 | 220 | 220 |

#### Good Reported Braking Action

|               |      |        |    |          |        |        |    |     |     |
|---------------|------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1585 | 25/-15 | 45 | -70/240  | 35/-30 | 40/-40 | 50 | 135 | 325 |
| AUTOBRAKE MAX | 1775 | 30/-10 | 50 | -75/260  | 15/-10 | 45/-45 | 75 | 85  | 285 |
| AUTOBRAKE 2   | 2840 | 55/-40 | 95 | -130/430 | 50/-70 | 85/-85 | 95 | 220 | 220 |

#### Medium Reported Braking Action

|               |      |        |    |          |        |        |     |     |      |
|---------------|------|--------|----|----------|--------|--------|-----|-----|------|
| MAX MANUAL    | 2165 | 45/-25 | 70 | -110/390 | 85/-70 | 55/-60 | 65  | 375 | 1055 |
| AUTOBRAKE MAX | 2195 | 45/-25 | 70 | -110/390 | 80/-65 | 60/-60 | 75  | 365 | 1035 |
| AUTOBRAKE 3   | 2720 | 50/-30 | 85 | -130/450 | 50/-60 | 75/-80 | 100 | 175 | 675  |

#### Poor Reported Braking Action

|               |      |        |     |          |          |        |     |     |      |
|---------------|------|--------|-----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2780 | 65/-40 | 100 | -155/600 | 195/-135 | 75/-80 | 80  | 810 | 2840 |
| AUTOBRAKE MAX | 2790 | 65/-40 | 100 | -160/600 | 195/-135 | 75/-80 | 80  | 815 | 2850 |
| AUTOBRAKE 3   | 3000 | 65/-40 | 105 | -165/620 | 170/-120 | 85/-85 | 100 | 665 | 2715 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**FLAPS DRIVE (5 < Flaps < 20)**

**VREF30 + 20**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 200000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>200000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |      |        |    |          |        |        |     |    |    |
|---------------|------|--------|----|----------|--------|--------|-----|----|----|
| MAX MANUAL    | 1015 | 30/-5  | 25 | -40/135  | 15/-10 | 20/-20 | 35  | 25 | 60 |
| AUTOBRAKE MAX | 1430 | 25/-5  | 35 | -60/195  | 0/0    | 35/-35 | 70  | 0  | 0  |
| AUTOBRAKE 2   | 2420 | 50/-30 | 75 | -115/395 | 25/-50 | 70/-70 | 100 | 60 | 60 |

**Good Reported Braking Action**

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1430 | 25/-10 | 40 | -65/230  | 35/-30 | 35/-35 | 50  | 110 | 260 |
| AUTOBRAKE MAX | 1520 | 25/-10 | 40 | -70/240  | 30/-20 | 40/-40 | 65  | 110 | 270 |
| AUTOBRAKE 2   | 2420 | 50/-30 | 75 | -115/395 | 25/-50 | 70/-70 | 100 | 60  | 60  |

**Medium Reported Braking Action**

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1945 | 40/-25 | 60 | -105/375 | 85/-70 | 50/-50 | 70  | 305 | 840 |
| AUTOBRAKE MAX | 1965 | 40/-20 | 60 | -105/380 | 85/-65 | 50/-55 | 70  | 300 | 830 |
| AUTOBRAKE 3   | 2280 | 45/-20 | 65 | -115/415 | 40/-40 | 65/-65 | 105 | 135 | 610 |

**Poor Reported Braking Action**

|               |      |        |    |          |          |        |     |     |      |
|---------------|------|--------|----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2495 | 60/-35 | 90 | -150/580 | 190/-130 | 65/-70 | 80  | 675 | 2245 |
| AUTOBRAKE MAX | 2515 | 60/-35 | 90 | -150/580 | 195/-135 | 65/-70 | 80  | 680 | 2260 |
| AUTOBRAKE 3   | 2605 | 60/-30 | 90 | -155/590 | 170/-110 | 70/-75 | 100 | 625 | 2220 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.



## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### FLAPS DRIVE (Flaps ≥ 20)

#### VREF20

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 200000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>200000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |      |        |    |          |        |        |    |    |    |
|---------------|------|--------|----|----------|--------|--------|----|----|----|
| MAX MANUAL    | 960  | 30/-15 | 20 | -40/130  | 10/-10 | 20/-20 | 35 | 25 | 50 |
| AUTOBRAKE MAX | 1320 | 20/-20 | 30 | -55/185  | 0/0    | 30/-30 | 65 | 0  | 0  |
| AUTOBRAKE 2   | 2200 | 45/-45 | 65 | -110/380 | 25/-45 | 60/-60 | 95 | 50 | 50 |

#### Good Reported Braking Action

|               |      |        |    |          |        |        |    |    |     |
|---------------|------|--------|----|----------|--------|--------|----|----|-----|
| MAX MANUAL    | 1340 | 25/-20 | 35 | -65/225  | 35/-30 | 30/-35 | 50 | 95 | 220 |
| AUTOBRAKE MAX | 1420 | 25/-25 | 40 | -65/230  | 30/-20 | 35/-35 | 65 | 95 | 230 |
| AUTOBRAKE 2   | 2200 | 45/-45 | 65 | -110/380 | 25/-45 | 60/-60 | 95 | 50 | 50  |

#### Medium Reported Braking Action

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1805 | 40/-35 | 55 | -100/365 | 80/-65 | 45/-50 | 65  | 260 | 700 |
| AUTOBRAKE MAX | 1815 | 40/-35 | 55 | -100/365 | 80/-60 | 45/-50 | 70  | 255 | 690 |
| AUTOBRAKE 3   | 2080 | 40/-40 | 60 | -110/395 | 45/-40 | 55/-60 | 100 | 125 | 510 |

#### Poor Reported Braking Action

|               |      |        |    |          |          |        |    |     |      |
|---------------|------|--------|----|----------|----------|--------|----|-----|------|
| MAX MANUAL    | 2305 | 55/-50 | 80 | -145/560 | 180/-120 | 60/-65 | 75 | 580 | 1860 |
| AUTOBRAKE MAX | 2310 | 55/-50 | 80 | -145/560 | 180/-125 | 60/-65 | 75 | 580 | 1865 |
| AUTOBRAKE 3   | 2390 | 55/-50 | 80 | -150/570 | 160/-105 | 65/-70 | 95 | 535 | 1835 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**FLAPS PRIMARY FAIL (Flaps 20)**

**VREF20**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 200000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>200000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |      |        |    |          |        |        |     |    |    |
|---------------|------|--------|----|----------|--------|--------|-----|----|----|
| MAX MANUAL    | 1080 | 25/-15 | 25 | -40/145  | 15/-15 | 25/-25 | 45  | 30 | 60 |
| AUTOBRAKE MAX | 1320 | 20/-20 | 30 | -55/185  | 0/0    | 30/-30 | 65  | 0  | 0  |
| AUTOBRAKE 2   | 2245 | 45/-45 | 65 | -110/385 | 5/-25  | 65/-65 | 115 | 10 | 10 |

**Good Reported Braking Action**

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1475 | 25/-25 | 40 | -70/240  | 35/-35 | 35/-35 | 60  | 110 | 265 |
| AUTOBRAKE MAX | 1485 | 30/-25 | 40 | -70/240  | 35/-30 | 35/-35 | 65  | 110 | 265 |
| AUTOBRAKE 2   | 2245 | 45/-45 | 65 | -110/385 | 5/-25  | 65/-65 | 115 | 10  | 10  |

**Medium Reported Braking Action**

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1965 | 40/-40 | 60 | -105/385 | 90/-70 | 50/-50 | 75  | 305 | 835 |
| AUTOBRAKE MAX | 1955 | 40/-40 | 60 | -105/380 | 95/-75 | 50/-50 | 75  | 305 | 830 |
| AUTOBRAKE 3   | 2120 | 40/-35 | 60 | -110/405 | 55/-35 | 60/-60 | 110 | 175 | 710 |

**Poor Reported Braking Action**

|               |      |        |    |          |          |        |     |     |      |
|---------------|------|--------|----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2480 | 60/-55 | 85 | -155/585 | 195/-130 | 65/-70 | 85  | 660 | 2200 |
| AUTOBRAKE MAX | 2490 | 60/-55 | 85 | -155/585 | 200/-140 | 65/-70 | 85  | 660 | 2205 |
| AUTOBRAKE 3   | 2515 | 60/-50 | 85 | -155/590 | 190/-120 | 65/-70 | 100 | 645 | 2195 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### FLIGHT CONTROL MODE (Flaps 20)

#### VREF20

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 200000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>200000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |      |        |    |          |        |        |     |    |    |
|---------------|------|--------|----|----------|--------|--------|-----|----|----|
| MAX MANUAL    | 1105 | 25/-15 | 25 | -45/145  | 15/-15 | 25/-25 | 45  | 30 | 70 |
| AUTOBRAKE MAX | 1320 | 20/-20 | 30 | -55/185  | 0/0    | 30/-30 | 65  | 0  | 0  |
| AUTOBRAKE 2   | 2260 | 45/-45 | 65 | -115/385 | 0/-15  | 65/-65 | 125 | 0  | 0  |

#### Good Reported Braking Action

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1520 | 30/-25 | 40 | -70/245  | 40/-35 | 35/-35 | 65  | 125 | 300 |
| AUTOBRAKE MAX | 1510 | 30/-25 | 40 | -70/245  | 35/-30 | 40/-40 | 70  | 120 | 290 |
| AUTOBRAKE 2   | 2260 | 45/-45 | 65 | -115/385 | 0/-15  | 65/-65 | 125 | 0   | 0   |

#### Medium Reported Braking Action

|               |      |        |    |          |         |        |     |     |     |
|---------------|------|--------|----|----------|---------|--------|-----|-----|-----|
| MAX MANUAL    | 2030 | 45/-40 | 65 | -110/390 | 95/-75  | 50/-55 | 80  | 340 | 945 |
| AUTOBRAKE MAX | 2020 | 45/-40 | 65 | -110/390 | 100/-80 | 55/-55 | 85  | 335 | 940 |
| AUTOBRAKE 3   | 2140 | 45/-35 | 65 | -115/405 | 70/-35  | 60/-60 | 110 | 245 | 855 |

#### Poor Reported Braking Action

|               |      |        |    |          |          |        |     |     |      |
|---------------|------|--------|----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2570 | 60/-55 | 90 | -155/600 | 210/-140 | 65/-70 | 95  | 725 | 2515 |
| AUTOBRAKE MAX | 2580 | 65/-55 | 90 | -155/600 | 215/-145 | 70/-70 | 95  | 730 | 2525 |
| AUTOBRAKE 3   | 2585 | 65/-55 | 90 | -160/600 | 215/-130 | 70/-75 | 105 | 725 | 2520 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**FLIGHT CONTROLS (Flaps 20)**

**VREF30 + 20**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 200000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>200000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |      |        |    |          |        |        |     |    |     |
|---------------|------|--------|----|----------|--------|--------|-----|----|-----|
| MAX MANUAL    | 1210 | 20/-5  | 30 | -45/160  | 20/-20 | 30/-30 | 60  | 50 | 115 |
| AUTOBRAKE MAX | 1430 | 25/-5  | 35 | -60/195  | 0/0    | 35/-35 | 70  | 0  | 15  |
| AUTOBRAKE 2   | 2470 | 45/-20 | 75 | -120/405 | 5/-25  | 75/-75 | 125 | 10 | 10  |

**Good Reported Braking Action**

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1685 | 30/-10 | 50 | -75/260  | 55/-45 | 45/-45 | 80  | 180 | 450 |
| AUTOBRAKE MAX | 1685 | 30/-10 | 50 | -75/260  | 50/-45 | 45/-45 | 80  | 165 | 430 |
| AUTOBRAKE 2   | 2470 | 45/-20 | 75 | -120/405 | 5/-25  | 75/-75 | 125 | 10  | 10  |

**Medium Reported Braking Action**

|               |      |        |    |          |         |        |     |     |      |
|---------------|------|--------|----|----------|---------|--------|-----|-----|------|
| MAX MANUAL    | 2230 | 50/-25 | 75 | -115/410 | 115/-90 | 60/-60 | 90  | 440 | 1280 |
| AUTOBRAKE MAX | 2230 | 50/-25 | 75 | -115/410 | 120/-95 | 60/-60 | 95  | 440 | 1280 |
| AUTOBRAKE 3   | 2340 | 45/-15 | 70 | -120/425 | 80/-40  | 65/-65 | 115 | 355 | 1205 |

**Poor Reported Braking Action**

|               |      |        |     |          |          |        |     |     |      |
|---------------|------|--------|-----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2785 | 70/-40 | 105 | -165/620 | 230/-160 | 75/-80 | 100 | 875 | 3125 |
| AUTOBRAKE MAX | 2795 | 70/-40 | 105 | -165/620 | 235/-160 | 75/-80 | 100 | 875 | 3140 |
| AUTOBRAKE 3   | 2800 | 70/-35 | 105 | -165/620 | 235/-140 | 75/-80 | 110 | 870 | 3130 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### HYD PRESS SYS C (Flaps 20)

#### VREF20

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 200000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>200000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |      |        |    |          |        |        |     |    |    |
|---------------|------|--------|----|----------|--------|--------|-----|----|----|
| MAX MANUAL    | 1080 | 25/-15 | 25 | -40/145  | 15/-15 | 25/-25 | 45  | 30 | 60 |
| AUTOBRAKE MAX | 1320 | 20/-20 | 30 | -55/185  | 0/0    | 30/-30 | 65  | 0  | 0  |
| AUTOBRAKE 2   | 2245 | 45/-45 | 65 | -110/385 | 5/-25  | 65/-65 | 115 | 10 | 10 |

#### Good Reported Braking Action

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1475 | 25/-25 | 40 | -70/240  | 35/-35 | 35/-35 | 60  | 110 | 265 |
| AUTOBRAKE MAX | 1485 | 30/-25 | 40 | -70/240  | 35/-30 | 35/-35 | 65  | 110 | 265 |
| AUTOBRAKE 2   | 2245 | 45/-45 | 65 | -110/385 | 5/-25  | 65/-65 | 115 | 10  | 10  |

#### Medium Reported Braking Action

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1965 | 40/-40 | 60 | -105/385 | 90/-70 | 50/-50 | 75  | 305 | 835 |
| AUTOBRAKE MAX | 1955 | 40/-40 | 60 | -105/380 | 95/-75 | 50/-50 | 75  | 305 | 830 |
| AUTOBRAKE 3   | 2120 | 40/-35 | 60 | -110/405 | 55/-35 | 60/-60 | 110 | 175 | 710 |

#### Poor Reported Braking Action

|               |      |        |    |          |          |        |     |     |      |
|---------------|------|--------|----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2480 | 60/-55 | 85 | -155/585 | 195/-130 | 65/-70 | 85  | 660 | 2200 |
| AUTOBRAKE MAX | 2490 | 60/-55 | 85 | -155/585 | 200/-140 | 65/-70 | 85  | 660 | 2205 |
| AUTOBRAKE 3   | 2515 | 60/-50 | 85 | -155/590 | 190/-120 | 65/-70 | 100 | 645 | 2195 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.



ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

HYD PRESS SYS L (Flaps 25)

VREF25

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 200000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>200000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

Dry Runway

|               |      |        |    |          |        |        |     |   |    |
|---------------|------|--------|----|----------|--------|--------|-----|---|----|
| MAX MANUAL    | 990  | 25/-10 | 20 | -40/140  | 15/-15 | 20/-20 | 40  | 0 | 30 |
| AUTOBRAKE MAX | 1260 | 20/-15 | 30 | -55/180  | 0/0    | 30/-30 | 65  | 0 | 0  |
| AUTOBRAKE 2   | 2135 | 40/-30 | 60 | -110/375 | 0/-10  | 60/-60 | 120 | 0 | 0  |

Good Reported Braking Action

|               |      |        |    |          |        |        |     |   |     |
|---------------|------|--------|----|----------|--------|--------|-----|---|-----|
| MAX MANUAL    | 1435 | 25/-20 | 40 | -70/250  | 45/-40 | 35/-35 | 65  | 0 | 135 |
| AUTOBRAKE MAX | 1495 | 25/-20 | 40 | -75/255  | 40/-30 | 40/-40 | 70  | 0 | 135 |
| AUTOBRAKE 2   | 2135 | 40/-30 | 60 | -110/375 | 0/-10  | 60/-60 | 120 | 0 | 0   |

Medium Reported Braking Action

|               |      |        |    |          |          |        |     |   |     |
|---------------|------|--------|----|----------|----------|--------|-----|---|-----|
| MAX MANUAL    | 2065 | 40/-30 | 65 | -120/435 | 125/-95  | 55/-60 | 85  | 0 | 455 |
| AUTOBRAKE MAX | 2070 | 40/-30 | 65 | -120/435 | 130/-100 | 55/-60 | 85  | 0 | 455 |
| AUTOBRAKE 3   | 2145 | 45/-30 | 65 | -120/445 | 115/-75  | 60/-60 | 100 | 0 | 455 |

Poor Reported Braking Action

|               |      |        |     |          |          |        |     |   |      |
|---------------|------|--------|-----|----------|----------|--------|-----|---|------|
| MAX MANUAL    | 2875 | 60/-50 | 100 | -195/765 | 380/-215 | 80/-85 | 100 | 0 | 1310 |
| AUTOBRAKE MAX | 2885 | 60/-50 | 100 | -195/765 | 385/-220 | 80/-85 | 100 | 0 | 1315 |
| AUTOBRAKE 3   | 2910 | 60/-50 | 100 | -195/765 | 375/-220 | 85/-85 | 100 | 0 | 1325 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### HYD PRESS SYS L (Flaps 30)

#### VREF30

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |
| BRAKING<br>CONFIGURATION | 200000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>200000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV<br>NO<br>REV  |

#### Dry Runway

|               |      |        |    |          |        |        |     |   |    |
|---------------|------|--------|----|----------|--------|--------|-----|---|----|
| MAX MANUAL    | 945  | 25/-5  | 20 | -40/135  | 15/-15 | 20/-20 | 40  | 0 | 25 |
| AUTOBRAKE MAX | 1180 | 20/-5  | 25 | -50/175  | 0/0    | 30/-30 | 65  | 0 | 0  |
| AUTOBRAKE 2   | 1970 | 40/-10 | 55 | -105/355 | 0/-5   | 55/-55 | 120 | 0 | 0  |

#### Good Reported Braking Action

|               |      |        |    |          |        |        |     |   |     |
|---------------|------|--------|----|----------|--------|--------|-----|---|-----|
| MAX MANUAL    | 1365 | 25/-10 | 35 | -70/245  | 45/-35 | 35/-35 | 65  | 0 | 120 |
| AUTOBRAKE MAX | 1410 | 25/-10 | 35 | -70/250  | 35/-30 | 35/-35 | 70  | 0 | 115 |
| AUTOBRAKE 2   | 1970 | 40/-10 | 55 | -105/355 | 0/-5   | 55/-55 | 120 | 0 | 0   |

#### Medium Reported Braking Action

|               |      |        |    |          |         |        |    |   |     |
|---------------|------|--------|----|----------|---------|--------|----|---|-----|
| MAX MANUAL    | 1965 | 40/-20 | 60 | -115/430 | 125/-95 | 55/-55 | 85 | 0 | 400 |
| AUTOBRAKE MAX | 1965 | 40/-20 | 60 | -115/430 | 130/-95 | 55/-55 | 85 | 0 | 405 |
| AUTOBRAKE 3   | 2020 | 40/-15 | 60 | -120/435 | 120/-75 | 55/-55 | 95 | 0 | 415 |

#### Poor Reported Braking Action

|               |      |        |    |          |          |        |     |   |      |
|---------------|------|--------|----|----------|----------|--------|-----|---|------|
| MAX MANUAL    | 2745 | 60/-35 | 95 | -190/750 | 375/-210 | 75/-80 | 100 | 0 | 1180 |
| AUTOBRAKE MAX | 2755 | 60/-35 | 95 | -190/750 | 380/-215 | 80/-80 | 100 | 0 | 1185 |
| AUTOBRAKE 3   | 2775 | 60/-35 | 95 | -195/755 | 370/-210 | 80/-80 | 105 | 0 | 1190 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**HYD PRESS SYS L+C (Flaps 20)**

**VREF30 + 20**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 200000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>200000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |      |        |    |          |        |        |     |   |    |
|---------------|------|--------|----|----------|--------|--------|-----|---|----|
| MAX MANUAL    | 1245 | 30/-5  | 30 | -50/165  | 20/-20 | 30/-30 | 55  | 0 | 50 |
| AUTOBRAKE MAX | 1430 | 25/-5  | 35 | -60/195  | 0/0    | 35/-35 | 70  | 0 | 0  |
| AUTOBRAKE 2   | 2480 | 45/-10 | 70 | -120/405 | 0/0    | 75/-75 | 140 | 0 | 0  |

**Good Reported Braking Action**

|               |      |        |    |          |        |        |     |   |     |
|---------------|------|--------|----|----------|--------|--------|-----|---|-----|
| MAX MANUAL    | 1805 | 30/-10 | 50 | -85/285  | 60/-50 | 45/-50 | 80  | 0 | 215 |
| AUTOBRAKE MAX | 1790 | 30/-10 | 50 | -85/285  | 60/-45 | 50/-50 | 85  | 0 | 205 |
| AUTOBRAKE 2   | 2480 | 45/-10 | 70 | -120/405 | 0/0    | 75/-75 | 140 | 0 | 0   |

**Medium Reported Braking Action**

|               |      |        |    |          |          |        |     |   |     |
|---------------|------|--------|----|----------|----------|--------|-----|---|-----|
| MAX MANUAL    | 2590 | 50/-25 | 85 | -140/495 | 170/-125 | 75/-75 | 105 | 0 | 710 |
| AUTOBRAKE MAX | 2585 | 50/-25 | 85 | -140/495 | 175/-135 | 75/-75 | 110 | 0 | 705 |
| AUTOBRAKE 3   | 2605 | 50/-20 | 85 | -140/495 | 170/-115 | 75/-75 | 110 | 0 | 715 |

**Poor Reported Braking Action**

|               |      |        |     |          |          |          |     |   |      |
|---------------|------|--------|-----|----------|----------|----------|-----|---|------|
| MAX MANUAL    | 3580 | 75/-45 | 130 | -225/845 | 480/-275 | 105/-105 | 125 | 0 | 2010 |
| AUTOBRAKE MAX | 3590 | 75/-45 | 130 | -225/850 | 490/-285 | 105/-110 | 125 | 0 | 2015 |
| AUTOBRAKE 3   | 3590 | 75/-45 | 135 | -225/850 | 490/-275 | 105/-110 | 130 | 0 | 2020 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.





## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### HYD PRESS SYS L+R (Flaps 20)

#### VREF30 + 20

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 200000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>200000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |                       |       |    |         |        |        |    |   |   |
|---------------|-----------------------|-------|----|---------|--------|--------|----|---|---|
| MAX MANUAL    | 1360                  | 20/-5 | 35 | -60/195 | 35/-30 | 35/-35 | 65 | 0 | 0 |
| AUTOBRAKE MAX | Autobrake Inoperative |       |    |         |        |        |    |   |   |
| AUTOBRAKE 2   | Autobrake Inoperative |       |    |         |        |        |    |   |   |

#### Good Reported Braking Action

|               |                       |        |    |          |         |        |     |   |   |
|---------------|-----------------------|--------|----|----------|---------|--------|-----|---|---|
| MAX MANUAL    | 2180                  | 35/-10 | 65 | -110/375 | 120/-95 | 65/-65 | 100 | 0 | 0 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |          |         |        |     |   |   |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |          |         |        |     |   |   |

#### Medium Reported Braking Action

|               |                       |        |     |          |          |          |     |   |   |
|---------------|-----------------------|--------|-----|----------|----------|----------|-----|---|---|
| MAX MANUAL    | 3575                  | 60/-20 | 115 | -210/750 | 450/-280 | 110/-110 | 140 | 0 | 0 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |     |          |          |          |     |   |   |
| AUTOBRAKE 3   | Autobrake Inoperative |        |     |          |          |          |     |   |   |

#### Poor Reported Braking Action

|               |                       |       |     |           |           |          |     |   |   |
|---------------|-----------------------|-------|-----|-----------|-----------|----------|-----|---|---|
| MAX MANUAL    | 6120                  | 80/15 | 215 | -445/1775 | 2080/-875 | 200/-205 | 180 | 0 | 0 |
| 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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**HYD PRESS SYS R (Flaps 25)**

**VREF25**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 200000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>200000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |                       |        |    |         |        |        |    |   |    |
|---------------|-----------------------|--------|----|---------|--------|--------|----|---|----|
| MAX MANUAL    | 1090                  | 20/-10 | 25 | -45/165 | 20/-20 | 25/-25 | 50 | 0 | 45 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |         |        |        |    |   |    |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |         |        |        |    |   |    |

**Good Reported Braking Action**

|               |                       |        |    |         |        |        |    |   |     |
|---------------|-----------------------|--------|----|---------|--------|--------|----|---|-----|
| MAX MANUAL    | 1580                  | 30/-20 | 45 | -80/290 | 60/-50 | 40/-40 | 70 | 0 | 190 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |         |        |        |    |   |     |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |         |        |        |    |   |     |

**Medium Reported Braking Action**

|               |                       |        |    |          |          |        |    |   |     |
|---------------|-----------------------|--------|----|----------|----------|--------|----|---|-----|
| MAX MANUAL    | 2240                  | 45/-35 | 70 | -135/500 | 165/-115 | 60/-65 | 85 | 0 | 590 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |          |          |        |    |   |     |
| AUTOBRAKE 3   | Autobrake Inoperative |        |    |          |          |        |    |   |     |

**Poor Reported Braking Action**

|               |                       |        |     |          |          |        |     |   |      |
|---------------|-----------------------|--------|-----|----------|----------|--------|-----|---|------|
| MAX MANUAL    | 3070                  | 65/-50 | 110 | -220/880 | 535/-255 | 85/-90 | 100 | 0 | 1675 |
| 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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### HYD PRESS SYS R (Flaps 30)

#### VREF30

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |
| BRAKING<br>CONFIGURATION | 200000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>200000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV<br>NO<br>REV  |

#### Dry Runway

|               |                       |       |    |         |        |        |    |   |    |
|---------------|-----------------------|-------|----|---------|--------|--------|----|---|----|
| MAX MANUAL    | 1035                  | 15/-5 | 25 | -45/160 | 20/-15 | 25/-25 | 45 | 0 | 40 |
| AUTOBRAKE MAX | Autobrake Inoperative |       |    |         |        |        |    |   |    |
| AUTOBRAKE 2   | Autobrake Inoperative |       |    |         |        |        |    |   |    |

#### Good Reported Braking Action

|               |                       |        |    |         |        |        |    |   |     |
|---------------|-----------------------|--------|----|---------|--------|--------|----|---|-----|
| MAX MANUAL    | 1480                  | 25/-10 | 40 | -80/280 | 55/-45 | 40/-40 | 65 | 0 | 160 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |         |        |        |    |   |     |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |         |        |        |    |   |     |

#### Medium Reported Braking Action

|               |                       |        |    |          |          |        |    |   |     |
|---------------|-----------------------|--------|----|----------|----------|--------|----|---|-----|
| MAX MANUAL    | 2090                  | 40/-20 | 65 | -130/485 | 155/-110 | 60/-60 | 85 | 0 | 495 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |          |          |        |    |   |     |
| AUTOBRAKE 3   | Autobrake Inoperative |        |    |          |          |        |    |   |     |

#### Poor Reported Braking Action

|               |                       |        |     |          |          |        |    |   |      |
|---------------|-----------------------|--------|-----|----------|----------|--------|----|---|------|
| MAX MANUAL    | 2860                  | 60/-35 | 100 | -210/855 | 505/-240 | 80/-85 | 95 | 0 | 1415 |
| 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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**HYD PRESS SYS R+C (Flaps 20)**

**VREF30 + 20**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 200000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>200000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |                       |       |    |         |        |        |    |   |     |
|---------------|-----------------------|-------|----|---------|--------|--------|----|---|-----|
| MAX MANUAL    | 1550                  | 25/-5 | 40 | -65/225 | 40/-35 | 40/-40 | 75 | 0 | 120 |
| AUTOBRAKE MAX | Autobrake Inoperative |       |    |         |        |        |    |   |     |
| AUTOBRAKE 2   | Autobrake Inoperative |       |    |         |        |        |    |   |     |

**Good Reported Braking Action**

|               |                       |        |    |          |         |        |     |   |     |
|---------------|-----------------------|--------|----|----------|---------|--------|-----|---|-----|
| MAX MANUAL    | 2235                  | 40/-15 | 70 | -110/385 | 110/-90 | 60/-60 | 100 | 0 | 440 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |          |         |        |     |   |     |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |          |         |        |     |   |     |

**Medium Reported Braking Action**

|               |                       |        |     |          |          |        |     |   |      |
|---------------|-----------------------|--------|-----|----------|----------|--------|-----|---|------|
| MAX MANUAL    | 3130                  | 65/-35 | 110 | -180/655 | 290/-195 | 90/-90 | 120 | 0 | 1290 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |     |          |          |        |     |   |      |
| AUTOBRAKE 3   | Autobrake Inoperative |        |     |          |          |        |     |   |      |

**Poor Reported Braking Action**

|               |                       |        |     |           |           |          |     |   |      |
|---------------|-----------------------|--------|-----|-----------|-----------|----------|-----|---|------|
| MAX MANUAL    | 4220                  | 90/-55 | 165 | -290/1150 | 1095/-405 | 120/-130 | 135 | 0 | 3675 |
| 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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### NAV AIR DATA SYS (Flaps 20)

#### VREF20

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 200000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>200000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |      |        |    |          |        |        |     |    |    |
|---------------|------|--------|----|----------|--------|--------|-----|----|----|
| MAX MANUAL    | 1105 | 25/-15 | 25 | -45/145  | 15/-15 | 25/-25 | 45  | 30 | 70 |
| AUTOBRAKE MAX | 1320 | 20/-20 | 30 | -55/185  | 0/0    | 30/-30 | 65  | 0  | 0  |
| AUTOBRAKE 2   | 2260 | 45/-45 | 65 | -115/385 | 0/-15  | 65/-65 | 125 | 0  | 0  |

#### Good Reported Braking Action

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1520 | 30/-25 | 40 | -70/245  | 40/-35 | 35/-35 | 65  | 125 | 300 |
| AUTOBRAKE MAX | 1510 | 30/-25 | 40 | -70/245  | 35/-30 | 40/-40 | 70  | 120 | 290 |
| AUTOBRAKE 2   | 2260 | 45/-45 | 65 | -115/385 | 0/-15  | 65/-65 | 125 | 0   | 0   |

#### Medium Reported Braking Action

|               |      |        |    |          |         |        |     |     |     |
|---------------|------|--------|----|----------|---------|--------|-----|-----|-----|
| MAX MANUAL    | 2030 | 45/-40 | 65 | -110/390 | 95/-75  | 50/-55 | 80  | 340 | 945 |
| AUTOBRAKE MAX | 2020 | 45/-40 | 65 | -110/390 | 100/-80 | 55/-55 | 85  | 335 | 940 |
| AUTOBRAKE 3   | 2140 | 45/-35 | 65 | -115/405 | 70/-35  | 60/-60 | 110 | 245 | 855 |

#### Poor Reported Braking Action

|               |      |        |    |          |          |        |     |     |      |
|---------------|------|--------|----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2570 | 60/-55 | 90 | -155/600 | 210/-140 | 65/-70 | 95  | 725 | 2515 |
| AUTOBRAKE MAX | 2580 | 65/-55 | 90 | -155/600 | 215/-145 | 70/-70 | 95  | 730 | 2525 |
| AUTOBRAKE 3   | 2585 | 65/-55 | 90 | -160/600 | 215/-130 | 70/-75 | 105 | 725 | 2520 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.



ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

PITCH DOWN AUTHORITY (Flaps 25)

VREF25

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 200000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>200000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

Dry Runway

|               |      |        |    |          |        |        |     |    |    |
|---------------|------|--------|----|----------|--------|--------|-----|----|----|
| MAX MANUAL    | 1070 | 25/-10 | 20 | -40/145  | 15/-10 | 20/-20 | 45  | 15 | 35 |
| AUTOBRAKE MAX | 1260 | 20/-15 | 30 | -55/180  | 0/0    | 30/-30 | 65  | 0  | 0  |
| AUTOBRAKE 2   | 2120 | 45/-30 | 60 | -110/370 | 10/-25 | 60/-60 | 105 | 15 | 15 |

Good Reported Braking Action

|               |      |        |    |          |        |        |     |    |     |
|---------------|------|--------|----|----------|--------|--------|-----|----|-----|
| MAX MANUAL    | 1425 | 25/-15 | 35 | -65/235  | 35/-30 | 35/-35 | 55  | 75 | 175 |
| AUTOBRAKE MAX | 1435 | 25/-15 | 35 | -65/235  | 35/-30 | 35/-35 | 65  | 75 | 180 |
| AUTOBRAKE 2   | 2130 | 45/-30 | 60 | -110/370 | 10/-25 | 60/-60 | 105 | 15 | 15  |

Medium Reported Braking Action

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1860 | 35/-30 | 55 | -100/370 | 80/-60 | 45/-45 | 70  | 220 | 575 |
| AUTOBRAKE MAX | 1860 | 35/-25 | 55 | -100/370 | 85/-65 | 45/-50 | 75  | 220 | 575 |
| AUTOBRAKE 3   | 2015 | 40/-25 | 55 | -110/390 | 55/-30 | 55/-55 | 110 | 110 | 430 |

Poor Reported Braking Action

|               |      |        |    |          |          |        |    |     |      |
|---------------|------|--------|----|----------|----------|--------|----|-----|------|
| MAX MANUAL    | 2330 | 50/-40 | 75 | -145/560 | 170/-115 | 60/-60 | 75 | 495 | 1555 |
| AUTOBRAKE MAX | 2340 | 50/-40 | 75 | -145/565 | 180/-120 | 60/-65 | 75 | 500 | 1560 |
| AUTOBRAKE 3   | 2365 | 50/-35 | 75 | -145/565 | 170/-105 | 60/-65 | 95 | 470 | 1535 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### PITCH DOWN AUTHORITY (Flaps 30)

#### VREF30

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |
| BRAKING<br>CONFIGURATION | 200000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>200000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV<br>NO<br>REV  |

#### Dry Runway

|               |      |        |    |          |        |        |     |    |    |
|---------------|------|--------|----|----------|--------|--------|-----|----|----|
| MAX MANUAL    | 1020 | 25/-5  | 20 | -40/140  | 10/-10 | 20/-20 | 45  | 15 | 30 |
| AUTOBRAKE MAX | 1180 | 20/0   | 25 | -50/175  | 5/0    | 30/-30 | 65  | 0  | 0  |
| AUTOBRAKE 2   | 1970 | 40/-15 | 55 | -105/355 | 0/-15  | 55/-55 | 110 | 0  | 0  |

#### Good Reported Braking Action

|               |      |        |    |          |        |        |     |    |     |
|---------------|------|--------|----|----------|--------|--------|-----|----|-----|
| MAX MANUAL    | 1355 | 20/-10 | 35 | -65/230  | 30/-30 | 30/-30 | 55  | 65 | 150 |
| AUTOBRAKE MAX | 1365 | 25/-5  | 35 | -65/230  | 35/-30 | 30/-30 | 65  | 65 | 155 |
| AUTOBRAKE 2   | 1975 | 40/-15 | 55 | -105/355 | 5/-15  | 55/-55 | 110 | 5  | 5   |

#### Medium Reported Braking Action

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1765 | 35/-20 | 50 | -100/360 | 75/-60 | 45/-45 | 70  | 195 | 505 |
| AUTOBRAKE MAX | 1765 | 35/-15 | 50 | -100/360 | 80/-65 | 45/-45 | 70  | 195 | 505 |
| AUTOBRAKE 3   | 1870 | 35/-10 | 50 | -105/375 | 60/-30 | 50/-50 | 105 | 110 | 400 |

#### Poor Reported Braking Action

|               |      |        |    |          |          |        |    |     |      |
|---------------|------|--------|----|----------|----------|--------|----|-----|------|
| MAX MANUAL    | 2215 | 50/-30 | 70 | -140/555 | 170/-115 | 55/-60 | 75 | 450 | 1375 |
| AUTOBRAKE MAX | 2225 | 50/-30 | 70 | -145/555 | 175/-120 | 55/-60 | 75 | 450 | 1380 |
| AUTOBRAKE 3   | 2235 | 50/-25 | 70 | -145/555 | 170/-105 | 60/-60 | 90 | 440 | 1370 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.



ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

PITCH UP AUTHORITY (Flaps ≤ 15)

VREF30 + 40

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 200000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>200000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

Dry Runway

|               |      |        |    |          |        |        |    |     |     |
|---------------|------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1145 | 35/-10 | 25 | -45/145  | 15/-15 | 25/-25 | 40 | 35  | 75  |
| AUTOBRAKE MAX | 1710 | 25/-5  | 45 | -65/215  | 0/0    | 45/-45 | 75 | 0   | 0   |
| AUTOBRAKE 2   | 2745 | 55/-40 | 90 | -125/420 | 60/-65 | 80/-80 | 85 | 240 | 265 |

Good Reported Braking Action

|               |      |        |    |          |        |        |    |     |     |
|---------------|------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1575 | 25/-15 | 45 | -70/240  | 35/-30 | 40/-40 | 50 | 120 | 280 |
| AUTOBRAKE MAX | 1790 | 30/-10 | 50 | -75/260  | 20/-15 | 45/-50 | 75 | 80  | 245 |
| AUTOBRAKE 2   | 2745 | 55/-40 | 90 | -125/420 | 60/-65 | 80/-80 | 85 | 240 | 265 |

Medium Reported Braking Action

|               |      |        |    |          |        |        |    |     |     |
|---------------|------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 2135 | 40/-25 | 70 | -105/385 | 85/-70 | 55/-60 | 60 | 325 | 865 |
| AUTOBRAKE MAX | 2205 | 45/-25 | 70 | -110/395 | 80/-65 | 60/-60 | 75 | 325 | 870 |
| AUTOBRAKE 3   | 2650 | 50/-35 | 85 | -125/445 | 70/-65 | 75/-75 | 85 | 190 | 565 |

Poor Reported Braking Action

|               |      |        |     |          |          |        |    |     |      |
|---------------|------|--------|-----|----------|----------|--------|----|-----|------|
| MAX MANUAL    | 2720 | 60/-40 | 95  | -155/595 | 190/-130 | 75/-75 | 75 | 690 | 2220 |
| AUTOBRAKE MAX | 2745 | 60/-40 | 100 | -155/595 | 190/-130 | 75/-80 | 75 | 685 | 2225 |
| AUTOBRAKE 3   | 2935 | 60/-45 | 100 | -165/615 | 180/-130 | 80/-85 | 85 | 585 | 2085 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.



## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### PITCH UP AUTHORITY (Flaps ≥ 20)

#### VREF30 + 20

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 200000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>200000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |      |        |    |          |        |        |    |     |     |
|---------------|------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 990  | 30/-5  | 20 | -40/130  | 10/-10 | 20/-20 | 35 | 25  | 50  |
| AUTOBRAKE MAX | 1430 | 25/-5  | 35 | -60/195  | 0/0    | 35/-35 | 70 | 0   | 0   |
| AUTOBRAKE 2   | 2315 | 50/-30 | 75 | -115/385 | 45/-50 | 65/-65 | 85 | 130 | 130 |

#### Good Reported Braking Action

|               |      |        |    |          |        |        |    |     |     |
|---------------|------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1375 | 25/-10 | 35 | -65/225  | 30/-30 | 35/-35 | 45 | 95  | 220 |
| AUTOBRAKE MAX | 1515 | 25/-10 | 40 | -70/240  | 20/-15 | 40/-40 | 70 | 80  | 215 |
| AUTOBRAKE 2   | 2315 | 50/-30 | 75 | -115/385 | 45/-50 | 65/-65 | 85 | 130 | 130 |

#### Medium Reported Braking Action

|               |      |        |    |          |        |        |    |     |     |
|---------------|------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1855 | 40/-20 | 55 | -100/365 | 75/-60 | 50/-50 | 60 | 260 | 680 |
| AUTOBRAKE MAX | 1895 | 40/-20 | 60 | -100/370 | 70/-55 | 50/-50 | 70 | 255 | 670 |
| AUTOBRAKE 3   | 2225 | 40/-25 | 65 | -115/410 | 55/-50 | 60/-65 | 90 | 125 | 440 |

#### Poor Reported Braking Action

|               |      |        |    |          |          |        |    |     |      |
|---------------|------|--------|----|----------|----------|--------|----|-----|------|
| MAX MANUAL    | 2365 | 55/-35 | 80 | -145/560 | 175/-120 | 65/-65 | 70 | 565 | 1775 |
| AUTOBRAKE MAX | 2375 | 55/-35 | 80 | -145/565 | 175/-120 | 65/-65 | 75 | 565 | 1775 |
| AUTOBRAKE 3   | 2505 | 55/-35 | 85 | -150/575 | 160/-110 | 70/-70 | 85 | 470 | 1690 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

PRI FLIGHT COMPUTERS (Flaps 20)

VREF20

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 200000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>200000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

Dry Runway

|               |      |        |    |          |        |        |     |    |    |
|---------------|------|--------|----|----------|--------|--------|-----|----|----|
| MAX MANUAL    | 1105 | 25/-15 | 25 | -45/145  | 15/-15 | 25/-25 | 45  | 30 | 70 |
| AUTOBRAKE MAX | 1320 | 20/-20 | 30 | -55/185  | 0/0    | 30/-30 | 65  | 0  | 0  |
| AUTOBRAKE 2   | 2260 | 45/-45 | 65 | -115/385 | 0/-15  | 65/-65 | 125 | 0  | 0  |

Good Reported Braking Action

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1520 | 30/-25 | 40 | -70/245  | 40/-35 | 35/-35 | 65  | 125 | 300 |
| AUTOBRAKE MAX | 1510 | 30/-25 | 40 | -70/245  | 35/-30 | 40/-40 | 70  | 120 | 290 |
| AUTOBRAKE 2   | 2260 | 45/-45 | 65 | -115/385 | 0/-15  | 65/-65 | 125 | 0   | 0   |

Medium Reported Braking Action

|               |      |        |    |          |         |        |     |     |     |
|---------------|------|--------|----|----------|---------|--------|-----|-----|-----|
| MAX MANUAL    | 2030 | 45/-40 | 65 | -110/390 | 95/-75  | 50/-55 | 80  | 340 | 945 |
| AUTOBRAKE MAX | 2020 | 45/-40 | 65 | -110/390 | 100/-80 | 55/-55 | 85  | 335 | 940 |
| AUTOBRAKE 3   | 2140 | 45/-35 | 65 | -115/405 | 70/-35  | 60/-60 | 110 | 245 | 855 |

Poor Reported Braking Action

|               |      |        |    |          |          |        |     |     |      |
|---------------|------|--------|----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2570 | 60/-55 | 90 | -155/600 | 210/-140 | 65/-70 | 95  | 725 | 2515 |
| AUTOBRAKE MAX | 2580 | 65/-55 | 90 | -155/600 | 215/-145 | 70/-70 | 95  | 730 | 2525 |
| AUTOBRAKE 3   | 2585 | 65/-55 | 90 | -160/600 | 215/-130 | 70/-75 | 105 | 725 | 2520 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### SLATS DRIVE (Flaps 20)

#### VREF30 + 30

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 200000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>200000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |      |        |    |          |        |        |    |     |     |
|---------------|------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1105 | 30/-5  | 25 | -40/145  | 15/-15 | 25/-25 | 40 | 30  | 70  |
| AUTOBRAKE MAX | 1565 | 25/-5  | 40 | -60/205  | 5/0    | 40/-40 | 75 | 0   | 0   |
| AUTOBRAKE 2   | 2550 | 50/-35 | 80 | -120/405 | 55/-60 | 75/-75 | 85 | 170 | 175 |

#### Good Reported Braking Action

|               |      |        |    |          |        |        |    |     |     |
|---------------|------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1545 | 25/-15 | 45 | -70/240  | 40/-35 | 40/-40 | 55 | 120 | 285 |
| AUTOBRAKE MAX | 1670 | 30/-10 | 45 | -75/250  | 25/-20 | 45/-45 | 75 | 115 | 290 |
| AUTOBRAKE 2   | 2550 | 50/-35 | 80 | -120/405 | 55/-60 | 75/-75 | 85 | 170 | 175 |

#### Medium Reported Braking Action

|               |      |        |    |          |        |        |    |     |     |
|---------------|------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 2065 | 40/-25 | 65 | -105/385 | 90/-70 | 55/-55 | 65 | 315 | 840 |
| AUTOBRAKE MAX | 2095 | 40/-25 | 65 | -105/390 | 80/-65 | 55/-60 | 75 | 310 | 825 |
| AUTOBRAKE 3   | 2450 | 45/-30 | 75 | -120/430 | 65/-55 | 70/-70 | 90 | 160 | 565 |

#### Poor Reported Braking Action

|               |      |        |    |          |          |        |    |     |      |
|---------------|------|--------|----|----------|----------|--------|----|-----|------|
| MAX MANUAL    | 2605 | 60/-40 | 90 | -155/585 | 190/-130 | 70/-75 | 75 | 655 | 2095 |
| AUTOBRAKE MAX | 2615 | 60/-40 | 90 | -155/585 | 190/-130 | 70/-75 | 80 | 655 | 2095 |
| AUTOBRAKE 3   | 2750 | 60/-40 | 95 | -160/600 | 175/-125 | 75/-80 | 85 | 555 | 2000 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

SPOILERS (Flaps 25)

VREF25

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 200000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>200000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

Dry Runway

|               |      |        |    |          |        |        |    |    |    |
|---------------|------|--------|----|----------|--------|--------|----|----|----|
| MAX MANUAL    | 955  | 25/-10 | 20 | -40/130  | 10/-10 | 20/-20 | 40 | 25 | 50 |
| AUTOBRAKE MAX | 1260 | 20/-15 | 30 | -55/180  | 0/0    | 30/-30 | 65 | 0  | 0  |
| AUTOBRAKE 2   | 2100 | 45/-35 | 60 | -110/370 | 15/-40 | 60/-60 | 95 | 30 | 30 |

Good Reported Braking Action

|               |      |        |    |          |        |        |    |    |     |
|---------------|------|--------|----|----------|--------|--------|----|----|-----|
| MAX MANUAL    | 1325 | 25/-20 | 35 | -65/225  | 35/-30 | 30/-30 | 55 | 95 | 220 |
| AUTOBRAKE MAX | 1385 | 25/-20 | 35 | -65/230  | 30/-25 | 35/-35 | 65 | 95 | 225 |
| AUTOBRAKE 2   | 2100 | 45/-35 | 60 | -110/370 | 15/-40 | 60/-60 | 95 | 30 | 30  |

Medium Reported Braking Action

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1770 | 35/-30 | 55 | -100/360 | 80/-65 | 45/-45 | 65  | 255 | 690 |
| AUTOBRAKE MAX | 1780 | 40/-30 | 55 | -100/365 | 80/-65 | 45/-45 | 70  | 250 | 685 |
| AUTOBRAKE 3   | 1985 | 40/-30 | 55 | -110/390 | 45/-35 | 55/-55 | 100 | 135 | 550 |

Poor Reported Braking Action

|               |      |        |    |          |          |        |    |     |      |
|---------------|------|--------|----|----------|----------|--------|----|-----|------|
| MAX MANUAL    | 2250 | 55/-40 | 75 | -145/560 | 180/-120 | 60/-60 | 75 | 560 | 1790 |
| AUTOBRAKE MAX | 2255 | 55/-40 | 75 | -145/560 | 180/-125 | 60/-65 | 75 | 560 | 1795 |
| AUTOBRAKE 3   | 2305 | 55/-40 | 75 | -145/565 | 165/-105 | 60/-65 | 95 | 540 | 1785 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### SPOILERS (Flaps 30)

#### VREF30

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 200000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>200000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |      |        |    |          |        |        |     |    |    |
|---------------|------|--------|----|----------|--------|--------|-----|----|----|
| MAX MANUAL    | 915  | 20/-5  | 20 | -35/130  | 10/-10 | 20/-20 | 40  | 20 | 45 |
| AUTOBRAKE MAX | 1180 | 20/-5  | 25 | -50/175  | 0/0    | 30/-30 | 65  | 0  | 0  |
| AUTOBRAKE 2   | 1955 | 40/-20 | 55 | -105/355 | 5/-30  | 55/-55 | 100 | 10 | 10 |

#### Good Reported Braking Action

|               |      |        |    |          |        |        |     |    |     |
|---------------|------|--------|----|----------|--------|--------|-----|----|-----|
| MAX MANUAL    | 1255 | 20/-10 | 30 | -60/220  | 35/-30 | 30/-30 | 55  | 80 | 190 |
| AUTOBRAKE MAX | 1315 | 25/-10 | 35 | -65/225  | 25/-25 | 30/-30 | 60  | 80 | 195 |
| AUTOBRAKE 2   | 1955 | 40/-20 | 55 | -105/355 | 5/-30  | 55/-55 | 100 | 10 | 10  |

#### Medium Reported Braking Action

|               |      |        |    |          |        |        |    |     |     |
|---------------|------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1680 | 35/-20 | 50 | -95/355  | 80/-60 | 45/-45 | 65 | 230 | 600 |
| AUTOBRAKE MAX | 1690 | 35/-20 | 50 | -95/355  | 80/-60 | 45/-45 | 70 | 225 | 600 |
| AUTOBRAKE 3   | 1850 | 35/-15 | 50 | -105/375 | 50/-35 | 50/-50 | 95 | 135 | 510 |

#### Poor Reported Braking Action

|               |      |        |    |          |          |        |    |     |      |
|---------------|------|--------|----|----------|----------|--------|----|-----|------|
| MAX MANUAL    | 2140 | 50/-30 | 70 | -140/550 | 175/-115 | 55/-60 | 75 | 505 | 1575 |
| AUTOBRAKE MAX | 2150 | 50/-30 | 70 | -140/550 | 180/-120 | 55/-60 | 75 | 505 | 1580 |
| AUTOBRAKE 3   | 2180 | 50/-25 | 70 | -145/555 | 170/-105 | 60/-60 | 90 | 505 | 1585 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.



777 Flight Crew Operations Manual

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

STABILIZER (Flaps 20)

VREF30 + 20

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 200000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>200000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

Dry Runway

|               |      |        |    |          |        |        |    |     |     |
|---------------|------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1030 | 30/-5  | 25 | -40/135  | 15/-10 | 25/-25 | 35 | 25  | 60  |
| AUTOBRAKE MAX | 1430 | 25/-5  | 35 | -60/195  | 0/0    | 35/-35 | 70 | 0   | 0   |
| AUTOBRAKE 2   | 2360 | 50/-30 | 75 | -115/390 | 40/-50 | 65/-65 | 90 | 100 | 100 |

Good Reported Braking Action

|               |      |        |    |          |        |        |    |     |     |
|---------------|------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1435 | 25/-10 | 40 | -65/230  | 35/-30 | 35/-35 | 50 | 105 | 255 |
| AUTOBRAKE MAX | 1530 | 25/-10 | 40 | -70/240  | 30/-20 | 40/-40 | 70 | 110 | 260 |
| AUTOBRAKE 2   | 2360 | 50/-30 | 75 | -115/390 | 40/-50 | 65/-65 | 90 | 100 | 100 |

Medium Reported Braking Action

|               |      |        |    |          |        |        |    |     |     |
|---------------|------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1925 | 40/-25 | 60 | -105/375 | 85/-65 | 50/-50 | 65 | 285 | 765 |
| AUTOBRAKE MAX | 1940 | 40/-20 | 60 | -105/375 | 80/-60 | 50/-55 | 75 | 280 | 755 |
| AUTOBRAKE 3   | 2250 | 45/-25 | 65 | -115/410 | 55/-45 | 65/-65 | 95 | 135 | 535 |

Poor Reported Braking Action

|               |      |        |    |          |          |        |    |     |      |
|---------------|------|--------|----|----------|----------|--------|----|-----|------|
| MAX MANUAL    | 2440 | 55/-35 | 85 | -150/575 | 185/-125 | 65/-70 | 75 | 610 | 1965 |
| AUTOBRAKE MAX | 2445 | 55/-35 | 85 | -150/575 | 185/-125 | 65/-70 | 75 | 615 | 1965 |
| AUTOBRAKE 3   | 2555 | 55/-35 | 85 | -155/585 | 165/-110 | 70/-75 | 95 | 540 | 1905 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.



ADVISORY INFORMATION

Recommended Brake Cooling Schedule  
Reference Brake Energy (Millions of Foot Pounds)

|                     |             | BRAKES ON SPEED (KIAS)      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |     |   |   |   |   |   |     |  |  |  |  |  |     |  |  |  |  |  |
|---------------------|-------------|-----------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|---|---|---|---|---|-----|--|--|--|--|--|-----|--|--|--|--|--|
|                     |             | 80                          |      |      |      |      |      | 100  |      |      |      |      |      | 120  |      |      |      |      |      | 140 |   |   |   |   |   | 160 |  |  |  |  |  | 180 |  |  |  |  |  |
| WEIGHT<br>(1000 KG) | OAT<br>(°C) | PRESSURE ALTITUDE (1000 FT) |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |     |   |   |   |   |   |     |  |  |  |  |  |     |  |  |  |  |  |
|                     |             | 0                           | 2    | 4    | 0    | 2    | 4    | 0    | 2    | 4    | 0    | 2    | 4    | 0    | 2    | 4    | 0    | 2    | 4    | 0   | 2 | 4 | 0 | 2 | 4 |     |  |  |  |  |  |     |  |  |  |  |  |
| 300                 | 0           | 18.3                        | 19.2 | 20.2 | 27.3 | 28.8 | 30.5 | 37.8 | 40.0 | 42.4 | 49.5 | 52.5 | 55.8 | 62.2 | 66.0 | 70.2 | 75.2 | 79.8 | 84.8 |     |   |   |   |   |   |     |  |  |  |  |  |     |  |  |  |  |  |
|                     | 10          | 18.8                        | 19.7 | 20.7 | 28.2 | 29.7 | 31.4 | 39.0 | 41.3 | 43.8 | 51.1 | 54.2 | 57.6 | 64.2 | 68.2 | 72.4 | 77.5 | 82.3 | 87.4 |     |   |   |   |   |   |     |  |  |  |  |  |     |  |  |  |  |  |
|                     | 15          | 19.2                        | 20.1 | 21.1 | 28.7 | 30.3 | 32.0 | 39.7 | 42.1 | 44.6 | 52.0 | 55.2 | 58.6 | 65.3 | 69.4 | 73.7 | 78.8 | 83.7 | 88.8 |     |   |   |   |   |   |     |  |  |  |  |  |     |  |  |  |  |  |
|                     | 20          | 19.5                        | 20.4 | 21.5 | 29.2 | 30.8 | 32.5 | 40.4 | 42.8 | 45.3 | 52.9 | 56.1 | 59.6 | 66.4 | 70.5 | 74.9 | 80.1 | 85.0 | 90.2 |     |   |   |   |   |   |     |  |  |  |  |  |     |  |  |  |  |  |
|                     | 30          | 19.9                        | 20.9 | 22.0 | 29.9 | 31.6 | 33.3 | 41.5 | 43.9 | 46.6 | 54.4 | 57.7 | 61.3 | 68.3 | 72.5 | 77.0 | 82.3 | 87.3 | 92.6 |     |   |   |   |   |   |     |  |  |  |  |  |     |  |  |  |  |  |
| 280                 | 40          | 20.1                        | 21.1 | 22.2 | 30.3 | 32.0 | 33.8 | 42.2 | 44.7 | 47.4 | 55.4 | 58.9 | 62.5 | 69.7 | 74.0 | 78.7 | 84.1 | 89.2 | 94.6 |     |   |   |   |   |   |     |  |  |  |  |  |     |  |  |  |  |  |
|                     | 0           | 17.3                        | 18.2 | 19.1 | 25.8 | 27.2 | 28.8 | 35.7 | 37.7 | 40.0 | 46.7 | 49.5 | 52.6 | 58.6 | 62.2 | 66.1 | 70.9 | 75.3 | 80.0 |     |   |   |   |   |   |     |  |  |  |  |  |     |  |  |  |  |  |
|                     | 10          | 17.8                        | 18.7 | 19.6 | 26.6 | 28.1 | 29.6 | 36.8 | 38.9 | 41.2 | 48.2 | 51.1 | 54.2 | 60.5 | 64.2 | 68.2 | 73.2 | 77.7 | 82.5 |     |   |   |   |   |   |     |  |  |  |  |  |     |  |  |  |  |  |
|                     | 15          | 18.1                        | 19.0 | 20.0 | 27.1 | 28.6 | 30.2 | 37.5 | 39.6 | 42.0 | 49.1 | 52.0 | 55.2 | 61.6 | 65.3 | 69.4 | 74.4 | 79.0 | 83.9 |     |   |   |   |   |   |     |  |  |  |  |  |     |  |  |  |  |  |
|                     | 20          | 18.4                        | 19.3 | 20.3 | 27.6 | 29.1 | 30.7 | 38.1 | 40.3 | 42.7 | 49.9 | 52.9 | 56.1 | 62.6 | 66.4 | 70.6 | 75.6 | 80.3 | 85.2 |     |   |   |   |   |   |     |  |  |  |  |  |     |  |  |  |  |  |
| 260                 | 30          | 18.9                        | 19.8 | 20.8 | 28.3 | 29.8 | 31.5 | 39.1 | 41.4 | 43.9 | 51.3 | 54.4 | 57.7 | 64.4 | 68.3 | 72.6 | 77.8 | 82.5 | 87.6 |     |   |   |   |   |   |     |  |  |  |  |  |     |  |  |  |  |  |
|                     | 40          | 19.0                        | 20.0 | 21.0 | 28.6 | 30.2 | 31.9 | 39.8 | 42.1 | 44.6 | 52.2 | 55.4 | 58.9 | 65.7 | 69.8 | 74.1 | 79.5 | 84.3 | 89.5 |     |   |   |   |   |   |     |  |  |  |  |  |     |  |  |  |  |  |
|                     | 0           | 16.4                        | 17.2 | 18.0 | 24.4 | 25.7 | 27.1 | 33.5 | 35.5 | 37.5 | 43.8 | 46.4 | 49.3 | 54.9 | 58.3 | 62.0 | 66.5 | 70.7 | 75.1 |     |   |   |   |   |   |     |  |  |  |  |  |     |  |  |  |  |  |
|                     | 10          | 16.8                        | 17.6 | 18.5 | 25.1 | 26.4 | 27.9 | 34.6 | 36.6 | 38.7 | 45.2 | 47.9 | 50.8 | 56.7 | 60.2 | 63.9 | 68.7 | 72.9 | 77.5 |     |   |   |   |   |   |     |  |  |  |  |  |     |  |  |  |  |  |
|                     | 15          | 17.1                        | 18.0 | 18.9 | 25.6 | 26.9 | 28.4 | 35.2 | 37.3 | 39.4 | 46.0 | 48.8 | 51.7 | 57.7 | 61.3 | 65.1 | 69.9 | 74.2 | 78.8 |     |   |   |   |   |   |     |  |  |  |  |  |     |  |  |  |  |  |
| 240                 | 20          | 17.4                        | 18.3 | 19.2 | 26.0 | 27.4 | 28.9 | 35.8 | 37.9 | 40.1 | 46.8 | 49.6 | 52.6 | 58.7 | 62.3 | 66.2 | 71.0 | 75.4 | 80.1 |     |   |   |   |   |   |     |  |  |  |  |  |     |  |  |  |  |  |
|                     | 30          | 17.8                        | 18.7 | 19.6 | 26.6 | 28.0 | 29.6 | 36.8 | 38.9 | 41.2 | 48.1 | 51.0 | 54.1 | 60.3 | 64.0 | 68.0 | 73.0 | 77.5 | 82.3 |     |   |   |   |   |   |     |  |  |  |  |  |     |  |  |  |  |  |
|                     | 40          | 18.0                        | 18.8 | 19.8 | 26.9 | 28.4 | 30.0 | 37.3 | 39.5 | 41.9 | 49.0 | 51.9 | 55.2 | 61.6 | 65.4 | 69.5 | 74.6 | 79.2 | 84.1 |     |   |   |   |   |   |     |  |  |  |  |  |     |  |  |  |  |  |
|                     | 0           | 15.5                        | 16.2 | 17.0 | 22.9 | 24.1 | 25.4 | 31.4 | 33.2 | 35.1 | 40.9 | 43.3 | 45.9 | 51.2 | 54.3 | 57.7 | 62.0 | 65.9 | 70.0 |     |   |   |   |   |   |     |  |  |  |  |  |     |  |  |  |  |  |
|                     | 10          | 15.9                        | 16.6 | 17.4 | 23.5 | 24.8 | 26.1 | 32.4 | 34.2 | 36.2 | 42.2 | 44.7 | 47.4 | 52.8 | 56.1 | 59.6 | 64.0 | 68.0 | 72.3 |     |   |   |   |   |   |     |  |  |  |  |  |     |  |  |  |  |  |
| 220                 | 15          | 16.2                        | 16.9 | 17.7 | 24.0 | 25.3 | 26.6 | 33.0 | 34.8 | 36.9 | 43.0 | 45.5 | 48.3 | 53.8 | 57.1 | 60.6 | 65.1 | 69.2 | 73.5 |     |   |   |   |   |   |     |  |  |  |  |  |     |  |  |  |  |  |
|                     | 20          | 16.4                        | 17.2 | 18.0 | 24.4 | 25.7 | 27.0 | 33.5 | 35.4 | 37.5 | 43.7 | 46.3 | 49.1 | 54.7 | 58.0 | 61.6 | 66.2 | 70.3 | 74.7 |     |   |   |   |   |   |     |  |  |  |  |  |     |  |  |  |  |  |
|                     | 30          | 16.8                        | 17.6 | 18.4 | 25.0 | 26.3 | 27.7 | 34.4 | 36.3 | 38.5 | 44.9 | 47.5 | 50.4 | 56.2 | 59.7 | 63.4 | 68.1 | 72.3 | 76.8 |     |   |   |   |   |   |     |  |  |  |  |  |     |  |  |  |  |  |
|                     | 40          | 16.9                        | 17.7 | 18.6 | 25.3 | 26.6 | 28.1 | 34.9 | 36.9 | 39.1 | 45.7 | 48.4 | 51.4 | 57.3 | 60.9 | 64.7 | 69.6 | 73.9 | 78.5 |     |   |   |   |   |   |     |  |  |  |  |  |     |  |  |  |  |  |
|                     | 0           | 14.5                        | 15.2 | 15.9 | 21.4 | 22.5 | 23.7 | 29.2 | 30.9 | 32.6 | 37.9 | 40.2 | 42.6 | 47.4 | 50.3 | 53.4 | 57.4 | 60.9 | 64.8 |     |   |   |   |   |   |     |  |  |  |  |  |     |  |  |  |  |  |
| 200                 | 10          | 14.9                        | 15.6 | 16.4 | 22.0 | 23.2 | 24.4 | 30.1 | 31.8 | 33.6 | 39.1 | 41.4 | 43.9 | 48.9 | 51.9 | 55.1 | 59.2 | 62.9 | 66.8 |     |   |   |   |   |   |     |  |  |  |  |  |     |  |  |  |  |  |
|                     | 15          | 15.2                        | 15.9 | 16.7 | 22.4 | 23.6 | 24.8 | 30.7 | 32.4 | 34.2 | 39.8 | 42.2 | 44.7 | 49.8 | 52.8 | 56.1 | 60.3 | 64.0 | 68.0 |     |   |   |   |   |   |     |  |  |  |  |  |     |  |  |  |  |  |
|                     | 20          | 15.5                        | 16.2 | 16.9 | 22.8 | 24.0 | 25.2 | 31.2 | 32.9 | 34.8 | 40.5 | 42.9 | 45.5 | 50.6 | 53.7 | 57.0 | 61.3 | 65.1 | 69.1 |     |   |   |   |   |   |     |  |  |  |  |  |     |  |  |  |  |  |
|                     | 30          | 15.8                        | 16.5 | 17.3 | 23.3 | 24.6 | 25.9 | 32.0 | 33.8 | 35.7 | 41.6 | 44.1 | 46.7 | 52.1 | 55.2 | 58.6 | 63.0 | 66.9 | 71.1 |     |   |   |   |   |   |     |  |  |  |  |  |     |  |  |  |  |  |
|                     | 40          | 15.9                        | 16.6 | 17.4 | 23.6 | 24.8 | 26.2 | 32.5 | 34.3 | 36.3 | 42.3 | 44.8 | 47.6 | 53.0 | 56.3 | 59.8 | 64.3 | 68.3 | 72.6 |     |   |   |   |   |   |     |  |  |  |  |  |     |  |  |  |  |  |
| 180                 | 0           | 13.6                        | 14.3 | 14.9 | 19.9 | 20.9 | 22.0 | 27.1 | 28.5 | 30.1 | 35.0 | 37.0 | 39.2 | 43.5 | 46.1 | 48.9 | 52.6 | 55.8 | 59.3 |     |   |   |   |   |   |     |  |  |  |  |  |     |  |  |  |  |  |
|                     | 10          | 14.0                        | 14.6 | 15.3 | 20.5 | 21.5 | 22.6 | 27.9 | 29.4 | 31.1 | 36.0 | 38.1 | 40.4 | 44.9 | 47.6 | 50.5 | 54.3 | 57.6 | 61.2 |     |   |   |   |   |   |     |  |  |  |  |  |     |  |  |  |  |  |
|                     | 15          | 14.3                        | 14.9 | 15.6 | 20.9 | 21.9 | 23.0 | 28.4 | 29.9 | 31.7 | 36.7 | 38.8 | 41.1 | 45.7 | 48.5 | 51.4 | 55.3 | 58.7 | 62.3 |     |   |   |   |   |   |     |  |  |  |  |  |     |  |  |  |  |  |
|                     | 20          | 14.5                        | 15.1 | 15.8 | 21.2 | 22.3 | 23.4 | 28.9 | 30.4 | 32.2 | 37.3 | 39.5 | 41.8 | 46.5 | 49.3 | 52.3 | 56.2 | 59.7 | 63.4 |     |   |   |   |   |   |     |  |  |  |  |  |     |  |  |  |  |  |
|                     | 30          | 14.8                        | 15.5 | 16.2 | 21.7 | 22.8 | 24.0 | 29.6 | 31.2 | 33.0 | 38.3 | 40.6 | 43.0 | 47.8 | 50.7 | 53.8 | 57.8 | 61.3 | 65.2 |     |   |   |   |   |   |     |  |  |  |  |  |     |  |  |  |  |  |
| 160                 | 40          | 14.9                        | 15.6 | 16.3 | 21.9 | 23.1 | 24.3 | 30.0 | 31.7 | 33.5 | 38.9 | 41.2 | 43.7 | 48.7 | 51.6 | 54.8 | 58.9 | 62.6 | 66.5 |     |   |   |   |   |   |     |  |  |  |  |  |     |  |  |  |  |  |
|                     | 0           | 12.8                        | 13.3 | 13.9 | 18.4 | 19.4 | 20.3 | 24.9 | 26.2 | 27.6 | 31.9 | 33.8 | 35.7 | 39.6 | 41.9 | 44.4 | 47.7 | 50.6 | 53.7 |     |   |   |   |   |   |     |  |  |  |  |  |     |  |  |  |  |  |
|                     | 10          | 13.1                        | 13.7 | 14.3 | 19.0 | 19.9 | 20.9 | 25.6 | 27.0 | 28.5 | 32.9 | 34.8 | 36.8 | 40.8 | 43.2 | 45.9 | 49.2 | 52.2 | 55.4 |     |   |   |   |   |   |     |  |  |  |  |  |     |  |  |  |  |  |
|                     | 15          | 13.3                        | 13.9 | 14.6 | 19.3 | 20.3 | 21.3 | 26.1 | 27.5 | 29.0 | 33.5 | 35.4 | 37.5 | 41.6 | 44.0 | 46.7 | 50.1 | 53.2 | 56.4 |     |   |   |   |   |   |     |  |  |  |  |  |     |  |  |  |  |  |
|                     | 20          | 13.5                        | 14.1 | 14.8 | 19.6 | 20.6 | 21.7 | 26.5 | 27.9 | 29.5 | 34.1 | 36.0 | 38.1 | 42.3 | 44.8 | 47.5 | 51.0 | 54.1 | 57.4 |     |   |   |   |   |   |     |  |  |  |  |  |     |  |  |  |  |  |
| 140                 | 30          | 13.8                        | 14.4 | 15.1 | 20.1 | 21.1 | 22.2 | 27.2 | 28.6 | 30.2 | 35.0 | 37.0 | 39.2 | 43.4 | 46.0 | 48.8 | 52.4 | 55.6 | 59.0 |     |   |   |   |   |   |     |  |  |  |  |  |     |  |  |  |  |  |
|                     | 40          | 13.9                        | 14.5 | 15.2 | 20.3 | 21.3 | 22.4 | 27.5 | 29.0 | 30.7 | 35.5 | 37.6 | 39.8 | 44.2 | 46.8 | 49.7 | 53.4 | 56.7 | 60.2 |     |   |   |   |   |   |     |  |  |  |  |  |     |  |  |  |  |  |

To correct for wind, enter table with the brakes on speed minus one half the headwind or plus 1.5 times the tailwind.

If ground speed is used for brakes on speed, ignore wind and enter table with sea level, 15°C.

**ADVISORY INFORMATION**

**Recommended Brake Cooling Schedule**  
**Event Adjusted Brake Energy (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   | 100  |
| LANDING | RTO MAX MAN | 10                                                         | 20   | 30   | 40   | 50   | 60   | 70   | 80   | 90   | 100  |
|         | MAX MAN     | 5.5                                                        | 14.9 | 24.1 | 33.2 | 42.3 | 51.4 | 60.6 | 69.9 | 79.3 | 88.9 |
|         | MAX AUTO    | 5.5                                                        | 14.0 | 22.4 | 31.0 | 39.6 | 48.5 | 57.6 | 67.0 | 76.7 | 86.9 |
|         | AUTOBRAKE 4 | 5.5                                                        | 13.5 | 21.4 | 29.3 | 37.3 | 45.5 | 54.1 | 63.1 | 72.6 | 82.8 |
|         | AUTOBRAKE 3 | 5.5                                                        | 12.9 | 20.3 | 27.6 | 35.0 | 42.5 | 50.5 | 58.8 | 67.8 | 77.4 |
|         | AUTOBRAKE 2 | 5.4                                                        | 12.4 | 19.2 | 25.9 | 32.7 | 39.7 | 46.9 | 54.6 | 62.8 | 71.7 |
|         | AUTOBRAKE 1 | 5.4                                                        | 11.9 | 18.2 | 24.4 | 30.6 | 37.0 | 43.7 | 50.8 | 58.5 | 66.8 |

**2 Engine Reverse Thrust**

|         |             | REFERENCE BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS) |      |      |      |      |      |      |      |      |      |
|---------|-------------|------------------------------------------------------------|------|------|------|------|------|------|------|------|------|
| EVENT   |             | 10                                                         | 20   | 30   | 40   | 50   | 60   | 70   | 80   | 90   | 100  |
| LANDING | RTO MAX MAN | 10                                                         | 20   | 30   | 40   | 50   | 60   | 70   | 80   | 90   | 100  |
|         | MAX MAN     | 4.8                                                        | 13.6 | 22.1 | 30.5 | 38.8 | 47.0 | 55.2 | 63.4 | 71.7 | 80.0 |
|         | MAX AUTO    | 3.0                                                        | 10.1 | 17.3 | 24.5 | 31.9 | 39.6 | 47.5 | 55.9 | 64.7 | 74.0 |
|         | AUTOBRAKE 4 | 2.5                                                        | 7.9  | 13.5 | 19.4 | 25.6 | 32.1 | 39.1 | 46.6 | 54.7 | 63.4 |
|         | AUTOBRAKE 3 | 1.6                                                        | 5.5  | 9.7  | 14.2 | 19.1 | 24.5 | 30.3 | 36.6 | 43.4 | 50.7 |
|         | AUTOBRAKE 2 | 0.9                                                        | 3.6  | 6.6  | 10.0 | 13.7 | 17.8 | 22.4 | 27.4 | 32.8 | 38.7 |
|         | AUTOBRAKE 1 | 0.6                                                        | 2.7  | 5.0  | 7.5  | 10.3 | 13.4 | 16.8 | 20.7 | 25.1 | 30.1 |

**Cooling Time (Minutes)**

|                       |                         | EVENT ADJUSTED BRAKE ENERGY (MILLIONS OF FOOT POUNDS) |     |     |     |     |     |     |            |          |                        |
|-----------------------|-------------------------|-------------------------------------------------------|-----|-----|-----|-----|-----|-----|------------|----------|------------------------|
|                       |                         | 16 & BELOW                                            | 17  | 18  | 20  | 24  | 28  | 32  | 35         | 36 TO 44 | 45 & ABOVE             |
| INFLIGHT<br>GEAR DOWN | NO SPECIAL<br>PROCEDURE |                                                       | 1   | 2   | 3   | 4   | 6   | 7   | 7          | CAUTION  | FUSE PLUG<br>MELT ZONE |
| GROUND                | REQUIRED                |                                                       | 11  | 18  | 26  | 42  | 55  | 66  | 73         |          |                        |
| BTMS                  | UP TO 2.4               | 2.4                                                   | 2.6 | 2.9 | 3.4 | 4.0 | 4.5 | 4.9 | 5.0 TO 6.3 |          |                        |

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 for each taxi mile.

For one brake deactivated, increase brake energy by 10 percent.

For two brakes deactivated, increase brake energy by 20 percent.

When in caution zone, wheel fuse plugs may melt. Delay takeoff and inspect after one hour. If overheat occurs after takeoff, extend gear soon for at least 8 minutes.

When in fuse plug melt zone, clear runway immediately. Unless required, do not set parking brake. Do not 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 EICAS may be used 12 to 15 minutes after airplane has come to a complete stop, or inflight with gear retracted, to determine recommended cooling schedule. (Inflight gear extended, the BTMS indications may vary between individual brakes, due to airstream effects, gear tilt, and position of the gear temperature probes.)





ADVISORY INFORMATION

Approach or Landing Climb Limited Weight  
Valid for approach with flaps 20 and landing with flaps 25 or 30

| AIRPORT OAT |     | APPROACH OR LANDING CLIMB LIMITED WEIGHT (1000 KG) |       |       |       |       |
|-------------|-----|----------------------------------------------------|-------|-------|-------|-------|
|             |     | AIRPORT PRESSURE ALTITUDE (FT)                     |       |       |       |       |
| °C          | °F  | 0                                                  | 2000  | 4000  | 6000  | 8000  |
| 54          | 129 | 238.4                                              |       |       |       |       |
| 52          | 126 | 244.3                                              |       |       |       |       |
| 50          | 122 | 250.3                                              | 231.9 |       |       |       |
| 48          | 118 | 256.5                                              | 237.7 |       |       |       |
| 46          | 115 | 262.6                                              | 243.5 | 225.4 |       |       |
| 44          | 111 | 268.9                                              | 249.3 | 230.6 |       |       |
| 42          | 108 | 276.2                                              | 255.3 | 236.1 | 218.5 |       |
| 40          | 104 | 283.9                                              | 261.8 | 241.9 | 224.0 |       |
| 38          | 100 | 290.9                                              | 268.5 | 247.7 | 229.5 | 209.8 |
| 36          | 97  | 297.7                                              | 275.4 | 253.6 | 233.8 | 213.6 |
| 34          | 93  | 303.2                                              | 280.8 | 258.3 | 238.1 | 217.5 |
| 32          | 90  | 307.8                                              | 285.2 | 262.4 | 242.5 | 220.9 |
| 30          | 86  | 312.6                                              | 289.7 | 266.7 | 246.7 | 224.1 |
| 28          | 82  | 312.7                                              | 294.1 | 271.0 | 250.3 | 227.4 |
| 26          | 79  | 312.9                                              | 298.4 | 274.8 | 254.4 | 231.1 |
| 24          | 75  | 313.1                                              | 298.5 | 278.4 | 258.7 | 234.8 |
| 22          | 72  | 313.3                                              | 298.6 | 281.6 | 261.7 | 238.9 |
| 20          | 68  | 313.5                                              | 298.8 | 281.8 | 264.0 | 242.7 |
| 18          | 64  | 313.7                                              | 298.9 | 281.9 | 266.1 | 245.4 |
| 16          | 61  | 313.8                                              | 299.1 | 281.9 | 266.2 | 247.2 |
| 14          | 57  | 314.0                                              | 299.2 | 282.0 | 266.3 | 248.8 |
| 12          | 54  | 314.2                                              | 299.3 | 282.1 | 266.3 | 248.8 |
| 10          | 50  | 314.4                                              | 299.4 | 282.2 | 266.4 | 248.9 |
| -40         | -40 | 315.2                                              | 300.2 | 282.6 | 266.5 | 248.8 |

Based on engine bleed for packs on, engine anti-ice on or off, and wing anti-ice off.  
With engine bleed for packs off, increase weight by 2450 kg.  
With engine and wing anti-ice on, decrease weight by 2200 kg.  
When operating in icing conditions during any part of the flight with forecast landing temperature below 10°C, decrease weight by 20100 kg.

Intentionally  
Blank



## Performance Inflight - QRH

## Chapter PI-QRH

## Engine Inoperative

## Section 12

## ENGINE INOP

## Initial Max Continuous %N1

Based on .84M, engine bleed for packs on and anti-ice off

| TAT<br>(°C) | PRESSURE ALTITUDE (1000 FT) |       |       |       |       |       |       |       |       |
|-------------|-----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
|             | 27                          | 29    | 31    | 33    | 35    | 37    | 39    | 41    | 43    |
| 20          | 100.8                       | 100.2 | 99.6  | 99.5  | 99.9  | 99.6  | 99.8  | 99.4  | 99.3  |
| 15          | 101.3                       | 100.7 | 100.1 | 100.0 | 100.4 | 99.9  | 100.0 | 99.8  | 99.7  |
| 10          | 102.0                       | 101.3 | 100.6 | 100.5 | 100.8 | 100.3 | 100.5 | 100.3 | 100.2 |
| 5           | 102.5                       | 102.1 | 101.2 | 101.1 | 101.4 | 100.9 | 101.0 | 100.8 | 100.6 |
| 0           | 101.6                       | 102.5 | 102.1 | 101.9 | 102.4 | 101.6 | 101.8 | 101.5 | 101.2 |
| -5          | 100.7                       | 101.5 | 102.4 | 102.9 | 103.5 | 102.6 | 102.8 | 102.4 | 102.1 |
| -10         | 99.7                        | 100.6 | 101.5 | 102.9 | 104.3 | 103.6 | 103.7 | 103.4 | 103.0 |
| -15         | 99.8                        | 99.6  | 100.5 | 102.0 | 103.9 | 103.9 | 104.0 | 103.9 | 103.9 |
| -20         | 97.8                        | 98.7  | 99.5  | 101.0 | 102.9 | 102.9 | 103.0 | 102.9 | 102.8 |
| -25         | 96.8                        | 97.7  | 98.6  | 100.0 | 101.9 | 101.9 | 101.9 | 101.9 | 101.8 |
| -30         | 95.8                        | 96.7  | 97.6  | 99.0  | 100.9 | 100.9 | 100.9 | 100.8 | 100.8 |
| -35         | 94.9                        | 95.7  | 96.5  | 97.9  | 99.8  | 99.8  | 99.9  | 99.8  | 99.7  |
| -40         | 93.9                        | 94.7  | 95.5  | 96.9  | 98.8  | 98.8  | 98.8  | 98.8  | 98.7  |

## ENGINE INOP

### Max Continuous %N1

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

### 37000 FT to 27000 FT Pressure Altitudes

| 37000 FT PRESS ALT |     | TAT (°C) |       |       |       |       |       |       |       |       |       |       |       |
|--------------------|-----|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| CIAS               | M   | -50      | -45   | -40   | -35   | -30   | -25   | -20   | -15   | -10   | -5    | 0     | 5     |
| 200                | .63 | 96.8     | 97.9  | 98.9  | 100.0 | 101.0 | 102.1 | 103.1 | 103.7 | 102.8 | 101.7 | 100.7 | 100.5 |
| 240                | .74 | 96.8     | 97.9  | 98.9  | 100.0 | 101.0 | 102.1 | 103.0 | 103.7 | 103.5 | 102.2 | 101.3 | 100.6 |
| 280                | .86 | 96.4     | 97.5  | 98.5  | 99.6  | 100.6 | 101.6 | 102.7 | 103.7 | 103.5 | 102.7 | 101.7 | 100.9 |
| 35000 FT PRESS ALT |     | TAT (°C) |       |       |       |       |       |       |       |       |       |       |       |
| CIAS               | M   | -50      | -45   | -40   | -35   | -30   | -25   | -20   | -15   | -10   | -5    | 0     | 5     |
| 200                | .60 | 96.8     | 97.9  | 98.9  | 100.0 | 101.0 | 102.1 | 103.1 | 104.1 | 103.8 | 102.4 | 101.3 | 100.9 |
| 240                | .71 | 96.8     | 97.9  | 98.9  | 100.0 | 101.0 | 102.1 | 103.1 | 104.0 | 104.5 | 103.0 | 101.9 | 101.1 |
| 280                | .82 | 96.8     | 97.9  | 98.9  | 100.0 | 101.0 | 102.1 | 103.1 | 104.1 | 104.2 | 103.5 | 102.3 | 101.4 |
| 33000 FT PRESS ALT |     | TAT (°C) |       |       |       |       |       |       |       |       |       |       |       |
| CIAS               | M   | -50      | -45   | -40   | -35   | -30   | -25   | -20   | -15   | -10   | -5    | 0     | 5     |
| 200                | .58 | 96.8     | 97.9  | 98.9  | 100.0 | 101.0 | 102.1 | 103.1 | 103.3 | 103.1 | 101.9 | 101.0 | 100.2 |
| 240                | .68 | 96.8     | 97.9  | 98.9  | 100.0 | 101.0 | 102.1 | 103.1 | 103.5 | 103.3 | 102.4 | 101.4 | 100.7 |
| 280                | .79 | 95.7     | 96.7  | 97.8  | 98.8  | 99.9  | 100.9 | 101.9 | 102.9 | 103.5 | 102.9 | 101.8 | 101.1 |
| 320                | .89 | 93.5     | 94.6  | 95.6  | 96.6  | 97.6  | 98.6  | 99.6  | 100.6 | 101.6 | 102.5 | 102.1 | 101.2 |
| 31000 FT PRESS ALT |     | TAT (°C) |       |       |       |       |       |       |       |       |       |       |       |
| CIAS               | M   | -45      | -40   | -35   | -30   | -25   | -20   | -15   | -10   | -5    | 0     | 5     | 10    |
| 200                | .55 | 97.9     | 98.9  | 100.0 | 101.0 | 102.1 | 103.1 | 103.7 | 103.4 | 102.2 | 101.0 | 100.2 | 99.8  |
| 240                | .66 | 97.9     | 98.9  | 100.0 | 101.0 | 102.1 | 103.1 | 103.9 | 103.6 | 102.5 | 101.4 | 100.5 | 100.0 |
| 280                | .76 | 96.5     | 97.6  | 98.6  | 99.7  | 100.7 | 101.7 | 102.7 | 103.7 | 103.0 | 101.9 | 101.0 | 100.4 |
| 320                | .85 | 94.1     | 95.1  | 96.1  | 97.1  | 98.1  | 99.1  | 100.1 | 101.0 | 102.0 | 102.2 | 101.2 | 100.6 |
| 29000 FT PRESS ALT |     | TAT (°C) |       |       |       |       |       |       |       |       |       |       |       |
| CIAS               | M   | -40      | -35   | -30   | -25   | -20   | -15   | -10   | -5    | 0     | 5     | 10    | 15    |
| 200                | .53 | 98.9     | 100.0 | 101.0 | 102.1 | 103.1 | 104.0 | 104.2 | 103.2 | 101.8 | 100.9 | 100.1 | 100.3 |
| 240                | .63 | 98.8     | 99.8  | 100.9 | 101.9 | 102.9 | 103.9 | 104.2 | 103.4 | 102.1 | 101.1 | 100.5 | 99.9  |
| 280                | .73 | 97.7     | 98.7  | 99.8  | 100.8 | 101.8 | 102.8 | 103.8 | 103.9 | 102.7 | 101.7 | 100.9 | 100.4 |
| 320                | .82 | 95.2     | 96.2  | 97.2  | 98.2  | 99.2  | 100.1 | 101.1 | 102.1 | 103.0 | 102.0 | 101.2 | 100.7 |
| 27000 FT PRESS ALT |     | TAT (°C) |       |       |       |       |       |       |       |       |       |       |       |
| CIAS               | M   | -40      | -35   | -30   | -25   | -20   | -15   | -10   | -5    | 0     | 5     | 10    | 15    |
| 200                | .51 | 98.9     | 100.0 | 101.0 | 102.1 | 103.1 | 104.1 | 104.8 | 104.2 | 102.8 | 101.6 | 100.7 | 100.0 |
| 240                | .60 | 98.8     | 99.8  | 100.9 | 101.9 | 102.9 | 103.9 | 104.8 | 104.2 | 102.9 | 101.8 | 100.9 | 100.4 |
| 280                | .70 | 97.4     | 98.5  | 99.5  | 100.5 | 101.5 | 102.5 | 103.5 | 104.5 | 103.4 | 102.4 | 101.5 | 100.9 |
| 320                | .79 | 95.1     | 96.2  | 97.2  | 98.1  | 99.1  | 100.1 | 101.1 | 102.0 | 103.0 | 102.8 | 102.0 | 101.3 |
| 360                | .88 | 92.8     | 93.8  | 94.7  | 95.7  | 96.7  | 97.6  | 98.6  | 99.5  | 100.4 | 101.3 | 102.1 | 101.4 |

### %N1 Adjustments for Engine Bleed

| BLEED CONFIGURATION                   | PRESSURE ALTITUDE (1000 FT) |      |      |      |      |      |
|---------------------------------------|-----------------------------|------|------|------|------|------|
|                                       | 37                          | 35   | 33   | 31   | 29   | 27   |
| ENGINE ANTI-ICE ON                    | -0.2                        | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 |
| ENGINE & WING ANTI-ICE ON (packs on)  | -0.3                        | -0.3 | -0.3 | -0.3 | -0.3 | -0.3 |
| ENGINE & WING ANTI-ICE ON (packs off) | -0.4                        | -0.4 | -0.4 | -0.4 | -0.4 | -0.4 |

## ENGINE INOP

### Max Continuous %N1

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

#### 25000 FT to 18000 FT Pressure Altitudes

| 25000 FT PRESS ALT |     | TAT (°C) |       |       |       |       |       |       |       |       |       |       |       |
|--------------------|-----|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| KLAS               | M   | -35      | -30   | -25   | -20   | -15   | -10   | -5    | 0     | 5     | 10    | 15    | 20    |
| 200                | .49 | 100.0    | 101.0 | 102.1 | 103.1 | 104.1 | 105.1 | 105.1 | 103.8 | 102.4 | 101.3 | 100.5 | 100.5 |
| 240                | .58 | 99.9     | 100.9 | 101.9 | 103.0 | 104.0 | 105.0 | 104.9 | 103.8 | 102.6 | 101.6 | 100.9 | 100.4 |
| 280                | .67 | 98.1     | 99.2  | 100.2 | 101.2 | 102.2 | 103.2 | 104.1 | 104.2 | 103.0 | 102.0 | 101.4 | 100.8 |
| 320                | .76 | 96.0     | 97.0  | 98.0  | 99.0  | 99.9  | 100.9 | 101.9 | 102.8 | 103.5 | 102.5 | 101.8 | 101.2 |
| 360                | .85 | 93.8     | 94.8  | 95.8  | 96.7  | 97.7  | 98.6  | 99.5  | 100.5 | 101.4 | 102.3 | 102.0 | 101.4 |
| 24000 FT PRESS ALT |     | TAT (°C) |       |       |       |       |       |       |       |       |       |       |       |
| KLAS               | M   | -35      | -30   | -25   | -20   | -15   | -10   | -5    | 0     | 5     | 10    | 15    | 20    |
| 200                | .48 | 100.0    | 101.0 | 102.1 | 103.1 | 104.1 | 105.0 | 105.2 | 104.1 | 102.7 | 101.6 | 100.7 | 100.2 |
| 240                | .57 | 99.5     | 100.5 | 101.6 | 102.6 | 103.6 | 104.6 | 105.1 | 104.2 | 103.0 | 101.9 | 101.2 | 100.6 |
| 280                | .66 | 98.0     | 99.0  | 100.0 | 101.0 | 102.0 | 103.0 | 103.9 | 104.6 | 103.3 | 102.3 | 101.6 | 101.0 |
| 320                | .75 | 95.9     | 96.9  | 97.9  | 98.9  | 99.8  | 100.8 | 101.8 | 102.7 | 103.6 | 102.8 | 102.0 | 101.4 |
| 360                | .83 | 93.8     | 94.8  | 95.7  | 96.7  | 97.6  | 98.6  | 99.5  | 100.4 | 101.3 | 102.3 | 102.3 | 101.7 |
| 22000 FT PRESS ALT |     | TAT (°C) |       |       |       |       |       |       |       |       |       |       |       |
| KLAS               | M   | -30      | -25   | -20   | -15   | -10   | -5    | 0     | 5     | 10    | 15    | 20    | 25    |
| 200                | .46 | 101.0    | 102.1 | 103.1 | 104.1 | 105.1 | 105.4 | 104.5 | 103.0 | 101.7 | 100.9 | 100.3 | 100.3 |
| 240                | .55 | 100.2    | 101.2 | 102.2 | 103.2 | 104.2 | 105.2 | 104.8 | 103.7 | 102.5 | 101.7 | 101.1 | 100.5 |
| 280                | .63 | 98.5     | 99.5  | 100.5 | 101.5 | 102.5 | 103.4 | 104.4 | 104.0 | 102.8 | 102.0 | 101.4 | 100.9 |
| 320                | .72 | 96.7     | 97.7  | 98.6  | 99.6  | 100.6 | 101.5 | 102.5 | 103.4 | 103.4 | 102.5 | 101.8 | 101.3 |
| 360                | .80 | 94.6     | 95.6  | 96.5  | 97.5  | 98.4  | 99.3  | 100.3 | 101.2 | 102.1 | 102.7 | 102.1 | 101.6 |
| 20000 FT PRESS ALT |     | TAT (°C) |       |       |       |       |       |       |       |       |       |       |       |
| KLAS               | M   | -30      | -25   | -20   | -15   | -10   | -5    | 0     | 5     | 10    | 15    | 20    | 25    |
| 200                | .44 | 100.9    | 101.9 | 102.9 | 103.9 | 104.9 | 105.9 | 104.7 | 103.4 | 102.0 | 101.1 | 100.5 | 99.9  |
| 240                | .53 | 100.4    | 101.4 | 102.4 | 103.4 | 104.4 | 105.4 | 106.2 | 104.4 | 103.2 | 102.2 | 101.5 | 101.0 |
| 280                | .61 | 98.1     | 99.1  | 100.1 | 101.1 | 102.1 | 103.1 | 104.0 | 104.8 | 103.5 | 102.5 | 101.8 | 101.4 |
| 320                | .69 | 96.3     | 97.2  | 98.2  | 99.2  | 100.1 | 101.1 | 102.0 | 103.0 | 103.9 | 102.9 | 102.2 | 101.6 |
| 360                | .77 | 94.4     | 95.4  | 96.3  | 97.3  | 98.2  | 99.1  | 100.1 | 101.0 | 101.9 | 102.8 | 102.6 | 102.0 |
| 18000 FT PRESS ALT |     | TAT (°C) |       |       |       |       |       |       |       |       |       |       |       |
| KLAS               | M   | -25      | -20   | -15   | -10   | -5    | 0     | 5     | 10    | 15    | 20    | 25    | 30    |
| 200                | .42 | 99.4     | 100.4 | 101.4 | 102.4 | 103.3 | 103.8 | 102.5 | 101.3 | 100.4 | 99.6  | 98.8  | 98.2  |
| 240                | .51 | 100.9    | 101.9 | 102.9 | 103.9 | 104.9 | 105.9 | 105.7 | 104.1 | 102.8 | 101.9 | 101.1 | 100.4 |
| 280                | .59 | 98.6     | 99.6  | 100.6 | 101.6 | 102.5 | 103.5 | 104.4 | 104.2 | 103.1 | 102.2 | 101.5 | 100.8 |
| 320                | .67 | 96.8     | 97.7  | 98.7  | 99.6  | 100.6 | 101.5 | 102.4 | 103.4 | 103.4 | 102.6 | 101.9 | 101.2 |
| 360                | .75 | 95.0     | 96.0  | 96.9  | 97.9  | 98.8  | 99.7  | 100.6 | 101.5 | 102.4 | 102.9 | 102.2 | 101.6 |

### %N1 Adjustments for Engine Bleed

| BLEED CONFIGURATION                   | PRESSURE ALTITUDE (1000 FT) |      |      |      |      |
|---------------------------------------|-----------------------------|------|------|------|------|
|                                       | 25                          | 24   | 22   | 20   | 18   |
| ENGINE ANTI-ICE ON                    | -0.2                        | -0.2 | -0.2 | -0.2 | -0.2 |
| ENGINE & WING ANTI-ICE ON (packs on)  | -0.3                        | -0.3 | -0.3 | -0.3 | -0.3 |
| ENGINE & WING ANTI-ICE ON (packs off) | -0.4                        | -0.4 | -0.4 | -0.4 | -0.4 |

# ENGINE INOP

## Max Continuous %N1

Based on engine bleed for packs on or off and anti-ice off  
16000 FT to 5000 FT Pressure Altitudes

| 16000 FT PRESS ALT |     |      | TAT (°C) |       |       |       |       |       |       |       |       |       |       |
|--------------------|-----|------|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| KIAS               | M   | -25  | -20      | -15   | -10   | -5    | 0     | 5     | 10    | 15    | 20    | 25    | 30    |
| 200                | .41 | 97.7 | 98.6     | 99.6  | 100.6 | 101.5 | 102.5 | 102.1 | 101.0 | 100.0 | 99.3  | 98.4  | 97.5  |
| 240                | .49 | 99.1 | 100.1    | 101.1 | 102.1 | 103.1 | 104.0 | 105.0 | 104.0 | 102.7 | 101.7 | 100.9 | 100.0 |
| 280                | .57 | 98.1 | 99.1     | 100.1 | 101.1 | 102.0 | 103.0 | 103.9 | 104.8 | 103.7 | 102.8 | 102.0 | 101.2 |
| 320                | .64 | 96.3 | 97.3     | 98.2  | 99.2  | 100.1 | 101.0 | 102.0 | 102.9 | 103.8 | 103.0 | 102.3 | 101.6 |
| 360                | .72 | 94.7 | 95.7     | 96.6  | 97.5  | 98.5  | 99.4  | 100.3 | 101.2 | 102.1 | 102.9 | 102.6 | 101.9 |
| 14000 FT PRESS ALT |     |      | TAT (°C) |       |       |       |       |       |       |       |       |       |       |
| KIAS               | M   | -20  | -15      | -10   | -5    | 0     | 5     | 10    | 15    | 20    | 25    | 30    | 35    |
| 200                | .39 | 97.9 | 98.9     | 99.8  | 100.8 | 101.7 | 102.6 | 101.5 | 100.5 | 99.8  | 99.0  | 98.1  | 97.2  |
| 240                | .47 | 98.0 | 98.9     | 99.9  | 100.8 | 101.8 | 102.7 | 103.3 | 102.1 | 101.3 | 100.6 | 99.7  | 98.8  |
| 280                | .54 | 98.7 | 99.6     | 100.6 | 101.5 | 102.5 | 103.4 | 104.3 | 104.5 | 103.4 | 102.6 | 101.9 | 101.1 |
| 320                | .62 | 96.9 | 97.9     | 98.8  | 99.7  | 100.7 | 101.6 | 102.5 | 103.4 | 103.6 | 102.9 | 102.3 | 101.5 |
| 360                | .69 | 95.4 | 96.3     | 97.3  | 98.2  | 99.1  | 100.0 | 100.9 | 101.8 | 102.6 | 103.0 | 102.4 | 101.8 |
| 12000 FT PRESS ALT |     |      | TAT (°C) |       |       |       |       |       |       |       |       |       |       |
| KIAS               | M   | -15  | -10      | -5    | 0     | 5     | 10    | 15    | 20    | 25    | 30    | 35    | 40    |
| 200                | .38 | 98.3 | 99.3     | 100.2 | 101.1 | 102.1 | 102.6 | 101.4 | 100.7 | 99.9  | 99.1  | 98.2  | 97.4  |
| 240                | .45 | 97.5 | 98.4     | 99.4  | 100.3 | 101.2 | 102.1 | 102.0 | 101.1 | 100.4 | 99.6  | 98.7  | 97.8  |
| 280                | .52 | 99.3 | 100.3    | 101.2 | 102.2 | 103.1 | 104.0 | 104.9 | 104.3 | 103.4 | 102.6 | 101.8 | 101.0 |
| 320                | .60 | 97.5 | 98.4     | 99.4  | 100.3 | 101.2 | 102.1 | 103.0 | 103.9 | 103.4 | 102.9 | 102.2 | 101.4 |
| 360                | .67 | 96.1 | 97.0     | 97.9  | 98.9  | 99.8  | 100.6 | 101.5 | 102.4 | 103.3 | 103.0 | 102.4 | 101.8 |
| 10000 FT PRESS ALT |     |      | TAT (°C) |       |       |       |       |       |       |       |       |       |       |
| KIAS               | M   | -15  | -10      | -5    | 0     | 5     | 10    | 15    | 20    | 25    | 30    | 35    | 40    |
| 200                | .36 | 97.9 | 98.8     | 99.8  | 100.7 | 101.6 | 102.5 | 102.4 | 101.5 | 100.8 | 100.1 | 99.2  | 98.2  |
| 240                | .43 | 97.0 | 98.0     | 98.9  | 99.8  | 100.7 | 101.6 | 102.5 | 101.9 | 101.2 | 100.4 | 99.6  | 98.7  |
| 280                | .51 | 98.1 | 99.0     | 100.0 | 100.9 | 101.8 | 102.7 | 103.6 | 104.3 | 103.4 | 102.7 | 102.0 | 101.1 |
| 320                | .58 | 96.4 | 97.3     | 98.2  | 99.2  | 100.1 | 101.0 | 101.8 | 102.7 | 103.2 | 102.7 | 102.0 | 101.3 |
| 360                | .65 | 95.2 | 96.1     | 97.1  | 98.0  | 98.8  | 99.7  | 100.6 | 101.5 | 102.3 | 102.8 | 102.3 | 101.7 |
| 5000 FT PRESS ALT  |     |      | TAT (°C) |       |       |       |       |       |       |       |       |       |       |
| KIAS               | M   | -10  | -5       | 0     | 5     | 10    | 15    | 20    | 25    | 30    | 35    | 40    | 45    |
| 200                | .33 | 96.6 | 97.5     | 98.4  | 99.3  | 100.2 | 101.1 | 101.9 | 101.7 | 101.1 | 100.4 | 99.5  | 98.6  |
| 240                | .40 | 96.0 | 96.9     | 97.8  | 98.7  | 99.6  | 100.5 | 101.3 | 102.0 | 101.4 | 100.7 | 99.8  | 98.9  |
| 280                | .46 | 95.4 | 96.3     | 97.2  | 98.1  | 99.0  | 99.9  | 100.7 | 101.6 | 101.7 | 101.1 | 100.3 | 99.4  |
| 320                | .53 | 94.8 | 95.7     | 96.6  | 97.5  | 98.3  | 99.2  | 100.0 | 100.9 | 101.7 | 101.4 | 100.7 | 99.9  |
| 360                | .59 | 94.0 | 94.8     | 95.7  | 96.6  | 97.5  | 98.3  | 99.2  | 100.0 | 100.8 | 101.7 | 101.1 | 100.3 |

## %N1 Adjustments for Engine Bleed

| BLEED CONFIGURATION                   | PRESSURE ALTITUDE (1000 FT) |      |      |      |      |
|---------------------------------------|-----------------------------|------|------|------|------|
|                                       | 16                          | 14   | 12   | 10   | 5    |
| ENGINE ANTI-ICE ON                    | -0.2                        | -0.2 | -0.3 | -0.3 | -0.3 |
| ENGINE & WING ANTI-ICE ON (packs on)  | -0.3                        | -0.3 | -0.4 | -0.4 | -0.4 |
| ENGINE & WING ANTI-ICE ON (packs off) | -0.4                        | -0.4 | -0.5 | -0.5 | -0.5 |

**ENGINE INOP**

**MAX CONTINUOUS THRUST**

**Driftdown Speed/Level Off Altitude**

**100 ft/min residual rate of climb**

**Includes APU fuel burn**

| WEIGHT (1000 KG)       |              | OPTIMUM<br>DRIFTDOWN<br>SPEED<br>(KIAS) | LEVEL OFF ALTITUDE (FT) |            |            |
|------------------------|--------------|-----------------------------------------|-------------------------|------------|------------|
| START<br>DRIFT<br>DOWN | LEVEL<br>OFF |                                         | ISA + 10°C<br>& BELOW   | ISA + 15°C | ISA + 20°C |
| 300                    | 290          | 282                                     | 17200                   | 15900      | 14500      |
| 280                    | 271          | 273                                     | 19200                   | 18000      | 16600      |
| 260                    | 252          | 264                                     | 21200                   | 20100      | 18800      |
| 240                    | 233          | 254                                     | 23300                   | 22300      | 21200      |
| 220                    | 213          | 243                                     | 25500                   | 24700      | 23600      |
| 200                    | 194          | 232                                     | 27500                   | 27000      | 26100      |
| 180                    | 174          | 221                                     | 29700                   | 29500      | 28700      |
| 160                    | 155          | 208                                     | 32100                   | 32100      | 31500      |

# ENGINE INOP

## MAX CONTINUOUS THRUST

### Driftdown/LRC Cruise Range Capability

#### Ground to Air Miles Conversion

| AIR DISTANCE (NM)        |      |      |      |      | GROUND<br>DISTANCE<br>(NM) | AIR DISTANCE (NM)        |      |      |      |      |
|--------------------------|------|------|------|------|----------------------------|--------------------------|------|------|------|------|
| HEADWIND COMPONENT (KTS) |      |      |      |      |                            | TAILWIND COMPONENT (KTS) |      |      |      |      |
| 100                      | 80   | 60   | 40   | 20   |                            | 20                       | 40   | 60   | 80   | 100  |
| 137                      | 128  | 119  | 112  | 106  | 100                        | 95                       | 90   | 86   | 82   | 79   |
| 273                      | 255  | 238  | 224  | 211  | 200                        | 190                      | 181  | 172  | 165  | 158  |
| 409                      | 382  | 357  | 336  | 317  | 300                        | 285                      | 271  | 259  | 247  | 237  |
| 545                      | 508  | 476  | 448  | 422  | 400                        | 380                      | 362  | 345  | 330  | 316  |
| 680                      | 634  | 594  | 559  | 528  | 500                        | 475                      | 452  | 431  | 413  | 395  |
| 815                      | 760  | 713  | 671  | 633  | 600                        | 570                      | 543  | 518  | 496  | 475  |
| 949                      | 886  | 831  | 782  | 739  | 700                        | 665                      | 634  | 605  | 579  | 555  |
| 1083                     | 1011 | 949  | 893  | 844  | 800                        | 760                      | 724  | 692  | 662  | 634  |
| 1217                     | 1137 | 1067 | 1005 | 949  | 900                        | 855                      | 815  | 778  | 745  | 714  |
| 1351                     | 1262 | 1184 | 1116 | 1055 | 1000                       | 951                      | 906  | 865  | 828  | 794  |
| 1484                     | 1387 | 1302 | 1227 | 1160 | 1100                       | 1046                     | 997  | 952  | 911  | 874  |
| 1618                     | 1513 | 1420 | 1338 | 1265 | 1200                       | 1141                     | 1088 | 1039 | 995  | 954  |
| 1752                     | 1638 | 1538 | 1449 | 1371 | 1300                       | 1236                     | 1178 | 1126 | 1078 | 1034 |
| 1885                     | 1763 | 1656 | 1561 | 1476 | 1400                       | 1331                     | 1269 | 1213 | 1161 | 1113 |
| 2019                     | 1888 | 1774 | 1672 | 1581 | 1500                       | 1427                     | 1360 | 1300 | 1244 | 1193 |
| 2153                     | 2014 | 1892 | 1783 | 1687 | 1600                       | 1522                     | 1451 | 1386 | 1327 | 1273 |
| 2288                     | 2140 | 2010 | 1895 | 1792 | 1700                       | 1617                     | 1542 | 1473 | 1410 | 1353 |
| 2422                     | 2266 | 2128 | 2006 | 1898 | 1800                       | 1712                     | 1632 | 1560 | 1493 | 1432 |

### Driftdown/Cruise Fuel and Time

| AIR<br>DIST<br>(NM) | FUEL REQUIRED (1000 KG)                |      |      |      |      |      |      |      | TIME<br>(HR:MIN) |
|---------------------|----------------------------------------|------|------|------|------|------|------|------|------------------|
|                     | WEIGHT AT START OF DRIFTDOWN (1000 KG) |      |      |      |      |      |      |      |                  |
|                     | 160                                    | 180  | 200  | 220  | 240  | 260  | 280  | 300  |                  |
| 100                 | 0.9                                    | 1.0  | 1.1  | 1.2  | 1.3  | 1.4  | 1.5  | 1.6  | 0:16             |
| 200                 | 2.1                                    | 2.3  | 2.6  | 2.8  | 3.0  | 3.3  | 3.5  | 3.7  | 0:32             |
| 300                 | 3.4                                    | 3.8  | 4.2  | 4.6  | 4.9  | 5.3  | 5.6  | 6.0  | 0:48             |
| 400                 | 4.8                                    | 5.3  | 5.8  | 6.4  | 6.9  | 7.4  | 7.9  | 8.4  | 1:04             |
| 500                 | 6.1                                    | 6.7  | 7.4  | 8.1  | 8.8  | 9.4  | 10.1 | 10.7 | 1:19             |
| 600                 | 7.3                                    | 8.1  | 9.0  | 9.8  | 10.6 | 11.4 | 12.1 | 12.9 | 1:35             |
| 700                 | 8.6                                    | 9.5  | 10.5 | 11.4 | 12.4 | 13.3 | 14.2 | 15.1 | 1:50             |
| 800                 | 9.8                                    | 10.9 | 12.0 | 13.1 | 14.2 | 15.2 | 16.3 | 17.3 | 2:05             |
| 900                 | 11.0                                   | 12.3 | 13.5 | 14.7 | 16.0 | 17.1 | 18.3 | 19.5 | 2:21             |
| 1000                | 12.2                                   | 13.6 | 15.0 | 16.4 | 17.7 | 19.0 | 20.3 | 21.6 | 2:36             |
| 1100                | 13.5                                   | 15.0 | 16.5 | 18.0 | 19.5 | 20.9 | 22.4 | 23.8 | 2:51             |
| 1200                | 14.6                                   | 16.3 | 18.0 | 19.6 | 21.2 | 22.8 | 24.4 | 25.9 | 3:06             |
| 1300                | 15.8                                   | 17.6 | 19.4 | 21.2 | 22.9 | 24.6 | 26.3 | 28.0 | 3:21             |
| 1400                | 17.0                                   | 18.9 | 20.9 | 22.7 | 24.6 | 26.5 | 28.3 | 30.1 | 3:36             |
| 1500                | 18.2                                   | 20.2 | 22.3 | 24.3 | 26.3 | 28.3 | 30.3 | 32.2 | 3:51             |
| 1600                | 19.3                                   | 21.5 | 23.7 | 25.8 | 28.0 | 30.1 | 32.2 | 34.2 | 4:07             |
| 1700                | 20.5                                   | 22.8 | 25.1 | 27.4 | 29.6 | 31.9 | 34.1 | 36.3 | 4:22             |
| 1800                | 21.6                                   | 24.1 | 26.5 | 28.9 | 31.3 | 33.6 | 36.0 | 38.3 | 4:37             |

Includes APU fuel burn.

Driftdown at optimum driftdown speed and cruise at LRC speed.



**ENGINE INOP**  
**MAX CONTINUOUS THRUST**

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

| WEIGHT<br>(1000 KG) | PRESSURE ALTITUDE (FT) |            |            |
|---------------------|------------------------|------------|------------|
|                     | ISA + 10°C<br>& BELOW  | ISA + 15°C | ISA + 20°C |
| 300                 | 13900                  | 12400      | 10300      |
| 280                 | 15700                  | 14300      | 12900      |
| 260                 | 17900                  | 16600      | 15000      |
| 240                 | 20200                  | 19000      | 17600      |
| 220                 | 22600                  | 21500      | 20200      |
| 200                 | 25100                  | 24100      | 22900      |
| 180                 | 27500                  | 26700      | 25800      |
| 160                 | 30100                  | 29600      | 28700      |
| 140                 | 32900                  | 32600      | 31900      |

With engine anti-ice on, decrease altitude capability by 200 ft.  
With engine and wing anti-ice on, decrease altitude capability by 500 ft.

**ENGINE INOP**

**MAX CONTINUOUS THRUST**

**Long Range Cruise Control**

| WEIGHT<br>(1000 KG) |        | PRESSURE ALTITUDE (1000 FT) |       |       |       |       |      |      |      |
|---------------------|--------|-----------------------------|-------|-------|-------|-------|------|------|------|
|                     |        | 10                          | 15    | 17    | 19    | 21    | 23   | 25   | 27   |
| 300                 | %N1    | 95.3                        | 100.0 |       |       |       |      |      |      |
|                     | MACH   | .585                        | .641  |       |       |       |      |      |      |
|                     | KIAS   | 325                         | 325   |       |       |       |      |      |      |
|                     | FF/ENG | 8702                        | 9064  |       |       |       |      |      |      |
| 280                 | %N1    | 93.5                        | 97.9  | 100.4 |       |       |      |      |      |
|                     | MACH   | .573                        | .622  | .652  |       |       |      |      |      |
|                     | KIAS   | 318                         | 315   | 319   |       |       |      |      |      |
|                     | FF/ENG | 8130                        | 8304  | 8651  |       |       |      |      |      |
| 260                 | %N1    | 91.4                        | 95.8  | 97.5  | 100.4 |       |      |      |      |
|                     | MACH   | .557                        | .602  | .624  | .656  |       |      |      |      |
|                     | KIAS   | 309                         | 305   | 304   | 308   |       |      |      |      |
|                     | FF/ENG | 7526                        | 7592  | 7698  | 8085  |       |      |      |      |
| 240                 | %N1    | 89.1                        | 93.4  | 95.1  | 97.0  | 100.1 |      |      |      |
|                     | MACH   | .541                        | .582  | .602  | .625  | .658  |      |      |      |
|                     | KIAS   | 300                         | 294   | 293   | 293   | 297   |      |      |      |
|                     | FF/ENG | 6938                        | 6922  | 6968  | 7077  | 7453  |      |      |      |
| 220                 | %N1    | 86.6                        | 90.9  | 92.6  | 94.4  | 96.3  | 99.3 |      |      |
|                     | MACH   | .523                        | .563  | .581  | .601  | .624  | .657 |      |      |
|                     | KIAS   | 290                         | 285   | 283   | 281   | 281   | 285  |      |      |
|                     | FF/ENG | 6358                        | 6292  | 6304  | 6340  | 6449  | 6782 |      |      |
| 200                 | %N1    | 83.9                        | 88.3  | 90.0  | 91.7  | 93.5  | 95.4 | 98.2 |      |
|                     | MACH   | .504                        | .544  | .561  | .578  | .598  | .621 | .653 |      |
|                     | KIAS   | 279                         | 275   | 272   | 270   | 269   | 268  | 272  |      |
|                     | FF/ENG | 5808                        | 5716  | 5695  | 5702  | 5731  | 5832 | 6122 |      |
| 180                 | %N1    | 81.4                        | 85.4  | 87.2  | 88.9  | 90.6  | 92.4 | 94.2 | 96.9 |
|                     | MACH   | .486                        | .523  | .539  | .556  | .574  | .593 | .615 | .646 |
|                     | KIAS   | 269                         | 263   | 262   | 259   | 257   | 256  | 255  | 257  |
|                     | FF/ENG | 5294                        | 5180  | 5138  | 5111  | 5109  | 5130 | 5212 | 5441 |
| 160                 | %N1    | 78.8                        | 82.4  | 84.0  | 85.8  | 87.5  | 89.2 | 90.9 | 92.9 |
|                     | MACH   | .468                        | .499  | .515  | .532  | .549  | .566 | .585 | .607 |
|                     | KIAS   | 259                         | 251   | 250   | 248   | 246   | 244  | 242  | 241  |
|                     | FF/ENG | 4818                        | 4633  | 4604  | 4562  | 4526  | 4516 | 4527 | 4589 |
| 140                 | %N1    | 76.1                        | 79.4  | 80.7  | 82.3  | 84.0  | 85.8 | 87.4 | 89.2 |
|                     | MACH   | .449                        | .477  | .490  | .505  | .522  | .539 | .557 | .575 |
|                     | KIAS   | 248                         | 240   | 237   | 235   | 233   | 232  | 230  | 228  |
|                     | FF/ENG | 4379                        | 4128  | 4076  | 4033  | 3984  | 3944 | 3935 | 3951 |

## ENGINE INOP

### MAX CONTINUOUS THRUST

#### Long Range Cruise Diversion Fuel and Time Ground to Air Miles Conversion

| AIR DISTANCE (NM)        |      |      |      |      | GROUND<br>DISTANCE<br>(NM) | AIR DISTANCE (NM)        |      |      |      |      |
|--------------------------|------|------|------|------|----------------------------|--------------------------|------|------|------|------|
| HEADWIND COMPONENT (KTS) |      |      |      |      |                            | TAILWIND COMPONENT (KTS) |      |      |      |      |
| 100                      | 80   | 60   | 40   | 20   |                            | 20                       | 40   | 60   | 80   | 100  |
| 289                      | 266  | 245  | 228  | 213  | 200                        | 191                      | 182  | 174  | 167  | 160  |
| 581                      | 534  | 492  | 457  | 427  | 400                        | 381                      | 364  | 348  | 333  | 320  |
| 873                      | 802  | 739  | 686  | 641  | 600                        | 572                      | 545  | 521  | 500  | 480  |
| 1166                     | 1071 | 987  | 916  | 855  | 800                        | 762                      | 726  | 694  | 665  | 639  |
| 1460                     | 1340 | 1235 | 1145 | 1069 | 1000                       | 952                      | 908  | 867  | 831  | 798  |
| 1755                     | 1611 | 1483 | 1375 | 1283 | 1200                       | 1142                     | 1089 | 1040 | 996  | 956  |
| 2051                     | 1881 | 1732 | 1605 | 1497 | 1400                       | 1333                     | 1270 | 1213 | 1161 | 1114 |
| 2348                     | 2153 | 1980 | 1836 | 1711 | 1600                       | 1523                     | 1451 | 1386 | 1326 | 1272 |
| 2645                     | 2424 | 2230 | 2066 | 1925 | 1800                       | 1713                     | 1632 | 1558 | 1491 | 1430 |
| 2943                     | 2697 | 2479 | 2297 | 2140 | 2000                       | 1902                     | 1812 | 1730 | 1655 | 1588 |

#### Reference Fuel and Time Required at Check Point

| AIR<br>DIST<br>(NM) | PRESSURE ALTITUDE (1000 FT) |                  |                   |                  |                   |                  |                   |                  |                   |                  |
|---------------------|-----------------------------|------------------|-------------------|------------------|-------------------|------------------|-------------------|------------------|-------------------|------------------|
|                     | 10                          |                  | 14                |                  | 18                |                  | 22                |                  | 26                |                  |
|                     | FUEL<br>(1000 KG)           | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) |
| 200                 | 3.3                         | 0:40             | 2.9               | 0:39             | 2.6               | 0:38             | 2.4               | 0:36             | 2.2               | 0:34             |
| 400                 | 7.0                         | 1:18             | 6.4               | 1:15             | 5.9               | 1:12             | 5.5               | 1:09             | 5.4               | 1:05             |
| 600                 | 10.6                        | 1:56             | 9.8               | 1:51             | 9.1               | 1:46             | 8.6               | 1:42             | 8.4               | 1:35             |
| 800                 | 14.2                        | 2:34             | 13.2              | 2:27             | 12.3              | 2:21             | 11.7              | 2:15             | 11.5              | 2:06             |
| 1000                | 17.7                        | 3:12             | 16.5              | 3:04             | 15.5              | 2:56             | 14.7              | 2:48             | 14.4              | 2:37             |
| 1200                | 21.3                        | 3:51             | 19.8              | 3:41             | 18.6              | 3:31             | 17.7              | 3:21             | 17.4              | 3:08             |
| 1400                | 24.8                        | 4:30             | 23.1              | 4:18             | 21.7              | 4:06             | 20.7              | 3:55             | 20.3              | 3:40             |
| 1600                | 28.2                        | 5:09             | 26.4              | 4:55             | 24.8              | 4:42             | 23.6              | 4:29             | 23.2              | 4:12             |
| 1800                | 31.6                        | 5:48             | 29.6              | 5:33             | 27.8              | 5:18             | 26.5              | 5:03             | 26.0              | 4:44             |

#### Fuel Required Adjustment (1000 KG)

| REFERENCE FUEL REQUIRED<br>(1000 KG) | WEIGHT AT CHECK POINT (1000 KG) |      |     |     |     |      |      |      |
|--------------------------------------|---------------------------------|------|-----|-----|-----|------|------|------|
|                                      | 160                             | 180  | 200 | 220 | 240 | 260  | 280  | 300  |
| 2                                    | -0.1                            | -0.1 | 0.0 | 0.1 | 0.3 | 0.4  | 0.5  | 0.6  |
| 4                                    | -0.3                            | -0.2 | 0.0 | 0.4 | 0.7 | 1.1  | 1.4  | 1.6  |
| 6                                    | -0.5                            | -0.3 | 0.0 | 0.6 | 1.2 | 1.8  | 2.3  | 2.7  |
| 8                                    | -0.7                            | -0.4 | 0.0 | 0.9 | 1.7 | 2.5  | 3.2  | 3.8  |
| 10                                   | -0.9                            | -0.5 | 0.0 | 1.1 | 2.2 | 3.1  | 4.1  | 4.9  |
| 12                                   | -1.1                            | -0.6 | 0.0 | 1.4 | 2.6 | 3.8  | 4.9  | 6.0  |
| 14                                   | -1.3                            | -0.7 | 0.0 | 1.6 | 3.1 | 4.5  | 5.8  | 7.1  |
| 16                                   | -1.5                            | -0.8 | 0.0 | 1.8 | 3.5 | 5.2  | 6.7  | 8.2  |
| 18                                   | -1.7                            | -0.9 | 0.0 | 2.0 | 4.0 | 5.8  | 7.6  | 9.3  |
| 20                                   | -1.9                            | -1.0 | 0.0 | 2.3 | 4.4 | 6.5  | 8.5  | 10.4 |
| 22                                   | -2.1                            | -1.1 | 0.0 | 2.5 | 4.9 | 7.2  | 9.4  | 11.5 |
| 24                                   | -2.3                            | -1.2 | 0.0 | 2.7 | 5.3 | 7.8  | 10.2 | 12.6 |
| 26                                   | -2.5                            | -1.3 | 0.0 | 2.9 | 5.7 | 8.5  | 11.1 | 13.7 |
| 28                                   | -2.7                            | -1.4 | 0.0 | 3.1 | 6.1 | 9.1  | 12.0 | 14.8 |
| 30                                   | -2.8                            | -1.5 | 0.0 | 3.3 | 6.6 | 9.7  | 12.9 | 15.9 |
| 32                                   | -3.0                            | -1.5 | 0.0 | 3.5 | 7.0 | 10.4 | 13.7 | 17.1 |

Includes APU fuel burn.

**ENGINE INOP**

**MAX CONTINUOUS THRUST**

**Holding  
Flaps Up**

| WEIGHT<br>(1000 KG) |        | PRESSURE ALTITUDE (FT) |      |       |       |       |       |
|---------------------|--------|------------------------|------|-------|-------|-------|-------|
|                     |        | 1500                   | 5000 | 10000 | 15000 | 20000 | 25000 |
| 300                 | %N1    | 83.8                   | 87.0 | 92.0  | 96.9  |       |       |
|                     | KIAS   | 254                    | 254  | 255   | 272   |       |       |
|                     | FF/ENG | 7940                   | 7710 | 7760  | 8150  |       |       |
| 280                 | %N1    | 81.8                   | 84.8 | 89.8  | 94.6  |       |       |
|                     | KIAS   | 245                    | 246  | 247   | 256   |       |       |
|                     | FF/ENG | 7370                   | 7180 | 7170  | 7410  |       |       |
| 260                 | %N1    | 79.7                   | 82.6 | 87.4  | 92.3  | 98.1  |       |
|                     | KIAS   | 236                    | 237  | 238   | 240   | 262   |       |
|                     | FF/ENG | 6830                   | 6640 | 6620  | 6760  | 7260  |       |
| 240                 | %N1    | 77.4                   | 80.2 | 84.7  | 89.8  | 94.8  |       |
|                     | KIAS   | 228                    | 228  | 228   | 229   | 242   |       |
|                     | FF/ENG | 6310                   | 6100 | 6090  | 6150  | 6380  |       |
| 220                 | %N1    | 74.9                   | 77.7 | 82.0  | 87.0  | 92.0  | 99.0  |
|                     | KIAS   | 221                    | 221  | 221   | 221   | 224   | 247   |
|                     | FF/ENG | 5770                   | 5580 | 5550  | 5570  | 5660  | 6350  |
| 200                 | %N1    | 72.3                   | 75.1 | 79.2  | 84.0  | 89.0  | 94.3  |
|                     | KIAS   | 215                    | 215  | 215   | 215   | 215   | 225   |
|                     | FF/ENG | 5240                   | 5110 | 5060  | 5050  | 5060  | 5340  |
| 180                 | %N1    | 69.6                   | 72.3 | 76.4  | 81.0  | 85.9  | 90.9  |
|                     | KIAS   | 209                    | 209  | 209   | 209   | 209   | 209   |
|                     | FF/ENG | 4730                   | 4680 | 4610  | 4560  | 4510  | 4610  |
| 160                 | %N1    | 67.0                   | 69.6 | 73.6  | 78.3  | 82.8  | 87.8  |
|                     | KIAS   | 209                    | 209  | 209   | 209   | 209   | 209   |
|                     | FF/ENG | 4320                   | 4330 | 4210  | 4130  | 4180  | 4140  |
| 140                 | %N1    | 64.6                   | 67.2 | 71.0  | 75.8  | 80.1  | 85.1  |
|                     | KIAS   | 209                    | 209  | 209   | 209   | 209   | 209   |
|                     | FF/ENG | 4050                   | 4070 | 3940  | 3840  | 3830  | 3730  |

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

## ENGINE INOP

### ADVISORY INFORMATION

#### Gear Down Landing Rate of Climb Available Flaps 20

| TAT (°C) | RATE OF CLIMB (FT/MIN) |     |      |      |      |      |
|----------|------------------------|-----|------|------|------|------|
|          | PRESSURE ALTITUDE (FT) |     |      |      |      |      |
|          | -2000                  | 0   | 2000 | 4000 | 6000 | 8000 |
| 52       | 460                    | 350 |      |      |      |      |
| 50       | 510                    | 400 | 210  |      |      |      |
| 48       | 550                    | 450 | 260  |      |      |      |
| 46       | 590                    | 500 | 310  | 120  |      |      |
| 44       | 640                    | 560 | 360  | 160  |      |      |
| 42       | 680                    | 610 | 400  | 200  | 30   |      |
| 40       | 720                    | 650 | 440  | 240  | 60   |      |
| 38       | 750                    | 690 | 480  | 270  | 80   | -110 |
| 36       | 780                    | 730 | 510  | 300  | 110  | -80  |
| 34       | 780                    | 760 | 540  | 330  | 140  | -60  |
| 32       | 780                    | 780 | 570  | 360  | 170  | -40  |
| 30       | 790                    | 780 | 610  | 390  | 200  | -10  |
| 20       | 810                    | 800 | 630  | 460  | 290  | 110  |
| 10       | 830                    | 820 | 650  | 470  | 300  | 120  |
| 0        | 850                    | 840 | 670  | 480  | 300  | 120  |
| -20      | 890                    | 870 | 690  | 490  | 310  | 130  |
| -40      | 930                    | 910 | 720  | 510  | 320  | 130  |

Rate of climb capability shown is valid for 200000 kg, gear down at VREF20 + 5.

Decrease rate of climb 30 ft/min per 5000 kg greater than 200000 kg.

Increase rate of climb 50 ft/min per 5000 kg less than 200000 kg.

#### Flaps 30

| TAT (°C) | RATE OF CLIMB (FT/MIN) |      |      |      |      |      |
|----------|------------------------|------|------|------|------|------|
|          | PRESSURE ALTITUDE (FT) |      |      |      |      |      |
|          | -2000                  | 0    | 2000 | 4000 | 6000 | 8000 |
| 52       | -30                    | -150 |      |      |      |      |
| 50       | 10                     | -100 | -290 |      |      |      |
| 48       | 50                     | -60  | -250 |      |      |      |
| 46       | 80                     | -10  | -210 | -390 |      |      |
| 44       | 120                    | 40   | -160 | -360 |      |      |
| 42       | 160                    | 90   | -120 | -320 | -490 |      |
| 40       | 190                    | 120  | -90  | -290 | -470 |      |
| 38       | 220                    | 150  | -50  | -260 | -440 | -640 |
| 36       | 250                    | 190  | -30  | -230 | -420 | -620 |
| 34       | 250                    | 220  | 0    | -210 | -390 | -590 |
| 32       | 250                    | 240  | 30   | -180 | -370 | -570 |
| 30       | 260                    | 240  | 60   | -150 | -340 | -550 |
| 20       | 270                    | 250  | 90   | -90  | -260 | -450 |
| 10       | 280                    | 260  | 90   | -90  | -260 | -440 |
| 0        | 290                    | 270  | 100  | -90  | -270 | -450 |
| -20      | 300                    | 280  | 100  | -100 | -280 | -470 |
| -40      | 320                    | 290  | 100  | -100 | -290 | -490 |

Rate of climb capability shown is valid for 200000 kg, gear down at VREF30 + 5.

Decrease rate of climb 30 ft/min per 5000 kg greater than 200000 kg.

Increase rate of climb 50 ft/min per 5000 kg less than 200000 kg.

Intentionally  
Blank



## Performance Inflight - QRH

## Chapter PI-QRH

## Gear Down

## Section 13

## GEAR DOWN

## 220 KIAS Max Climb %N1

| TAT (°C) | PRESSURE ALTITUDE (1000 FT) |      |      |      |      |      |      |      |      |       |       |       |       |       |       |
|----------|-----------------------------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|-------|
|          | 0                           | 5    | 10   | 12   | 14   | 16   | 18   | 20   | 22   | 24    | 26    | 28    | 30    | 32    | 34    |
| 55       | 89.5                        | 89.9 | 92.2 | 93.3 | 94.7 | 95.5 | 97.0 | 98.3 | 99.5 | 100.8 | 102.2 | 103.9 | 105.5 | 107.0 | 108.1 |
| 50       | 90.3                        | 90.0 | 91.5 | 92.6 | 94.0 | 95.1 | 96.2 | 97.6 | 98.7 | 100.0 | 101.5 | 103.1 | 104.7 | 106.2 | 107.3 |
| 45       | 91.4                        | 91.0 | 90.8 | 91.9 | 93.3 | 94.3 | 95.5 | 96.8 | 98.0 | 99.2  | 100.7 | 102.3 | 103.9 | 105.3 | 106.4 |
| 40       | 92.5                        | 92.1 | 92.5 | 91.6 | 92.5 | 93.6 | 94.7 | 96.0 | 97.2 | 98.5  | 99.9  | 101.5 | 103.1 | 104.5 | 105.6 |
| 35       | 93.5                        | 93.3 | 93.2 | 92.9 | 92.7 | 92.8 | 94.0 | 95.3 | 96.4 | 97.7  | 99.1  | 100.7 | 102.2 | 103.7 | 104.7 |
| 30       | 93.9                        | 95.0 | 94.3 | 94.3 | 93.7 | 93.7 | 93.7 | 94.5 | 95.6 | 96.9  | 98.3  | 99.8  | 101.4 | 102.8 | 103.9 |
| 25       | 93.1                        | 96.5 | 95.4 | 95.8 | 94.7 | 94.6 | 94.7 | 94.9 | 94.9 | 96.1  | 97.5  | 99.0  | 100.6 | 102.0 | 103.0 |
| 20       | 92.3                        | 96.6 | 96.3 | 96.6 | 95.8 | 95.6 | 95.6 | 95.8 | 95.9 | 96.0  | 96.6  | 98.2  | 99.7  | 101.1 | 102.2 |
| 15       | 91.5                        | 95.7 | 97.2 | 97.2 | 96.8 | 96.7 | 96.6 | 96.7 | 96.8 | 96.9  | 97.3  | 97.8  | 98.9  | 100.2 | 101.3 |
| 10       | 90.7                        | 94.9 | 96.7 | 97.7 | 97.8 | 97.6 | 97.5 | 97.4 | 97.5 | 97.6  | 98.0  | 98.5  | 99.1  | 99.7  | 100.4 |
| 5        | 89.9                        | 94.1 | 95.8 | 96.8 | 97.9 | 98.5 | 98.3 | 98.1 | 98.2 | 98.3  | 98.7  | 99.1  | 99.6  | 100.2 | 100.7 |
| 0        | 89.1                        | 93.2 | 94.9 | 96.0 | 97.0 | 98.0 | 98.9 | 98.8 | 98.8 | 98.9  | 99.4  | 99.9  | 100.2 | 100.7 | 101.5 |
| -5       | 88.3                        | 92.3 | 94.1 | 95.1 | 96.1 | 97.1 | 98.0 | 98.7 | 99.6 | 99.8  | 100.2 | 101.0 | 101.2 | 101.9 | 102.5 |
| -10      | 87.5                        | 91.5 | 93.2 | 94.2 | 95.2 | 96.2 | 97.0 | 97.7 | 98.9 | 100.5 | 101.0 | 101.8 | 102.5 | 103.0 | 103.4 |
| -15      | 86.6                        | 90.6 | 92.3 | 93.3 | 94.3 | 95.3 | 96.1 | 96.8 | 98.0 | 99.5  | 100.7 | 102.2 | 103.3 | 103.8 | 103.5 |
| -20      | 85.8                        | 89.7 | 91.4 | 92.4 | 93.4 | 94.3 | 95.2 | 95.9 | 97.0 | 98.5  | 99.7  | 101.2 | 103.1 | 103.1 | 103.0 |

## Anti-ice Adjustment

| ANTI-ICE<br>CONFIGURATION | PRESSURE ALTITUDE (1000 FT) |      |      |      |      |      |      |      |      |      |
|---------------------------|-----------------------------|------|------|------|------|------|------|------|------|------|
|                           | 0                           | 5    | 10   | 15   | 20   | 25   | 30   | 35   | 40   | 43   |
| ENGINE ONLY               | -0.2                        | -0.3 | -0.3 | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 |
| ENGINE AND WING*          | -0.3                        | -0.4 | -0.4 | -0.4 | -0.3 | -0.3 | -0.3 | -0.3 | -0.3 | -0.3 |
| ENGINE AND WING**         | -0.3                        | -0.5 | -0.5 | -0.5 | -0.5 | -0.5 | -0.4 | -0.4 | -0.4 | -0.4 |

\* Packs on or off with 2 bleed sources.

\*\* Packs off with 1 bleed source.

## Long Range Cruise Altitude Capability

## Max Climb Thrust, 300 ft/min residual rate of climb

| WEIGHT<br>(1000 KG) | PRESSURE ALTITUDE (FT) |            |            |
|---------------------|------------------------|------------|------------|
|                     | ISA + 10°C<br>& BELOW  | ISA + 15°C | ISA + 20°C |
| 300                 | 15100                  | 11400      | 9100       |
| 280                 | 18100                  | 15000      | 12000      |
| 260                 | 20800                  | 18700      | 15200      |
| 240                 | 24000                  | 22000      | 19400      |
| 220                 | 26900                  | 25400      | 23400      |
| 200                 | 29800                  | 29100      | 27600      |
| 180                 | 32400                  | 32300      | 31700      |
| 160                 | 34700                  | 34600      | 34600      |
| 140                 | 37000                  | 37100      | 37500      |

**GEAR DOWN**

**Long Range Cruise Control**

| WEIGHT<br>(1000 KG) |        | PRESSURE ALTITUDE (1000 FT) |      |      |      |      |      |      |      |      |      |
|---------------------|--------|-----------------------------|------|------|------|------|------|------|------|------|------|
|                     |        | 10                          | 15   | 17   | 19   | 21   | 23   | 25   | 27   | 29   | 31   |
| 300                 | %N1    | 88.9                        | 93.3 |      |      |      |      |      |      |      |      |
|                     | MACH   | .481                        | .520 |      |      |      |      |      |      |      |      |
|                     | KIAS   | 266                         | 262  |      |      |      |      |      |      |      |      |
|                     | FF/ENG | 6723                        | 6759 |      |      |      |      |      |      |      |      |
| 280                 | %N1    | 86.8                        | 91.3 | 93.0 |      |      |      |      |      |      |      |
|                     | MACH   | .468                        | .507 | .523 |      |      |      |      |      |      |      |
|                     | KIAS   | 259                         | 255  | 253  |      |      |      |      |      |      |      |
|                     | FF/ENG | 6260                        | 6252 | 6281 |      |      |      |      |      |      |      |
| 260                 | %N1    | 84.5                        | 89.1 | 90.9 | 92.7 | 94.6 |      |      |      |      |      |
|                     | MACH   | .453                        | .492 | .508 | .525 | .542 |      |      |      |      |      |
|                     | KIAS   | 251                         | 248  | 246  | 244  | 243  |      |      |      |      |      |
|                     | FF/ENG | 5814                        | 5774 | 5775 | 5801 | 5842 |      |      |      |      |      |
| 240                 | %N1    | 82.1                        | 86.8 | 88.5 | 90.4 | 92.1 | 94.0 |      |      |      |      |
|                     | MACH   | .438                        | .476 | .492 | .508 | .525 | .543 |      |      |      |      |
|                     | KIAS   | 242                         | 240  | 238  | 237  | 235  | 233  |      |      |      |      |
|                     | FF/ENG | 5362                        | 5312 | 5295 | 5295 | 5310 | 5359 |      |      |      |      |
| 220                 | %N1    | 79.5                        | 84.2 | 86.0 | 87.8 | 89.6 | 91.4 | 93.3 | 95.8 |      |      |
|                     | MACH   | .421                        | .459 | .475 | .491 | .508 | .525 | .543 | .562 |      |      |
|                     | KIAS   | 232                         | 231  | 230  | 228  | 227  | 225  | 224  | 222  |      |      |
|                     | FF/ENG | 4910                        | 4866 | 4834 | 4815 | 4808 | 4821 | 4879 | 5006 |      |      |
| 200                 | %N1    | 76.8                        | 81.4 | 83.1 | 85.0 | 86.9 | 88.6 | 90.4 | 92.6 | 95.4 |      |
|                     | MACH   | .403                        | .441 | .456 | .473 | .489 | .506 | .523 | .545 | .568 |      |
|                     | KIAS   | 223                         | 221  | 220  | 219  | 218  | 217  | 215  | 215  | 215  |      |
|                     | FF/ENG | 4475                        | 4419 | 4398 | 4361 | 4335 | 4332 | 4350 | 4452 | 4609 |      |
| 180                 | %N1    | 73.8                        | 78.5 | 80.1 | 81.9 | 83.9 | 85.9 | 87.8 | 89.9 | 92.1 | 94.9 |
|                     | MACH   | .384                        | .420 | .436 | .452 | .468 | .487 | .507 | .528 | .551 | .574 |
|                     | KIAS   | 212                         | 211  | 210  | 210  | 209  | 208  | 208  | 208  | 208  | 208  |
|                     | FF/ENG | 4041                        | 3967 | 3958 | 4007 | 3961 | 3881 | 3924 | 3977 | 4066 | 4214 |
| 160                 | %N1    | 70.6                        | 75.5 | 77.2 | 78.9 | 81.0 | 83.1 | 85.1 | 87.1 | 89.1 | 91.3 |
|                     | MACH   | .364                        | .401 | .417 | .433 | .451 | .470 | .489 | .510 | .532 | .555 |
|                     | KIAS   | 201                         | 201  | 201  | 201  | 201  | 201  | 201  | 201  | 201  | 201  |
|                     | FF/ENG | 3698                        | 3621 | 3615 | 3617 | 3609 | 3575 | 3516 | 3558 | 3600 | 3669 |
| 140                 | %N1    | 68.1                        | 73.0 | 74.7 | 76.4 | 78.4 | 80.5 | 82.5 | 84.4 | 86.4 | 88.5 |
|                     | MACH   | .353                        | .388 | .404 | .420 | .437 | .456 | .475 | .495 | .516 | .539 |
|                     | KIAS   | 195                         | 195  | 195  | 195  | 195  | 195  | 195  | 195  | 195  | 195  |
|                     | FF/ENG | 3403                        | 3317 | 3304 | 3301 | 3303 | 3285 | 3255 | 3256 | 3237 | 3270 |





GEAR DOWN

Long Range Cruise Enroute Fuel and Time  
Ground to Air Miles Conversion

| AIR DISTANCE (NM)        |      |      |      |      | GROUND<br>DISTANCE<br>(NM) | AIR DISTANCE (NM)        |      |      |      |      |
|--------------------------|------|------|------|------|----------------------------|--------------------------|------|------|------|------|
| HEADWIND COMPONENT (KTS) |      |      |      |      |                            | TAILWIND COMPONENT (KTS) |      |      |      |      |
| 100                      | 80   | 60   | 40   | 20   |                            | 20                       | 40   | 60   | 80   | 100  |
| 334                      | 296  | 263  | 238  | 218  | 200                        | 188                      | 178  | 168  | 160  | 153  |
| 679                      | 600  | 532  | 479  | 437  | 400                        | 376                      | 355  | 336  | 320  | 305  |
| 1027                     | 905  | 802  | 721  | 656  | 600                        | 565                      | 533  | 504  | 479  | 457  |
| 1379                     | 1213 | 1072 | 963  | 876  | 800                        | 753                      | 710  | 672  | 638  | 608  |
| 1733                     | 1523 | 1344 | 1206 | 1096 | 1000                       | 941                      | 888  | 840  | 797  | 759  |
| 2090                     | 1835 | 1618 | 1450 | 1316 | 1200                       | 1129                     | 1065 | 1007 | 955  | 910  |
| 2450                     | 2148 | 1892 | 1694 | 1536 | 1400                       | 1317                     | 1242 | 1174 | 1113 | 1060 |
| 2812                     | 2462 | 2167 | 1938 | 1757 | 1600                       | 1505                     | 1419 | 1341 | 1271 | 1211 |
| 3177                     | 2779 | 2442 | 2183 | 1978 | 1800                       | 1693                     | 1595 | 1507 | 1429 | 1361 |
| 3545                     | 3098 | 2719 | 2429 | 2199 | 2000                       | 1880                     | 1771 | 1673 | 1586 | 1511 |
| 3916                     | 3418 | 2997 | 2675 | 2420 | 2200                       | 2068                     | 1948 | 1840 | 1744 | 1660 |
| 4289                     | 3740 | 3276 | 2922 | 2641 | 2400                       | 2255                     | 2124 | 2006 | 1901 | 1810 |
| 4665                     | 4064 | 3556 | 3169 | 2863 | 2600                       | 2443                     | 2300 | 2172 | 2058 | 1959 |
| 5044                     | 4389 | 3838 | 3417 | 3085 | 2800                       | 2630                     | 2476 | 2337 | 2214 | 2108 |
| 5426                     | 4717 | 4120 | 3665 | 3307 | 3000                       | 2817                     | 2652 | 2503 | 2371 | 2256 |
| 5811                     | 5046 | 4402 | 3914 | 3530 | 3200                       | 3005                     | 2827 | 2668 | 2527 | 2405 |
| 6199                     | 5377 | 4686 | 4163 | 3752 | 3400                       | 3192                     | 3003 | 2834 | 2684 | 2553 |
| 6590                     | 5711 | 4972 | 4413 | 3975 | 3600                       | 3379                     | 3179 | 2999 | 2839 | 2700 |
| 6984                     | 6046 | 5258 | 4663 | 4198 | 3800                       | 3566                     | 3354 | 3164 | 2995 | 2848 |
| 7381                     | 6383 | 5545 | 4914 | 4422 | 4000                       | 3753                     | 3529 | 3328 | 3151 | 2996 |

Reference Fuel and Time Required at Check Point

| AIR<br>DIST<br>(NM) | PRESSURE ALTITUDE (1000 FT) |                  |                   |                  |                   |                  |                   |                  |                   |                  |
|---------------------|-----------------------------|------------------|-------------------|------------------|-------------------|------------------|-------------------|------------------|-------------------|------------------|
|                     | 10                          |                  | 14                |                  | 20                |                  | 24                |                  | 28                |                  |
|                     | FUEL<br>(1000 KG)           | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) |
| 200                 | 6.1                         | 0:51             | 5.5               | 0:49             | 4.9               | 0:45             | 4.4               | 0:44             | 4.1               | 0:42             |
| 400                 | 12.6                        | 1:42             | 11.5              | 1:36             | 10.4              | 1:29             | 9.4               | 1:24             | 8.9               | 1:20             |
| 600                 | 19.1                        | 2:32             | 17.6              | 2:24             | 15.9              | 2:12             | 14.4              | 2:05             | 13.8              | 1:58             |
| 800                 | 25.4                        | 3:24             | 23.4              | 3:13             | 21.2              | 2:57             | 19.4              | 2:46             | 18.4              | 2:37             |
| 1000                | 31.7                        | 4:17             | 29.3              | 4:02             | 26.5              | 3:41             | 24.3              | 3:28             | 23.1              | 3:15             |
| 1200                | 37.7                        | 5:10             | 34.9              | 4:51             | 31.7              | 4:26             | 29.1              | 4:10             | 27.7              | 3:54             |
| 1400                | 43.8                        | 6:03             | 40.6              | 5:41             | 36.8              | 5:11             | 33.9              | 4:52             | 32.2              | 4:34             |
| 1600                | 49.7                        | 6:57             | 46.0              | 6:32             | 41.8              | 5:57             | 38.6              | 5:34             | 36.7              | 5:13             |
| 1800                | 55.6                        | 7:51             | 51.5              | 7:22             | 46.8              | 6:42             | 43.3              | 6:17             | 41.1              | 5:53             |
| 2000                | 61.3                        | 8:46             | 56.8              | 8:14             | 51.7              | 7:29             | 47.9              | 7:00             | 45.4              | 6:34             |
| 2200                | 67.0                        | 9:41             | 62.1              | 9:05             | 56.5              | 8:15             | 52.5              | 7:43             | 49.7              | 7:14             |
| 2400                | 72.6                        | 10:37            | 67.3              | 9:57             | 61.3              | 9:02             | 56.9              | 8:27             | 53.9              | 7:55             |
| 2600                | 78.1                        | 11:33            | 72.4              | 10:50            | 66.0              | 9:49             | 61.4              | 9:11             | 58.0              | 8:36             |
| 2800                | 83.4                        | 12:30            | 77.4              | 11:43            | 70.6              | 10:37            | 65.7              | 9:56             | 62.0              | 9:17             |
| 3000                | 88.8                        | 13:27            | 82.4              | 12:36            | 75.1              | 11:25            | 70.0              | 10:40            | 66.1              | 9:58             |
| 3200                | 94.0                        | 14:25            | 87.3              | 13:30            | 79.6              | 12:14            | 74.3              | 11:25            | 70.0              | 10:40            |
| 3400                | 99.2                        | 15:24            | 92.1              | 14:24            | 84.0              | 13:02            | 78.5              | 12:10            | 74.0              | 11:22            |
| 3600                | 104.2                       | 16:23            | 96.8              | 15:19            | 88.4              | 13:51            | 82.6              | 12:56            | 77.8              | 12:04            |
| 3800                | 109.2                       | 17:22            | 101.6             | 16:14            | 92.7              | 14:41            | 86.7              | 13:41            | 81.7              | 12:47            |
| 4000                | 114.1                       | 18:22            | 106.2             | 17:09            | 97.0              | 15:30            | 90.8              | 14:28            | 85.4              | 13:29            |

**GEAR DOWN**

**Long Range Cruise Enroute Fuel and Time  
Fuel Required Adjustment (1000 KG)**

| REFERENCE FUEL REQUIRED<br>(1000 KG) | WEIGHT AT CHECK POINT (1000 KG) |     |     |      |      |      |
|--------------------------------------|---------------------------------|-----|-----|------|------|------|
|                                      | 160                             | 180 | 200 | 220  | 240  | 260  |
| 10                                   | -0.4                            | 0.0 | 0.8 | 1.7  | 2.9  | 4.2  |
| 20                                   | -0.9                            | 0.0 | 1.5 | 3.3  | 5.5  | 8.0  |
| 30                                   | -1.4                            | 0.0 | 2.1 | 4.8  | 7.9  | 11.4 |
| 40                                   | -1.9                            | 0.0 | 2.8 | 6.1  | 10.1 | 14.6 |
| 50                                   | -2.3                            | 0.0 | 3.4 | 7.4  | 12.1 | 17.5 |
| 60                                   | -2.8                            | 0.0 | 3.9 | 8.6  | 14.0 | 20.0 |
| 70                                   | -3.3                            | 0.0 | 4.5 | 9.7  | 15.6 | 22.3 |
| 80                                   | -3.7                            | 0.0 | 5.0 | 10.7 | 17.1 | 24.2 |
| 90                                   | -4.2                            | 0.0 | 5.5 | 11.6 | 18.4 | 25.8 |
| 100                                  | -4.6                            | 0.0 | 5.9 | 12.4 | 19.5 | 27.1 |
| 110                                  | -5.1                            | 0.0 | 6.3 | 13.1 | 20.4 | 28.1 |
| 120                                  | -5.5                            | 0.0 | 6.7 | 13.7 | 21.1 | 28.8 |

**Descent at VREF30 + 80**

| PRESSURE ALTITUDE<br>(1000 FT) | 17 | 19 | 21 | 23 | 25 | 27 | 29 | 31 | 33 | 35 |
|--------------------------------|----|----|----|----|----|----|----|----|----|----|
| DISTANCE (NM)                  | 40 | 44 | 48 | 52 | 56 | 60 | 64 | 68 | 72 | 76 |
| TIME (MINUTES)                 | 11 | 12 | 13 | 13 | 14 | 15 | 16 | 16 | 17 | 18 |

GEAR DOWN

Holding  
Flaps Up

| WEIGHT<br>(1000 KG) |        | PRESSURE ALTITUDE (FT) |      |       |       |       |       |       |
|---------------------|--------|------------------------|------|-------|-------|-------|-------|-------|
|                     |        | 1500                   | 5000 | 10000 | 15000 | 20000 | 25000 | 30000 |
| 300                 | %N1    | 78.4                   | 81.3 | 86.2  |       |       |       |       |
|                     | KIAS   | 243                    | 243  | 243   |       |       |       |       |
|                     | FF/ENG | 6570                   | 6380 | 6390  |       |       |       |       |
| 280                 | %N1    | 76.8                   | 79.6 | 84.2  | 89.5  |       |       |       |
|                     | KIAS   | 239                    | 239  | 239   | 239   |       |       |       |
|                     | FF/ENG | 6200                   | 6010 | 6030  | 6110  |       |       |       |
| 260                 | %N1    | 75.0                   | 77.8 | 82.3  | 87.4  | 92.6  |       |       |
|                     | KIAS   | 234                    | 234  | 234   | 234   | 234   |       |       |
|                     | FF/ENG | 5820                   | 5650 | 5650  | 5690  | 5840  |       |       |
| 240                 | %N1    | 73.0                   | 75.9 | 80.1  | 85.2  | 90.3  | 95.9  |       |
|                     | KIAS   | 228                    | 228  | 228   | 228   | 228   | 228   |       |
|                     | FF/ENG | 5430                   | 5290 | 5250  | 5270  | 5340  | 5650  |       |
| 220                 | %N1    | 70.9                   | 73.7 | 77.9  | 82.8  | 87.8  | 93.0  |       |
|                     | KIAS   | 221                    | 221  | 221   | 221   | 221   | 221   |       |
|                     | FF/ENG | 5030                   | 4930 | 4860  | 4860  | 4880  | 5050  |       |
| 200                 | %N1    | 68.7                   | 71.4 | 75.6  | 80.4  | 85.3  | 90.3  | 97.3  |
|                     | KIAS   | 215                    | 215  | 215   | 215   | 215   | 215   | 215   |
|                     | FF/ENG | 4660                   | 4590 | 4500  | 4470  | 4450  | 4550  | 4940  |
| 180                 | %N1    | 66.7                   | 69.4 | 73.4  | 78.2  | 82.9  | 88.0  | 93.5  |
|                     | KIAS   | 209                    | 209  | 209   | 209   | 209   | 209   | 209   |
|                     | FF/ENG | 4340                   | 4290 | 4180  | 4130  | 4190  | 4150  | 4370  |
| 160                 | %N1    | 65.6                   | 68.2 | 72.2  | 77.0  | 81.5  | 86.6  | 91.8  |
|                     | KIAS   | 209                    | 209  | 209   | 209   | 209   | 209   | 209   |
|                     | FF/ENG | 4170                   | 4210 | 4100  | 4020  | 4020  | 3930  | 4090  |
| 140                 | %N1    | 64.5                   | 67.2 | 71.1  | 76.0  | 80.4  | 85.4  | 90.5  |
|                     | KIAS   | 209                    | 209  | 209   | 209   | 209   | 209   | 209   |
|                     | FF/ENG | 4100                   | 4060 | 3960  | 3880  | 3870  | 3760  | 3880  |

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



GEAR DOWN

Holding  
Flaps 1

| WEIGHT<br>(1000 KG) |        | PRESSURE ALTITUDE (FT) |      |       |       |       |
|---------------------|--------|------------------------|------|-------|-------|-------|
|                     |        | 1500                   | 5000 | 10000 | 15000 | 20000 |
| 300                 | %N1    | 77.5                   | 80.5 | 85.3  | 90.6  |       |
|                     | KIAS   | 223                    | 223  | 223   | 223   |       |
|                     | FF/ENG | 6340                   | 6160 | 6200  | 6320  |       |
| 280                 | %N1    | 75.7                   | 78.6 | 83.3  | 88.5  | 93.8  |
|                     | KIAS   | 219                    | 219  | 219   | 219   | 219   |
|                     | FF/ENG | 5950                   | 5770 | 5800  | 5870  | 6030  |
| 260                 | %N1    | 73.7                   | 76.6 | 81.1  | 86.3  | 91.5  |
|                     | KIAS   | 214                    | 214  | 214   | 214   | 214   |
|                     | FF/ENG | 5540                   | 5390 | 5390  | 5450  | 5550  |
| 240                 | %N1    | 71.5                   | 74.4 | 78.8  | 83.9  | 89.1  |
|                     | KIAS   | 208                    | 208  | 208   | 208   | 208   |
|                     | FF/ENG | 5130                   | 5030 | 4990  | 5020  | 5060  |
| 220                 | %N1    | 69.2                   | 72.0 | 76.4  | 81.3  | 86.4  |
|                     | KIAS   | 201                    | 201  | 201   | 201   | 201   |
|                     | FF/ENG | 4720                   | 4670 | 4600  | 4590  | 4590  |
| 200                 | %N1    | 66.7                   | 69.4 | 73.8  | 78.7  | 83.6  |
|                     | KIAS   | 195                    | 195  | 195   | 195   | 195   |
|                     | FF/ENG | 4330                   | 4300 | 4210  | 4180  | 4170  |
| 180                 | %N1    | 64.3                   | 67.0 | 71.2  | 76.2  | 80.8  |
|                     | KIAS   | 189                    | 189  | 189   | 189   | 189   |
|                     | FF/ENG | 4060                   | 4040 | 3940  | 3890  | 3890  |
| 160                 | %N1    | 62.8                   | 65.5 | 69.6  | 74.6  | 79.1  |
|                     | KIAS   | 189                    | 189  | 189   | 189   | 189   |
|                     | FF/ENG | 3860                   | 3840 | 3740  | 3670  | 3680  |
| 140                 | %N1    | 61.6                   | 64.3 | 68.2  | 73.3  | 77.7  |
|                     | KIAS   | 189                    | 189  | 189   | 189   | 189   |
|                     | FF/ENG | 3700                   | 3670 | 3580  | 3510  | 3510  |

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



## Performance Inflight - QRH

## Chapter PI-QRH

## Gear Down, Engine INOP

## Section 14

## GEAR DOWN

## ENGINE INOP

## MAX CONTINUOUS THRUST

## Driftdown Speed/Level Off Altitude

100 ft/min residual rate of climb

Includes APU fuel burn

| WEIGHT (1000 KG)       |              | OPTIMUM<br>DRIFTDOWN<br>SPEED<br>(KIAS) | LEVEL OFF ALTITUDE (FT) |            |            |
|------------------------|--------------|-----------------------------------------|-------------------------|------------|------------|
| START<br>DRIFT<br>DOWN | LEVEL<br>OFF |                                         | ISA + 10°C<br>& BELOW   | ISA + 15°C | ISA + 20°C |
| 260                    | 248          | 233                                     | 3700                    | 1700       |            |
| 240                    | 230          | 227                                     | 6700                    | 4900       | 2800       |
| 220                    | 211          | 220                                     | 9100                    | 7800       | 6300       |
| 200                    | 192          | 214                                     | 11400                   | 10100      | 8800       |
| 180                    | 172          | 207                                     | 13800                   | 12500      | 11200      |
| 160                    | 152          | 199                                     | 17100                   | 15400      | 13800      |

## Long Range Cruise Altitude Capability

100 ft/min residual rate of climb

| WEIGHT<br>(1000 KG) | PRESSURE ALTITUDE (FT) |            |            |
|---------------------|------------------------|------------|------------|
|                     | ISA + 10°C<br>& BELOW  | ISA + 15°C | ISA + 20°C |
| 240                 | 5200                   | 2200       |            |
| 220                 | 8200                   | 6500       | 4200       |
| 200                 | 10500                  | 9200       | 7900       |
| 180                 | 12900                  | 11600      | 10300      |
| 160                 | 15700                  | 14300      | 13000      |
| 140                 | 19600                  | 18000      | 15800      |



**GEAR DOWN**  
**ENGINE INOP**

**MAX CONTINUOUS THRUST**

**Long Range Cruise Control**

| WEIGHT<br>(1000 KG) |        | PRESSURE ALTITUDE (1000 FT) |      |      |      |      |      |       |      |
|---------------------|--------|-----------------------------|------|------|------|------|------|-------|------|
|                     |        | 5                           | 7    | 9    | 11   | 13   | 15   | 17    | 19   |
| 240                 | %N1    | 97.5                        |      |      |      |      |      |       |      |
|                     | MACH   | .379                        |      |      |      |      |      |       |      |
|                     | KIAS   | 229                         |      |      |      |      |      |       |      |
|                     | FF/ENG | 10333                       |      |      |      |      |      |       |      |
| 220                 | %N1    | 95.1                        | 96.9 | 99.2 |      |      |      |       |      |
|                     | MACH   | .368                        | .381 | .395 |      |      |      |       |      |
|                     | KIAS   | 223                         | 222  | 222  |      |      |      |       |      |
|                     | FF/ENG | 9460                        | 9451 | 9611 |      |      |      |       |      |
| 200                 | %N1    | 92.3                        | 94.3 | 96.3 | 98.6 |      |      |       |      |
|                     | MACH   | .356                        | .369 | .383 | .398 |      |      |       |      |
|                     | KIAS   | 215                         | 215  | 215  | 215  |      |      |       |      |
|                     | FF/ENG | 8595                        | 8603 | 8679 | 8831 |      |      |       |      |
| 180                 | %N1    | 89.4                        | 91.5 | 93.5 | 95.5 | 97.8 |      |       |      |
|                     | MACH   | .344                        | .357 | .371 | .385 | .400 |      |       |      |
|                     | KIAS   | 208                         | 208  | 208  | 208  | 208  |      |       |      |
|                     | FF/ENG | 7819                        | 7816 | 7869 | 7928 | 8078 |      |       |      |
| 160                 | %N1    | 86.3                        | 88.4 | 90.4 | 92.4 | 94.4 | 96.6 | 100.1 |      |
|                     | MACH   | .332                        | .344 | .357 | .371 | .385 | .401 | .417  |      |
|                     | KIAS   | 201                         | 201  | 201  | 201  | 201  | 201  | 201   |      |
|                     | FF/ENG | 7068                        | 7052 | 7088 | 7129 | 7190 | 7311 | 7545  |      |
| 140                 | %N1    | 83.4                        | 85.3 | 87.4 | 89.4 | 91.4 | 93.4 | 95.7  | 98.9 |
|                     | MACH   | .322                        | .334 | .346 | .360 | .374 | .388 | .404  | .420 |
|                     | KIAS   | 195                         | 195  | 195  | 195  | 195  | 195  | 195   | 195  |
|                     | FF/ENG | 6427                        | 6405 | 6420 | 6444 | 6486 | 6543 | 6627  | 6824 |

# GEAR DOWN

# ENGINE INOP

## MAX CONTINUOUS THRUST

### Long Range Cruise Diversion Fuel and Time

#### Ground to Air Miles Conversion

| AIR DISTANCE (NM)        |      |      |      |      | GROUND<br>DISTANCE<br>(NM) | AIR DISTANCE (NM)        |     |     |     |     |
|--------------------------|------|------|------|------|----------------------------|--------------------------|-----|-----|-----|-----|
| HEADWIND COMPONENT (KTS) |      |      |      |      |                            | TAILWIND COMPONENT (KTS) |     |     |     |     |
| 100                      | 80   | 60   | 40   | 20   |                            | 20                       | 40  | 60  | 80  | 100 |
| 171                      | 150  | 133  | 119  | 109  | 100                        | 93                       | 88  | 83  | 78  | 75  |
| 351                      | 307  | 270  | 242  | 219  | 200                        | 187                      | 175 | 164 | 154 | 146 |
| 531                      | 464  | 407  | 364  | 330  | 300                        | 279                      | 260 | 244 | 230 | 218 |
| 713                      | 622  | 545  | 486  | 440  | 400                        | 372                      | 347 | 325 | 306 | 289 |
| 896                      | 780  | 683  | 609  | 550  | 500                        | 465                      | 433 | 406 | 381 | 361 |
| 1079                     | 939  | 821  | 731  | 661  | 600                        | 557                      | 519 | 486 | 457 | 432 |
| 1264                     | 1099 | 960  | 854  | 771  | 700                        | 650                      | 605 | 566 | 532 | 503 |
| 1449                     | 1259 | 1099 | 977  | 882  | 800                        | 743                      | 691 | 646 | 607 | 574 |
| 1635                     | 1419 | 1238 | 1100 | 992  | 900                        | 835                      | 777 | 726 | 682 | 645 |
| 1822                     | 1580 | 1377 | 1223 | 1103 | 1000                       | 928                      | 863 | 807 | 757 | 716 |

#### Reference Fuel and Time Required at Check Point

| AIR<br>DIST<br>(NM) | PRESSURE ALTITUDE (1000 FT) |                  |                   |                  |                   |                  |                   |                  |                   |                  |
|---------------------|-----------------------------|------------------|-------------------|------------------|-------------------|------------------|-------------------|------------------|-------------------|------------------|
|                     | 6                           |                  | 8                 |                  | 10                |                  | 12                |                  | 14                |                  |
|                     | FUEL<br>(1000 KG)           | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) |
| 100                 | 3.1                         | 0:28             | 3.0               | 0:27             | 2.8               | 0:26             | 2.7               | 0:26             | 2.5               | 0:25             |
| 200                 | 6.6                         | 0:54             | 6.3               | 0:53             | 6.1               | 0:52             | 5.9               | 0:50             | 5.7               | 0:49             |
| 300                 | 10.0                        | 1:21             | 9.7               | 1:19             | 9.4               | 1:17             | 9.1               | 1:15             | 8.9               | 1:13             |
| 400                 | 13.4                        | 1:48             | 13.0              | 1:45             | 12.6              | 1:42             | 12.2              | 1:39             | 12.0              | 1:37             |
| 500                 | 16.7                        | 2:15             | 16.2              | 2:11             | 15.8              | 2:08             | 15.3              | 2:04             | 15.1              | 2:01             |
| 600                 | 20.1                        | 2:43             | 19.5              | 2:38             | 18.9              | 2:33             | 18.4              | 2:29             | 18.1              | 2:25             |
| 700                 | 23.3                        | 3:10             | 22.6              | 3:05             | 22.0              | 2:59             | 21.5              | 2:54             | 21.1              | 2:49             |
| 800                 | 26.6                        | 3:38             | 25.8              | 3:31             | 25.1              | 3:25             | 24.5              | 3:19             | 24.1              | 3:13             |
| 900                 | 29.8                        | 4:05             | 28.9              | 3:58             | 28.2              | 3:51             | 27.5              | 3:45             | 27.0              | 3:38             |
| 1000                | 33.0                        | 4:33             | 32.0              | 4:25             | 31.2              | 4:18             | 30.4              | 4:10             | 29.9              | 4:03             |

## GEAR DOWN

## ENGINE INOP

### MAX CONTINUOUS THRUST

#### Long Range Cruise Diversion Fuel and Time Fuel Required Adjustment (1000 KG)

| REFERENCE FUEL REQUIRED<br>(1000 KG) | WEIGHT AT CHECK POINT (1000 KG) |     |     |     |      |      |
|--------------------------------------|---------------------------------|-----|-----|-----|------|------|
|                                      | 160                             | 180 | 200 | 220 | 240  | 260  |
| 4                                    | -0.2                            | 0.0 | 0.4 | 0.8 | 1.3  | 1.7  |
| 6                                    | -0.3                            | 0.0 | 0.6 | 1.3 | 2.0  | 2.7  |
| 8                                    | -0.4                            | 0.0 | 0.8 | 1.7 | 2.7  | 3.7  |
| 10                                   | -0.6                            | 0.0 | 1.0 | 2.2 | 3.4  | 4.7  |
| 12                                   | -0.7                            | 0.0 | 1.2 | 2.6 | 4.1  | 5.6  |
| 14                                   | -0.8                            | 0.0 | 1.4 | 3.0 | 4.7  | 6.5  |
| 16                                   | -0.9                            | 0.0 | 1.6 | 3.4 | 5.3  | 7.4  |
| 18                                   | -1.0                            | 0.0 | 1.8 | 3.8 | 6.0  | 8.3  |
| 20                                   | -1.1                            | 0.0 | 2.0 | 4.2 | 6.6  | 9.2  |
| 22                                   | -1.3                            | 0.0 | 2.2 | 4.5 | 7.2  | 10.1 |
| 24                                   | -1.4                            | 0.0 | 2.3 | 4.9 | 7.8  | 10.9 |
| 26                                   | -1.5                            | 0.0 | 2.5 | 5.2 | 8.3  | 11.7 |
| 28                                   | -1.6                            | 0.0 | 2.6 | 5.6 | 8.9  | 12.5 |
| 30                                   | -1.7                            | 0.0 | 2.8 | 5.9 | 9.4  | 13.3 |
| 32                                   | -1.8                            | 0.0 | 2.9 | 6.2 | 9.9  | 14.1 |
| 34                                   | -1.9                            | 0.0 | 3.0 | 6.5 | 10.4 | 14.8 |
| 36                                   | -2.0                            | 0.0 | 3.1 | 6.8 | 10.9 | 15.6 |

Based on Long Range Cruise and VREF30+80 descent. Includes APU fuel burn.



**GEAR DOWN**  
**ENGINE INOP**  
**MAX CONTINUOUS THRUST**

**Holding  
Flaps Up**

| WEIGHT<br>(1000 KG) |        | PRESSURE ALTITUDE (FT) |       |       |       |
|---------------------|--------|------------------------|-------|-------|-------|
|                     |        | 1500                   | 5000  | 10000 | 15000 |
| 260                 | %N1    | 96.3                   |       |       |       |
|                     | KIAS   | 234                    |       |       |       |
|                     | FF/ENG | 11890                  |       |       |       |
| 240                 | %N1    | 94.0                   | 97.4  |       |       |
|                     | KIAS   | 228                    | 228   |       |       |
|                     | FF/ENG | 10950                  | 10790 |       |       |
| 220                 | %N1    | 91.4                   | 94.8  |       |       |
|                     | KIAS   | 221                    | 221   |       |       |
|                     | FF/ENG | 10010                  | 9840  |       |       |
| 200                 | %N1    | 88.7                   | 92.2  | 97.3  |       |
|                     | KIAS   | 215                    | 215   | 215   |       |
|                     | FF/ENG | 9120                   | 8990  | 9140  |       |
| 180                 | %N1    | 86.1                   | 89.6  | 94.7  |       |
|                     | KIAS   | 209                    | 209   | 209   |       |
|                     | FF/ENG | 8370                   | 8260  | 8340  |       |
| 160                 | %N1    | 84.6                   | 88.1  | 93.1  | 99.0  |
|                     | KIAS   | 209                    | 209   | 209   | 209   |
|                     | FF/ENG | 7990                   | 7870  | 7930  | 8270  |
| 140                 | %N1    | 83.4                   | 86.7  | 91.8  | 97.0  |
|                     | KIAS   | 209                    | 209   | 209   | 209   |
|                     | FF/ENG | 7660                   | 7540  | 7570  | 7820  |

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

Intentionally  
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# Performance Inflight - QRH

# Chapter PI-QRH

## Text

## Section 15

### Introduction

This chapter contains information to supplement performance data from the Flight Management Computer. 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 Flight Manual, the Flight Manual shall always take precedence.

### General

#### Flight With Unreliable Airspeed / Turbulent Air Penetration

Body 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 may also cause unreliable airspeed/Mach indications. Climb, cruise and descent information is based on the recommended turbulent air penetration speed schedule: 270 knots below 25,000 feet, 280 knots or 0.82 Mach whichever is lower at 25,000 feet and above; maintain a minimum speed of 15 knots above the minimum maneuvering speed when below 0.82 Mach. This schedule provides ample protection from stall and high speed buffet, while also providing protection from exceeding structural limits. The Climb, Cruise and Descent tables in this section may also be used for turbulent air penetration. The Flight with Unreliable Airspeed - FINAL APPROACH table includes a 10 knot margin for landing.

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

#### Max Climb %N1

This table shows Max Climb %N1 for a 310/.84 climb speed schedule, normal engine bleed for packs on and anti-ice off. Enter the table with airport pressure altitude and TAT and read %N1. %N1 adjustments are shown for anti-ice operation.

#### Go-Around %N1

To find Go-Around %N1 based on normal engine bleed for packs on and anti-ice off, enter the Go-Around %N1 table with airport pressure altitude and reported OAT or TAT and read %N1. %N1 adjustments are shown for engine bleeds for various conditions.

---

## VREF Speeds

This table contains flaps 30, 25 and 20 reference speeds for a given weight.

---

## Advisory Information

### Normal Configuration Landing Distance

Tables are provided as advisory information for normal configuration landing distance on dry runways and slippery runways with good, medium, and poor reported braking action. These values are actual landing distances and do not include the 1.67 regulatory factor. Therefore, they cannot be used to determine the dispatch required landing field length.

To use these tables, determine the reference landing distance for the selected braking configuration. Then adjust the reference distance for landing weight, altitude, wind, slope, temperature, approach speed, and the number of operative thrust reversers to obtain the actual landing distance.

When landing on slippery runways or runways contaminated with ice, snow, slush, or standing water, the reported braking action must be considered. If the surface is affected by water, snow, or ice and the braking action is reported as "good", conditions should not be expected to be as good as on clean, dry runways. The value "good" is comparative and is intended to mean that airplanes should not experience braking or directional control difficulties when landing. The performance level used to calculate the "good" data is consistent with wet runway testing done on early Boeing jets. The performance level used to calculate "poor" data reflects runways covered with wet ice.

Use of the autobrake system commands the airplane to a constant deceleration rate. In some conditions, such as a runway with "poor" braking action, the airplane may not be able to achieve these deceleration rates. In these cases, runway slope and inoperative reversers influence the stopping distance. Since it cannot be determined quickly when this becomes a factor, it is conservative to add the effects of slope and inoperative reversers when using the autobrake system.

### Non-normal Configuration Landing Distance

Advisory information is provided to support non-normal configurations that affect the landing performance of the airplane. Landing distances and adjustments are provided for dry runways and runways with good, medium, and poor reported braking action.

Enter the table with the applicable non-normal configuration and read the normal approach speed. The reference landing distance is a reference distance from 50 ft above the threshold to stop based on a reference landing weight and speed at sea level, zero wind, and zero slope. Subsequent columns provide adjustments for off-reference landing weight, altitude, wind, slope, and speed conditions. Each adjustment is independently added to the reference landing distance. Landing distance includes the effects of max manual braking and reverse thrust.

For an engine inoperative landing, check the rate of climb capability shown in Gear Down Landing Rate of Climb Available tables to ensure adequate climb performance.

## Recommended Brake Cooling Schedule

Advisory information is provided to assist in avoiding problems associated with hot brakes. For normal operation, most landings are at weights below the AFM quick turnaround limit weight.

Use of the recommended cooling schedule will help avoid brake overheat and fuse plug problems that could result from repeated landings at short time intervals or a rejected takeoff.

Enter the Recommended Brake Cooling Schedule table with the airplane weight and brakes on speed, adjusted for wind, at the appropriate temperature and altitude condition. Instructions for applying wind adjustments are included below the table. Linear interpolation may be used to obtain intermediate values. The resulting number is the reference brake energy per brake in millions of foot-pounds, and represents the amount of energy absorbed by each brake during a rejected takeoff.

To determine the energy per brake absorbed during landing, enter the appropriate Event Adjusted Brake Energy Table (No Reverse Thrust or 2 Engine Reverse) with the reference brake energy per brake and the type of braking used during landing (Max Manual, Max Auto, or Autobrake). The resulting number is the adjusted brake energy per brake and represents the energy absorbed in each brake during the landing. The recommended cooling time is found in the final table by entering with the adjusted brake energy per brake. Times are provided for ground cooling and inflight gear down cooling.

Brake Temperature Monitor System (BTMS) indications are also shown. If brake cooling is determined from the BTMS, the hottest brake indication 10 to 15 minutes after the airplane has come to a complete stop, or inflight with gear retracted, may be used to determine recommended cooling schedule by entering at the bottom of the chart. An EICAS advisory message, BRAKE TEMP, will appear when any brake registers 5.0 or higher on the EICAS indication and disappear as the hottest brake cools with an EICAS indication of 3.5. Note that even without an EICAS advisory message, brake cooling is recommended.

## Approach or Landing Climb Limited Weight

In the event an overweight landing is necessary and the fuel dump system is unavailable, approach or landing climb limits should be checked if a Flaps 25 or 30 landing is planned. Enter the table with airport OAT and pressure altitude to read approach or landing climb limited weight. Apply the noted adjustments as required. At weights exceeding those shown, plan a Flaps 20 landing.

The table "Approach or Landing Climb Limited Weight" presents the data which are the more limiting of Approach Climb Limit Weight and Landing Climb Limit Weight.

---

## 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 Mach number of .84 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 engine bleed for packs on or off and all anti-ice bleeds off. Enter the table with pressure altitude and IAS or Mach to read %N1.

It is desirable to maintain engine thrust level within the limits of the Max Cruise thrust rating. However, where thrust level in excess of Max Cruise rating is required, such as for meeting terrain clearance, ATC altitude assignments, or to attain maximum range capability, it is permissible to use the thrust needed up to the Max Continuous thrust rating. The Max Continuous thrust rating is intended primarily for emergency use at the discretion of the pilot and is the maximum thrust that may be used continuously.

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## 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/Cruise 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 correct 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 Diversion Fuel and Time table.

## Long Range Cruise Altitude Capability

Table show the maximum altitude that can be maintained at a given weight and air temperature (ISA deviation), based on LRC speed, Max Continuous thrust, and 100 ft/min residual rate of climb.

## Long Range Cruise Control

The table provides target %N1, engine inoperative Long Range Cruise Mach number, IAS and fuel flow for the airplane weight and pressure altitude. The fuel flow values in this table reflect single engine fuel burn.

## Long Range Cruise Diversion Fuel and Time

Tables are provided for crews to determine the fuel and time required to proceed to an alternate airfield with one engine inoperative. The data is based on single engine Long Range Cruise speed and .84/310/250 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 corrections table with the fuel required for the reference weight and the actual weight at checkpoint. Read fuel and time required for the actual weight.

---

## Holding

Single engine holding data is provided in the same format as the all engine holding data and is based on the same assumptions.

## Gear Down Landing Rate of Climb Available

Rate of climb data is provided as guidance information in the event an engine inoperative landing is planned. The tables show gear down rate of climb available for Flaps 20 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 for all phases of flight. The data is based on engine bleeds for normal air conditioning.

Note: The Flight Management Computer System (FMCS) does not contain special provisions for operation with landing gear extended. As a result, the FMCS will generate inaccurate enroute speed schedules, display non-conservative predictions of fuel burn, estimated time of arrival (ETA), maximum altitude, and compute overly shallow descent path. To obtain accurate ETA predictions, gear down cruise speed and altitude should be entered on the CLB and CRZ pages. Gear down cruise speed should also be entered on the DES page and a STEP SIZE of zero should be entered on the PERF INIT or CRZ page. Use of VNAV during descent under these circumstances is not recommended.

Tables for gear down performance in this section are identical in format and used in the same manner as tables for the gear up configuration previously described.



**Performance Inflight - QRH****Chapter PI-QRH****Table of Contents****Section 20****777-200LR GE90-110B1L KG M FAA TO1-10 TO2-20****Pkg Model Identification ..... PI-QRH.ModID.20.1****General ..... PI-QRH.20.1**

Flight With Unreliable Airspeed / Turbulent Air

Penetration ..... PI-QRH.20.1

Max Climb %N1 ..... PI-QRH.20.4

Go-around %N1 ..... PI-QRH.20.5

VREF ..... PI-QRH.20.6

**Advisory Information..... PI-QRH.21.1**

Normal Configuration Landing Distance ..... PI-QRH.21.1

Non-Normal Configuration Landing Distance ..... PI-QRH.21.4

ADIRU/GPS DISAGREE (Flaps 25) ..... PI-QRH.21.4

ADIRU/GPS DISAGREE (Flaps 30) ..... PI-QRH.21.5

AIR DATA SYS (Flaps 20) ..... PI-QRH.21.6

Airspeed Unreliable (Flaps 20) ..... PI-QRH.21.7

ANTISKID (Flaps 25)..... PI-QRH.21.8

ANTISKID (Flaps 30)..... PI-QRH.21.9

ENG SHUTDOWN L, R (Flaps 20) ..... PI-QRH.21.10

ENG SHUTDOWN L, R (Flaps 30) ..... PI-QRH.21.11

FLAP / SLAT CONTROL (Flaps 20) ..... PI-QRH.21.12

FLAPS DRIVE (Flaps  $\leq 5$ ) ..... PI-QRH.21.13FLAPS DRIVE ( $5 < \text{Flaps} < 20$ ) ..... PI-QRH.21.14FLAPS DRIVE (Flaps  $\geq 20$ ) ..... PI-QRH.21.15

FLAPS PRIMARY FAIL (Flaps 20) ..... PI-QRH.21.16

FLIGHT CONTROL MODE (Flaps 20)..... PI-QRH.21.17

FLIGHT CONTROLS (Flaps 20) ..... PI-QRH.21.18

HYD PRESS SYS C (Flaps 20) ..... PI-QRH.21.19

HYD PRESS SYS L (Flaps 25)..... PI-QRH.21.20

HYD PRESS SYS L (Flaps 30)..... PI-QRH.21.21



777 Flight Crew Operations Manual

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|                                               |              |
|-----------------------------------------------|--------------|
| HYD PRESS SYS L+C (Flaps 20) .....            | PI-QRH.21.22 |
| HYD PRESS SYS L+R (Flaps 20) .....            | PI-QRH.21.23 |
| HYD PRESS SYS R (Flaps 25).....               | PI-QRH.21.24 |
| HYD PRESS SYS R (Flaps 30).....               | PI-QRH.21.25 |
| HYD PRESS SYS R+C (Flaps 20) .....            | PI-QRH.21.26 |
| NAV AIR DATA SYS (Flaps 20).....              | PI-QRH.21.27 |
| PITCH DOWN AUTHORITY (Flaps 25).....          | PI-QRH.21.28 |
| PITCH DOWN AUTHORITY (Flaps 30).....          | PI-QRH.21.29 |
| PITCH UP AUTHORITY (Flaps $\leq$ 15) .....    | PI-QRH.21.30 |
| PITCH UP AUTHORITY (Flaps $\geq$ 20) .....    | PI-QRH.21.31 |
| PRI FLIGHT COMPUTERS (Flaps 20) .....         | PI-QRH.21.32 |
| SLATS DRIVE (Flaps 20).....                   | PI-QRH.21.33 |
| SPOILERS (Flaps 25) .....                     | PI-QRH.21.34 |
| SPOILERS (Flaps 30) .....                     | PI-QRH.21.35 |
| STABILIZER (Flaps 20) .....                   | PI-QRH.21.36 |
| Recommended Brake Cooling Schedule. ....      | PI-QRH.21.37 |
| Approach or Landing Climb Limited Weight..... | PI-QRH.21.39 |

**Engine Inoperative .....PI-QRH.22.1**

|                                                 |              |
|-------------------------------------------------|--------------|
| Initial Max Continuous %N1 .....                | PI-QRH.22.1  |
| Max Continuous %N1.....                         | PI-QRH.22.2  |
| Driftdown Speed/Level Off Altitude.....         | PI-QRH.22.5  |
| Driftdown/LRC Cruise Range Capability.....      | PI-QRH.22.6  |
| Long Range Cruise Altitude Capability .....     | PI-QRH.22.7  |
| Long Range Cruise Control .....                 | PI-QRH.22.8  |
| Long Range Cruise Diversion Fuel and Time.....  | PI-QRH.22.9  |
| Holding .....                                   | PI-QRH.22.10 |
| Gear Down Landing Rate of Climb Available ..... | PI-QRH.22.11 |

**Gear Down.....PI-QRH.23.1**

|                                               |             |
|-----------------------------------------------|-------------|
| 220 KIAS Max Climb %N1 .....                  | PI-QRH.23.1 |
| Long Range Cruise Altitude Capability .....   | PI-QRH.23.2 |
| Long Range Cruise Control .....               | PI-QRH.23.3 |
| Long Range Cruise Enroute Fuel and Time ..... | PI-QRH.23.4 |



777 Flight Crew Operations Manual

---

|                                                 |                    |
|-------------------------------------------------|--------------------|
| Descent at VREF30 + 80 .....                    | PI-QRH.23.5        |
| Holding .....                                   | PI-QRH.23.6        |
| <b>Gear Down, Engine Inoperative .....</b>      | <b>PI-QRH.24.1</b> |
| Driftdown Speed/Level Off Altitude .....        | PI-QRH.24.1        |
| Long Range Cruise Altitude Capability .....     | PI-QRH.24.1        |
| Long Range Cruise Control .....                 | PI-QRH.24.2        |
| Long Range Cruise Diversion Fuel and Time ..... | PI-QRH.24.3        |
| Holding .....                                   | PI-QRH.24.4        |
| <b>Text .....</b>                               | <b>PI-QRH.25.1</b> |
| Introduction .....                              | PI-QRH.25.1        |
| General .....                                   | PI-QRH.25.1        |
| Advisory Information .....                      | PI-QRH.25.2        |
| Engine Inoperative .....                        | PI-QRH.25.4        |
| Gear Down .....                                 | PI-QRH.25.6        |



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**Performance Inflight - QRH**  
**Pkg Model Identification****Chapter PI-QRH**  
**Section 20****General**

The table below shows the airplanes that have been identified with the following performance package. Note, some airplanes may be identified with more than one performance package. This configuration table information reflects the Boeing delivered configuration updated for service bulletin incorporations in conformance with the policy stated in the introduction section of the FCOM. The performance data is prepared for the owner/operator named on the title page. The intent of this information is to assist flight crews and airlines in knowing which performance package is applicable to a given airplane. The performance package model identification information is based on Boeing's knowledge of the airline's fleet at a point in time approximately three months prior to the page date. Notice of Errata (NOE) will not be provided to airlines to identify airplanes that are moved between performance packages within this manual or airplanes added to the airline's fleet whose performance packages are already represented in this manual. These types of changes will be updated in the next block revision. Owners/operators are responsible for ensuring the operational documentation they are using is complete and matches the current configuration of their airplanes, and the accuracy and validity of all information furnished by the owner/operator or any other party. Owners/operators receiving active revision service are responsible to ensure that any modifications to the listed airplanes are properly reflected in this manual.

Airplane number is supplied by the operator. Registry number is supplied by the national regulatory agency. Serial and tabulation numbers are supplied by Boeing.

| <b>Airplane Number</b> | <b>Registry Number</b> | <b>Serial Number</b> | <b>Tabulation Number</b> |
|------------------------|------------------------|----------------------|--------------------------|
| 004                    | AP-BGY                 | 33781                | WD001                    |
| 005                    | AP-BGZ                 | 33782                | WD002                    |

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## Performance Inflight - QRH

## Chapter PI-QRH

## General

## Section 20

**Flight With Unreliable Airspeed / Turbulent Air Penetration**

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

**Climb****Flaps Up, Set Max Climb Thrust**

| PRESSURE ALTITUDE (FT)<br>(SPEED) |                                  | WEIGHT (1000 KG)    |                     |                     |                     |                     |
|-----------------------------------|----------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
|                                   |                                  | 150                 | 200                 | 250                 | 300                 | 350                 |
| 40000<br>(.82M)                   | <b>PITCH ATT</b><br>V/S (FT/MIN) | <b>5.0</b><br>2500  | <b>4.5</b><br>1500  |                     |                     |                     |
| 30000<br>(280 KIAS)               | <b>PITCH ATT</b><br>V/S (FT/MIN) | <b>6.5</b><br>3700  | <b>5.5</b><br>2600  | <b>5.5</b><br>1800  | <b>5.0</b><br>1300  | <b>4.5</b><br>900   |
| 20000<br>(270 KIAS)               | <b>PITCH ATT</b><br>V/S (FT/MIN) | <b>9.5</b><br>5000  | <b>8.5</b><br>3600  | <b>8.0</b><br>2700  | <b>7.5</b><br>2000  | <b>7.5</b><br>1400  |
| 10000<br>(270 KIAS)               | <b>PITCH ATT</b><br>V/S (FT/MIN) | <b>14.0</b><br>6700 | <b>11.5</b><br>4900 | <b>10.0</b><br>3700 | <b>9.5</b><br>2900  | <b>9.5</b><br>2200  |
| SEA LEVEL<br>(270 KIAS)           | <b>PITCH ATT</b><br>V/S (FT/MIN) | <b>17.5</b><br>7800 | <b>14.5</b><br>5700 | <b>12.5</b><br>4400 | <b>11.5</b><br>3500 | <b>11.0</b><br>2800 |

**Cruise****Flaps Up, %N1 for Level Flight**

| PRESSURE ALTITUDE (FT)<br>(SPEED) |                         | WEIGHT (1000 KG)   |                    |                    |                    |                    |
|-----------------------------------|-------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
|                                   |                         | 150                | 200                | 250                | 300                | 350                |
| 40000<br>(.82M)                   | <b>PITCH ATT</b><br>%N1 | <b>2.0</b><br>78.6 | <b>3.0</b><br>83.2 |                    |                    |                    |
| 35000<br>(.82M)                   | <b>PITCH ATT</b><br>%N1 | <b>1.5</b><br>76.5 | <b>2.0</b><br>78.9 | <b>3.0</b><br>82.8 | <b>3.5</b><br>88.0 |                    |
| 30000<br>(280 KIAS)               | <b>PITCH ATT</b><br>%N1 | <b>1.5</b><br>72.6 | <b>2.5</b><br>74.7 | <b>3.0</b><br>78.1 | <b>3.5</b><br>82.4 | <b>3.5</b><br>87.3 |
| 25000<br>(280 KIAS)               | <b>PITCH ATT</b><br>%N1 | <b>1.5</b><br>68.6 | <b>2.5</b><br>70.7 | <b>3.5</b><br>73.8 | <b>4.0</b><br>77.7 | <b>4.0</b><br>82.3 |
| 20000<br>(270 KIAS)               | <b>PITCH ATT</b><br>%N1 | <b>2.0</b><br>63.4 | <b>2.5</b><br>65.8 | <b>3.5</b><br>69.0 | <b>4.5</b><br>72.8 | <b>5.5</b><br>77.4 |
| 15000<br>(270 KIAS)               | <b>PITCH ATT</b><br>%N1 | <b>1.5</b><br>59.6 | <b>2.5</b><br>61.8 | <b>3.5</b><br>65.0 | <b>4.5</b><br>68.2 | <b>5.5</b><br>72.5 |

**Descent****Flaps Up, Set Idle Thrust**

| PRESSURE ALTITUDE (FT)<br>(SPEED) |                                  | WEIGHT (1000 KG)     |                      |                     |                     |                     |
|-----------------------------------|----------------------------------|----------------------|----------------------|---------------------|---------------------|---------------------|
|                                   |                                  | 150                  | 200                  | 250                 | 300                 | 350                 |
| 40000<br>(.82M)                   | <b>PITCH ATT</b><br>V/S (FT/MIN) | <b>-1.5</b><br>-2900 | <b>0.0</b><br>-2600  |                     |                     |                     |
| 30000<br>(280 KIAS)               | <b>PITCH ATT</b><br>V/S (FT/MIN) | <b>-1.5</b><br>-2500 | <b>-0.5</b><br>-2000 | <b>0.5</b><br>-1900 | <b>1.0</b><br>-1900 | <b>0.5</b><br>-2400 |
| 20000<br>(270 KIAS)               | <b>PITCH ATT</b><br>V/S (FT/MIN) | <b>-1.0</b><br>-1900 | <b>0.5</b><br>-1600  | <b>1.5</b><br>-1500 | <b>2.5</b><br>-1400 | <b>3.0</b><br>-1400 |
| 10000<br>(270 KIAS)               | <b>PITCH ATT</b><br>V/S (FT/MIN) | <b>-1.5</b><br>-1700 | <b>0.0</b><br>-1400  | <b>1.0</b><br>-1300 | <b>2.0</b><br>-1300 | <b>3.0</b><br>-1300 |
| SEA LEVEL<br>(270 KIAS)           | <b>PITCH ATT</b><br>V/S (FT/MIN) | <b>-2.0</b><br>-1500 | <b>-0.5</b><br>-1300 | <b>1.0</b><br>-1200 | <b>2.0</b><br>-1200 | <b>3.0</b><br>-1200 |

In shaded areas, data reflects the minimum speed limitation of 15 knots above minimum maneuvering speed.

## Flight With Unreliable Airspeed / Turbulent Air Penetration

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

### Holding

### Flaps Up, Set Thrust for Level Flight

| PRESSURE ALTITUDE (FT) |                  | WEIGHT (1000 KG) |            |            |            |            |
|------------------------|------------------|------------------|------------|------------|------------|------------|
|                        |                  | 150              | 200        | 250        | 300        | 350        |
| 10000                  | <b>PITCH ATT</b> | <b>3.0</b>       | <b>4.5</b> | <b>5.5</b> | <b>6.0</b> | <b>6.0</b> |
|                        | %N1              | 50.2             | 54.4       | 59.1       | 63.9       | 68.2       |
|                        | KIAS             | 216              | 216        | 226        | 244        | 262        |
| 5000                   | <b>PITCH ATT</b> | <b>3.0</b>       | <b>4.5</b> | <b>5.5</b> | <b>6.0</b> | <b>6.0</b> |
|                        | %N1              | 46.6             | 50.9       | 55.4       | 59.7       | 64.2       |
|                        | KIAS             | 216              | 216        | 226        | 244        | 262        |

## Terminal Area (5000 FT)

### %N1 for Level Flight

| FLAP POSITION<br>(VREF + INCREMENT)  |                  | WEIGHT (1000 KG) |            |            |            |            |
|--------------------------------------|------------------|------------------|------------|------------|------------|------------|
|                                      |                  | 150              | 200        | 250        | 300        | 350        |
| FLAPS UP<br>GEAR UP<br>(VREF30+80)   | <b>PITCH ATT</b> | <b>3.5</b>       | <b>5.0</b> | <b>6.0</b> | <b>6.0</b> | <b>6.5</b> |
|                                      | %N1              | 46.7             | 51.3       | 56.1       | 60.7       | 65.0       |
|                                      | KIAS             | 217              | 217        | 226        | 244        | 262        |
| FLAPS 1<br>GEAR UP<br>(VREF30+60)    | <b>PITCH ATT</b> | <b>5.0</b>       | <b>6.5</b> | <b>7.5</b> | <b>8.0</b> | <b>8.0</b> |
|                                      | %N1              | 47.5             | 52.4       | 57.6       | 62.6       | 66.8       |
|                                      | KIAS             | 197              | 197        | 206        | 224        | 242        |
| FLAPS 5<br>GEAR UP<br>(VREF30+40)    | <b>PITCH ATT</b> | <b>3.5</b>       | <b>5.5</b> | <b>6.5</b> | <b>6.5</b> | <b>6.5</b> |
|                                      | %N1              | 47.9             | 52.9       | 58.4       | 63.4       | 67.7       |
|                                      | KIAS             | 177              | 177        | 186        | 204        | 222        |
| FLAPS 15<br>GEAR UP<br>(VREF30+20)   | <b>PITCH ATT</b> | <b>3.5</b>       | <b>6.5</b> | <b>7.5</b> | <b>7.5</b> | <b>7.0</b> |
|                                      | %N1              | 48.0             | 54.1       | 60.5       | 65.3       | 69.8       |
|                                      | KIAS             | 157              | 157        | 166        | 184        | 202        |
| FLAPS 20<br>GEAR DOWN<br>(VREF30+20) | <b>PITCH ATT</b> | <b>2.0</b>       | <b>4.5</b> | <b>6.0</b> | <b>5.5</b> | <b>5.5</b> |
|                                      | %N1              | 55.2             | 60.2       | 66.1       | 71.7       | 76.6       |
|                                      | KIAS             | 157              | 157        | 166        | 184        | 202        |

## Final Approach (1500 FT)

### Gear Down, %N1 for 3° Glideslope

| FLAP POSITION<br>(VREF + INCREMENT) |                  | WEIGHT (1000 KG) |            |            |            |            |
|-------------------------------------|------------------|------------------|------------|------------|------------|------------|
|                                     |                  | 150              | 200        | 250        | 300        | 350        |
| FLAPS 20<br>(VREF20+10)             | <b>PITCH ATT</b> | <b>0.0</b>       | <b>1.5</b> | <b>2.0</b> | <b>2.0</b> | <b>2.5</b> |
|                                     | %N1              | 36.9             | 40.5       | 44.9       | 49.0       | 52.2       |
|                                     | KIAS             | 147              | 157        | 174        | 189        | 201        |
| FLAPS 25<br>(VREF25+10)             | <b>PITCH ATT</b> | <b>0.5</b>       | <b>1.5</b> | <b>1.5</b> | <b>1.5</b> | <b>2.0</b> |
|                                     | %N1              | 51.8             | 50.0       | 54.5       | 58.9       | 62.8       |
|                                     | KIAS             | 147              | 149        | 165        | 180        | 191        |
| FLAPS 30<br>(VREF30+10)             | <b>PITCH ATT</b> | <b>-0.5</b>      | <b>0.5</b> | <b>1.0</b> | <b>1.0</b> | <b>1.0</b> |
|                                     | %N1              | 57.2             | 56.3       | 60.1       | 65.3       | 70.9       |
|                                     | KIAS             | 147              | 147        | 156        | 174        | 192        |



**Flight With Unreliable Airspeed / Turbulent Air Penetration**

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

**Go-Around****Flaps 20, Gear Up, Set Go-Around Thrust**

| PRESSURE ALTITUDE (FT) |                  | WEIGHT (1000 KG) |             |             |             |             |
|------------------------|------------------|------------------|-------------|-------------|-------------|-------------|
|                        |                  | 150              | 200         | 250         | 300         | 350         |
| 10000                  | <b>PITCH ATT</b> | <b>22.0</b>      | <b>17.0</b> | <b>14.0</b> | <b>11.5</b> | <b>9.5</b>  |
|                        | V/S (FT/MIN)     | 4900             | 3600        | 2800        | 2200        | 1700        |
|                        | KIAS             | 136              | 151         | 167         | 185         | 203         |
| 5000                   | <b>PITCH ATT</b> | <b>25.5</b>      | <b>21.0</b> | <b>17.0</b> | <b>14.0</b> | <b>11.5</b> |
|                        | V/S (FT/MIN)     | 6400             | 4500        | 3600        | 2900        | 2400        |
|                        | KIAS             | 148              | 151         | 167         | 184         | 202         |
| SEA LEVEL              | <b>PITCH ATT</b> | <b>28.0</b>      | <b>23.0</b> | <b>19.0</b> | <b>15.5</b> | <b>13.0</b> |
|                        | V/S (FT/MIN)     | 7200             | 5100        | 4000        | 3300        | 2800        |
|                        | KIAS             | 157              | 157         | 166         | 184         | 202         |

## Max Climb %N1

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

| TAT<br>(°C) | PRESSURE ALTITUDE (1000 FT) / SPEED (KIAS OR MACH) |      |      |      |      |      |       |       |       |       |
|-------------|----------------------------------------------------|------|------|------|------|------|-------|-------|-------|-------|
|             | 0                                                  | 5    | 10   | 15   | 20   | 25   | 30    | 35    | 40    | 43    |
|             | 310                                                | 310  | 310  | 310  | 310  | 310  | 310   | .84   | .84   | .84   |
| 60          | 88.3                                               | 88.1 | 90.3 | 91.0 | 93.1 | 96.7 | 99.6  | 101.7 | 101.8 | 101.3 |
| 50          | 90.6                                               | 90.4 | 90.2 | 89.6 | 91.7 | 95.3 | 98.0  | 100.1 | 100.2 | 99.7  |
| 40          | 92.5                                               | 92.4 | 92.4 | 92.2 | 90.5 | 93.8 | 96.5  | 98.6  | 98.7  | 98.2  |
| 30          | 91.6                                               | 94.1 | 94.2 | 94.0 | 93.1 | 94.2 | 95.2  | 97.0  | 97.1  | 96.6  |
| 20          | 90.1                                               | 92.5 | 95.1 | 95.8 | 95.9 | 95.9 | 96.9  | 95.9  | 95.5  | 95.0  |
| 15          | 89.3                                               | 91.7 | 94.3 | 96.9 | 96.9 | 96.9 | 97.8  | 96.6  | 95.8  | 95.4  |
| 10          | 88.6                                               | 90.9 | 93.5 | 96.1 | 98.4 | 98.1 | 98.8  | 97.2  | 96.5  | 96.0  |
| 5           | 87.8                                               | 90.1 | 92.7 | 95.2 | 98.1 | 99.6 | 100.1 | 98.1  | 97.2  | 96.8  |
| 0           | 87.0                                               | 89.3 | 91.8 | 94.4 | 97.3 | 99.9 | 101.5 | 99.3  | 98.1  | 97.6  |
| -5          | 86.2                                               | 88.5 | 91.0 | 93.5 | 96.4 | 99.0 | 101.9 | 100.5 | 99.5  | 98.8  |
| -10         | 85.4                                               | 87.7 | 90.1 | 92.6 | 95.5 | 98.1 | 100.9 | 101.3 | 100.5 | 100.0 |
| -15         | 84.6                                               | 86.8 | 89.3 | 91.7 | 94.5 | 97.1 | 100.0 | 101.0 | 100.9 | 100.5 |
| -20         | 83.7                                               | 86.0 | 88.4 | 90.8 | 93.6 | 96.2 | 99.0  | 100.1 | 99.9  | 99.5  |
| -25         | 82.9                                               | 85.1 | 87.5 | 89.9 | 92.7 | 95.2 | 98.0  | 99.1  | 98.9  | 98.5  |
| -30         | 82.1                                               | 84.3 | 86.7 | 89.0 | 91.8 | 94.3 | 97.0  | 98.1  | 97.9  | 97.5  |
| -35         | 81.2                                               | 83.4 | 85.8 | 88.1 | 90.8 | 93.3 | 96.0  | 97.0  | 96.9  | 96.5  |
| -40         | 80.4                                               | 82.5 | 84.9 | 87.2 | 89.8 | 92.3 | 95.0  | 96.0  | 95.9  | 95.5  |

## %N1 Adjustments for Engine Bleed

| BLEED CONFIGURATION              | AIRPORT PRESSURE ALTITUDE (1000 FT) |      |      |      |      |      |      |      |      |      |
|----------------------------------|-------------------------------------|------|------|------|------|------|------|------|------|------|
|                                  | 0                                   | 5    | 10   | 15   | 20   | 25   | 30   | 35   | 40   | 43   |
| 2 PACKS ON - 1 BLEED SOURCE      | -0.4                                | -0.5 | -0.4 | -0.3 | -0.2 | -0.3 | -0.3 | -0.4 | -0.4 | -0.5 |
| 1 PACK ON - 1 OR 2 BLEED SOURCES | -0.4                                | -0.5 | -0.4 | -0.3 | -0.2 | -0.3 | -0.3 | -0.4 | -0.4 | -0.5 |
| ENGINE ANTI-ICE ON               | -0.3                                | -0.5 | -0.4 | -0.3 | -0.1 | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 |
| ENGINE AND WING ANTI-ICE ON*     | -0.6                                | -0.8 | -0.7 | -0.5 | -0.2 | -0.3 | -0.3 | -0.4 | -0.4 | -0.4 |
| ENGINE AND WING ANTI-ICE ON**    | -1.1                                | -0.9 | -0.9 | -0.6 | -0.3 | -0.4 | -0.5 | -0.5 | -0.6 | -0.6 |

\*Packs on or packs off with 2 bleed sources.

\*\*Packs off with 1 bleed source.

**Go-around %N1****Based on engine bleed for packs on, engine anti-ice on or off, and wing anti-ice off**

| REPORTED OAT |     | TAT | AIRPORT PRESSURE ALTITUDE (1000 FT) |       |       |       |       |       |       |       |       |       |       |       |       |
|--------------|-----|-----|-------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| °C           | °F  | °C  | -2                                  | -1    | 0     | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    |
| 66           | 150 | 70  | 93.2                                | 93.3  | 93.6  | 93.4  | 93.3  | 93.3  | 93.3  | 93.4  | 93.3  | 92.6  | 91.5  | 90.5  | 89.6  |
| 56           | 133 | 60  | 95.9                                | 96.1  | 96.4  | 96.2  | 96.1  | 96.1  | 96.1  | 96.2  | 96.1  | 95.4  | 94.3  | 93.4  | 92.5  |
| 51           | 124 | 55  | 97.2                                | 97.6  | 97.9  | 97.7  | 97.5  | 97.5  | 97.5  | 97.5  | 97.4  | 96.7  | 95.7  | 94.7  | 93.9  |
| 46           | 115 | 50  | 98.5                                | 98.9  | 99.3  | 99.2  | 98.9  | 98.8  | 98.8  | 98.8  | 98.7  | 98.0  | 97.0  | 96.1  | 95.2  |
| 41           | 106 | 45  | 99.6                                | 100.1 | 100.6 | 100.5 | 100.2 | 100.2 | 100.1 | 100.2 | 100.0 | 99.3  | 98.3  | 97.3  | 96.5  |
| 36           | 97  | 40  | 100.4                               | 101.6 | 102.4 | 102.3 | 101.9 | 101.8 | 101.7 | 101.7 | 101.3 | 100.5 | 99.5  | 98.6  | 97.8  |
| 31           | 88  | 35  | 99.6                                | 101.2 | 103.2 | 104.4 | 103.9 | 103.7 | 103.6 | 103.5 | 102.7 | 101.7 | 100.6 | 99.7  | 98.9  |
| 26           | 79  | 30  | 98.8                                | 100.4 | 102.3 | 103.8 | 105.1 | 105.9 | 105.9 | 106.1 | 105.0 | 103.4 | 101.9 | 100.8 | 100.0 |
| 21           | 70  | 25  | 97.9                                | 99.5  | 101.5 | 102.9 | 104.2 | 105.2 | 106.3 | 107.2 | 106.8 | 105.7 | 104.0 | 102.3 | 101.3 |
| 16           | 61  | 20  | 97.1                                | 98.7  | 100.6 | 102.0 | 103.3 | 104.3 | 105.4 | 106.5 | 106.8 | 106.3 | 105.2 | 104.2 | 103.3 |
| 11           | 53  | 15  | 96.3                                | 97.9  | 99.8  | 101.2 | 102.4 | 103.4 | 104.5 | 105.6 | 105.9 | 105.5 | 104.9 | 104.4 | 104.0 |
| 7            | 44  | 10  | 95.4                                | 97.0  | 98.9  | 100.3 | 101.5 | 102.5 | 103.6 | 104.6 | 105.0 | 104.6 | 104.0 | 103.5 | 103.4 |
| 2            | 35  | 5   | 94.6                                | 96.1  | 98.0  | 99.4  | 100.6 | 101.6 | 102.7 | 103.7 | 104.1 | 103.7 | 103.1 | 102.5 | 102.5 |
| -3           | 26  | 0   | 93.7                                | 95.3  | 97.1  | 98.5  | 99.7  | 100.7 | 101.7 | 102.8 | 103.1 | 102.7 | 102.1 | 101.6 | 101.6 |
| -13          | 8   | -10 | 92.0                                | 93.5  | 95.3  | 96.7  | 97.9  | 98.8  | 99.8  | 100.9 | 101.2 | 100.8 | 100.3 | 99.7  | 99.7  |
| -23          | -10 | -20 | 90.2                                | 91.7  | 93.5  | 94.8  | 96.0  | 96.9  | 97.9  | 98.9  | 99.3  | 98.9  | 98.3  | 97.8  | 97.8  |
| -33          | -27 | -30 | 88.4                                | 89.9  | 91.7  | 92.9  | 94.1  | 95.0  | 96.0  | 97.0  | 97.3  | 96.9  | 96.4  | 95.9  | 95.8  |
| -43          | -45 | -40 | 86.6                                | 88.0  | 89.7  | 91.0  | 92.1  | 93.0  | 94.0  | 95.0  | 95.3  | 94.9  | 94.4  | 93.9  | 93.9  |
| -53          | -63 | -50 | 84.7                                | 86.1  | 87.8  | 89.0  | 90.1  | 91.0  | 91.9  | 92.9  | 93.2  | 92.9  | 92.3  | 91.8  | 91.8  |

**%N1 Adjustments for Engine Bleed**

| BLEED CONFIGURATION | AIRPORT PRESSURE ALTITUDE (1000 FT) |      |      |      |      |      |      |      |      |      |      |      |      |
|---------------------|-------------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
|                     | -2                                  | -1   | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   |
| PACKS OFF           | 0.2                                 | 0.2  | 0.3  | 0.4  | 0.4  | 0.4  | 0.4  | 0.4  | 0.4  | 0.3  | 0.3  | 0.3  | 0.3  |
| 1 PACK ON           | -0.2                                | -0.2 | -0.3 | -0.4 | -0.4 | -0.4 | -0.4 | -0.4 | -0.4 | -0.3 | -0.3 | -0.3 | -0.3 |
| WING ANTI-ICE ON    | -0.2                                | -0.3 | -0.4 | -0.5 | -0.4 | -0.4 | -0.4 | -0.4 | -0.4 | -0.4 | -0.4 | -0.4 | -0.4 |

**VREF**

**Flaps 30**

| WEIGHT<br>(1000 KG) | VREF (KIAS)            |      |      |      |      |       |
|---------------------|------------------------|------|------|------|------|-------|
|                     | PRESSURE ALTITUDE (FT) |      |      |      |      |       |
|                     | 0                      | 2000 | 4000 | 6000 | 8000 | 10000 |
| 360                 | 184                    | 184  | 184  | 184  | 184  | 184   |
| 340                 | 180                    | 180  | 180  | 180  | 180  | 180   |
| 320                 | 173                    | 173  | 173  | 173  | 173  | 173   |
| 300                 | 164                    | 164  | 164  | 164  | 164  | 165   |
| 280                 | 158                    | 158  | 158  | 158  | 158  | 158   |
| 260                 | 149                    | 149  | 149  | 150  | 150  | 150   |
| 240                 | 143                    | 144  | 144  | 144  | 144  | 144   |
| 220                 | 137                    | 137  | 138  | 138  | 138  | 138   |
| 200                 | 137                    | 134  | 131  | 131  | 131  | 131   |
| 180                 | 137                    | 134  | 130  | 126  | 124  | 124   |
| 160                 | 137                    | 134  | 130  | 126  | 121  | 117   |

**Flaps 25**

| WEIGHT<br>(1000 KG) | VREF (KIAS)            |      |      |      |      |       |
|---------------------|------------------------|------|------|------|------|-------|
|                     | PRESSURE ALTITUDE (FT) |      |      |      |      |       |
|                     | 0                      | 2000 | 4000 | 6000 | 8000 | 10000 |
| 360                 | 183                    | 183  | 183  | 183  | 183  | 183   |
| 340                 | 180                    | 180  | 180  | 180  | 181  | 181   |
| 320                 | 175                    | 175  | 175  | 175  | 175  | 176   |
| 300                 | 169                    | 170  | 170  | 170  | 170  | 170   |
| 280                 | 164                    | 164  | 164  | 164  | 164  | 164   |
| 260                 | 158                    | 158  | 158  | 158  | 158  | 158   |
| 240                 | 152                    | 152  | 152  | 152  | 152  | 152   |
| 220                 | 145                    | 145  | 146  | 146  | 146  | 146   |
| 200                 | 139                    | 139  | 139  | 139  | 139  | 139   |
| 180                 | 137                    | 134  | 131  | 131  | 131  | 132   |
| 160                 | 137                    | 134  | 130  | 126  | 124  | 124   |

**Flaps 20**

| WEIGHT<br>(1000 KG) | VREF (KIAS)            |      |      |      |      |       |
|---------------------|------------------------|------|------|------|------|-------|
|                     | PRESSURE ALTITUDE (FT) |      |      |      |      |       |
|                     | 0                      | 2000 | 4000 | 6000 | 8000 | 10000 |
| 360                 | 193                    | 193  | 193  | 193  | 194  | 195   |
| 340                 | 190                    | 190  | 190  | 191  | 191  | 192   |
| 320                 | 185                    | 185  | 185  | 185  | 185  | 186   |
| 300                 | 179                    | 179  | 179  | 179  | 180  | 180   |
| 280                 | 173                    | 173  | 173  | 173  | 174  | 174   |
| 260                 | 167                    | 167  | 167  | 167  | 167  | 167   |
| 240                 | 160                    | 160  | 161  | 161  | 161  | 161   |
| 220                 | 154                    | 154  | 154  | 154  | 154  | 154   |
| 200                 | 147                    | 147  | 147  | 147  | 147  | 147   |
| 180                 | 139                    | 139  | 139  | 139  | 139  | 139   |
| 160                 | 137                    | 134  | 131  | 131  | 131  | 131   |



# Performance Inflight - QRH

## Advisory Information

# Chapter PI-QRH

## Section 21

### ADVISORY INFORMATION

#### Normal Configuration Landing Distance

#### Flaps 30

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                                   |                                         |                           |                        |                         |                                 |                          |           |
|--------------------------|--------------------------------------|---------------------------------------------------|-----------------------------------------|---------------------------|------------------------|-------------------------|---------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WEIGHT<br>ADJ                                     | ALT<br>ADJ                              | WIND<br>ADJ PER<br>10 KTS | SLOPE<br>ADJ<br>PER 1% | TEMP<br>ADJ<br>PER 10°C | APP<br>SPD<br>ADJ               | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 220000 KG<br>LANDING<br>WT           | PER<br>5000 KG<br>ABOVE/<br>BELOW<br>220000<br>KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | HEAD/<br>TAIL<br>WIND     | DOWN /<br>UP<br>HILL   | ABOVE/<br>BELOW<br>ISA  | PER<br>5 KTS<br>ABOVE<br>VREF30 | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |      |         |    |           |         |         |     |     |     |
|---------------|------|---------|----|-----------|---------|---------|-----|-----|-----|
| MAX MANUAL    | 910  | +25/0   | 20 | -35/+125  | +10/-10 | +20/-20 | 35  | 20  | 40  |
| AUTOBRAKE MAX | 1215 | +25/0   | 25 | -50/+180  | 0/0     | +30/-30 | 65  | 0   | 0   |
| AUTOBRAKE 4   | 1575 | +35/0   | 40 | -75/+255  | 0/0     | +40/-40 | 90  | 0   | 0   |
| AUTOBRAKE 3   | 1855 | +45/-10 | 45 | -90/+315  | 0/-10   | +50/-50 | 100 | 0   | 0   |
| AUTOBRAKE 2   | 2045 | +50/-20 | 60 | -105/+365 | +25/-45 | +55/-55 | 80  | 65  | 65  |
| AUTOBRAKE 1   | 2205 | +55/-25 | 70 | -120/+420 | +65/-70 | +60/-60 | 80  | 250 | 305 |

#### Good Reported Braking Action

|               |      |         |    |           |         |         |     |     |     |
|---------------|------|---------|----|-----------|---------|---------|-----|-----|-----|
| MAX MANUAL    | 1270 | +25/-5  | 30 | -60/+220  | +30/-25 | +30/-30 | 50  | 80  | 195 |
| AUTOBRAKE MAX | 1320 | +25/-5  | 35 | -65/+225  | +30/-20 | +30/-30 | 60  | 85  | 205 |
| AUTOBRAKE 4   | 1580 | +35/0   | 40 | -75/+260  | +10/-5  | +40/-40 | 90  | 5   | 35  |
| AUTOBRAKE 3   | 1855 | +45/-10 | 45 | -90/+315  | +5/-10  | +50/-50 | 100 | 0   | 0   |
| AUTOBRAKE 2   | 2045 | +50/-20 | 60 | -105/+365 | +25/-45 | +55/-55 | 80  | 65  | 65  |
| AUTOBRAKE 1   | 2205 | +55/-25 | 70 | -120/+420 | +65/-70 | +60/-60 | 80  | 250 | 305 |

#### Medium Reported Braking Action

|               |      |         |    |           |         |         |     |     |     |
|---------------|------|---------|----|-----------|---------|---------|-----|-----|-----|
| MAX MANUAL    | 1695 | +40/-15 | 50 | -95/+350  | +75/-60 | +45/-45 | 60  | 215 | 575 |
| AUTOBRAKE MAX | 1695 | +40/-15 | 50 | -95/+350  | +75/-60 | +45/-45 | 65  | 210 | 570 |
| AUTOBRAKE 4   | 1755 | +40/-5  | 50 | -100/+360 | +60/-35 | +50/-50 | 90  | 195 | 565 |
| AUTOBRAKE 3   | 1955 | +45/-10 | 50 | -105/+385 | +40/-35 | +55/-55 | 100 | 85  | 390 |
| AUTOBRAKE 2   | 2095 | +50/-20 | 60 | -115/+405 | +55/-65 | +60/-60 | 80  | 115 | 310 |
| AUTOBRAKE 1   | 2210 | +55/-25 | 70 | -125/+435 | +90/-70 | +60/-65 | 80  | 275 | 415 |

#### Poor Reported Braking Action

|               |      |         |    |           |           |         |     |     |      |
|---------------|------|---------|----|-----------|-----------|---------|-----|-----|------|
| MAX MANUAL    | 2145 | +50/-25 | 70 | -140/+540 | +165/-110 | +60/-60 | 70  | 445 | 1380 |
| AUTOBRAKE MAX | 2150 | +55/-25 | 70 | -140/+540 | +170/-115 | +60/-60 | 70  | 445 | 1385 |
| AUTOBRAKE 4   | 2150 | +55/-20 | 70 | -140/+540 | +170/-110 | +60/-60 | 75  | 445 | 1385 |
| AUTOBRAKE 3   | 2220 | +55/-20 | 70 | -140/+545 | +140/-90  | +65/-65 | 100 | 395 | 1340 |
| AUTOBRAKE 2   | 2320 | +55/-25 | 75 | -145/+560 | +145/-115 | +65/-65 | 80  | 345 | 1265 |
| AUTOBRAKE 1   | 2380 | +60/-30 | 80 | -150/+570 | +170/-120 | +70/-70 | 80  | 440 | 1220 |

Reference distance is for sea level, standard day, no wind or slope, VREF30, 2 engine 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.

Actual (unfactored) distances are shown.

Includes distance from 50 ft above threshold (305 meters of air distance).

## ADVISORY INFORMATION

### Normal Configuration Landing Distance

#### Flaps 25

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                                   |                                         |                           |                        |                         |                                 |                          |           |
|--------------------------|--------------------------------------|---------------------------------------------------|-----------------------------------------|---------------------------|------------------------|-------------------------|---------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WEIGHT<br>ADJ                                     | ALT<br>ADJ                              | WIND<br>ADJ PER<br>10 KTS | SLOPE<br>ADJ<br>PER 1% | TEMP<br>ADJ<br>PER 10°C | APP<br>SPD<br>ADJ               | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 220000 KG<br>LANDING<br>WT           | PER<br>5000 KG<br>ABOVE/<br>BELOW<br>220000<br>KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | HEAD/<br>TAIL<br>WIND     | DOWN /<br>UP<br>HILL   | ABOVE/<br>BELOW<br>ISA  | PER<br>5 KTS<br>ABOVE<br>VREF25 | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |      |         |    |           |         |         |     |     |     |
|---------------|------|---------|----|-----------|---------|---------|-----|-----|-----|
| MAX MANUAL    | 940  | +20/-5  | 20 | -35/+130  | +10/-10 | +20/-20 | 35  | 20  | 45  |
| AUTOBRAKE MAX | 1285 | +20/-5  | 30 | -55/+185  | 0/0     | +30/-30 | 65  | 0   | 0   |
| AUTOBRAKE 4   | 1670 | +30/-10 | 45 | -80/+265  | 0/0     | +45/-45 | 95  | 0   | 0   |
| AUTOBRAKE 3   | 1975 | +35/-15 | 55 | -95/+330  | 0/-15   | +55/-55 | 100 | 5   | 5   |
| AUTOBRAKE 2   | 2165 | +40/-25 | 70 | -110/+375 | +30/-50 | +60/-60 | 85  | 90  | 90  |
| AUTOBRAKE 1   | 2330 | +50/-30 | 80 | -125/+435 | +75/-75 | +65/-65 | 80  | 295 | 365 |

#### Good Reported Braking Action

|               |      |         |    |           |         |         |     |     |     |
|---------------|------|---------|----|-----------|---------|---------|-----|-----|-----|
| MAX MANUAL    | 1325 | +20/-10 | 35 | -65/+225  | +30/-30 | +35/-35 | 50  | 90  | 215 |
| AUTOBRAKE MAX | 1380 | +25/-10 | 35 | -65/+230  | +30/-20 | +35/-35 | 65  | 95  | 225 |
| AUTOBRAKE 4   | 1680 | +30/-10 | 45 | -80/+270  | +10/-5  | +45/-45 | 95  | 5   | 35  |
| AUTOBRAKE 3   | 1975 | +35/-15 | 55 | -95/+330  | +5/-15  | +55/-55 | 100 | 5   | 5   |
| AUTOBRAKE 2   | 2165 | +40/-25 | 70 | -110/+375 | +30/-50 | +60/-60 | 85  | 90  | 90  |
| AUTOBRAKE 1   | 2330 | +50/-30 | 80 | -125/+435 | +75/-75 | +65/-65 | 80  | 295 | 365 |

#### Medium Reported Braking Action

|               |      |         |    |           |         |         |     |     |     |
|---------------|------|---------|----|-----------|---------|---------|-----|-----|-----|
| MAX MANUAL    | 1775 | +35/-20 | 55 | -100/+360 | +75/-60 | +50/-50 | 60  | 235 | 635 |
| AUTOBRAKE MAX | 1775 | +35/-20 | 55 | -100/+360 | +80/-60 | +50/-50 | 65  | 235 | 630 |
| AUTOBRAKE 4   | 1855 | +35/-10 | 55 | -100/+370 | +55/-35 | +50/-50 | 95  | 195 | 610 |
| AUTOBRAKE 3   | 2075 | +35/-20 | 60 | -110/+395 | +40/-40 | +60/-60 | 100 | 90  | 410 |
| AUTOBRAKE 2   | 2220 | +40/-25 | 70 | -120/+420 | +65/-70 | +65/-65 | 85  | 145 | 350 |
| AUTOBRAKE 1   | 2340 | +50/-30 | 80 | -125/+445 | +95/-80 | +65/-65 | 80  | 315 | 480 |

#### Poor Reported Braking Action

|               |      |         |    |           |           |         |     |     |      |
|---------------|------|---------|----|-----------|-----------|---------|-----|-----|------|
| MAX MANUAL    | 2250 | +45/-30 | 80 | -145/+550 | +170/-115 | +65/-65 | 70  | 485 | 1535 |
| AUTOBRAKE MAX | 2255 | +50/-30 | 80 | -145/+550 | +175/-120 | +65/-65 | 70  | 490 | 1535 |
| AUTOBRAKE 4   | 2255 | +50/-30 | 80 | -145/+550 | +175/-110 | +65/-65 | 80  | 490 | 1535 |
| AUTOBRAKE 3   | 2350 | +45/-25 | 80 | -145/+560 | +145/-95  | +70/-70 | 100 | 415 | 1470 |
| AUTOBRAKE 2   | 2445 | +50/-35 | 85 | -150/+575 | +155/-120 | +70/-70 | 80  | 390 | 1395 |
| AUTOBRAKE 1   | 2510 | +55/-35 | 90 | -155/+585 | +175/-125 | +75/-75 | 80  | 490 | 1360 |

Reference distance is for sea level, standard day, no wind or slope, VREF25, 2 engine 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 55 m.

Actual (unfactored) distances are shown.

Includes distance from 50 ft above threshold (305 meters of air distance).



## ADVISORY INFORMATION

## Normal Configuration Landing Distance

## Flaps 20

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                                    |                                         |                           |                        |                         |                                 |                          |           |
|--------------------------|--------------------------------------|----------------------------------------------------|-----------------------------------------|---------------------------|------------------------|-------------------------|---------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WEIGHT<br>ADJ                                      | ALT<br>ADJ                              | WIND<br>ADJ PER<br>10 KTS | SLOPE<br>ADJ<br>PER 1% | TEMP<br>ADJ<br>PER 10°C | APP<br>SPD<br>ADJ               | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 220000 KG<br>LANDING<br>WT           | PER<br>5000 KG<br>ABOVE /<br>BELOW<br>220000<br>KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | HEAD/<br>TAIL<br>WIND     | DOWN /<br>UP<br>HILL   | ABOVE/<br>BELOW<br>ISA  | PER<br>5 KTS<br>ABOVE<br>VREF20 | ONE<br>REV               | NO<br>REV |

## Dry Runway

|               |      |         |    |           |         |         |     |     |     |
|---------------|------|---------|----|-----------|---------|---------|-----|-----|-----|
| MAX MANUAL    | 1005 | +25/-10 | 25 | -40/+135  | +10/-10 | +20/-20 | 35  | 25  | 55  |
| AUTOBRAKE MAX | 1390 | +20/-15 | 35 | -60/+195  | 0/0     | +35/-35 | 70  | 0   | 0   |
| AUTOBRAKE 4   | 1820 | +30/-20 | 50 | -80/+280  | 0/0     | +50/-50 | 100 | 0   | 0   |
| AUTOBRAKE 3   | 2160 | +40/-30 | 65 | -100/+345 | +5/-15  | +60/-60 | 105 | 5   | 5   |
| AUTOBRAKE 2   | 2370 | +45/-40 | 75 | -115/+395 | +35/-55 | +70/-70 | 90  | 105 | 105 |
| AUTOBRAKE 1   | 2560 | +55/-45 | 90 | -135/+455 | +80/-85 | +75/-75 | 90  | 345 | 420 |

## Good Reported Braking Action

|               |      |         |    |           |         |         |     |     |     |
|---------------|------|---------|----|-----------|---------|---------|-----|-----|-----|
| MAX MANUAL    | 1430 | +25/-20 | 40 | -65/+230  | +35/-30 | +35/-35 | 50  | 105 | 250 |
| AUTOBRAKE MAX | 1485 | +25/-20 | 40 | -70/+240  | +30/-20 | +40/-40 | 65  | 105 | 265 |
| AUTOBRAKE 4   | 1825 | +30/-20 | 50 | -85/+285  | +10/0   | +50/-50 | 100 | 10  | 40  |
| AUTOBRAKE 3   | 2160 | +40/-30 | 65 | -100/+345 | +5/-15  | +60/-60 | 105 | 5   | 5   |
| AUTOBRAKE 2   | 2370 | +45/-40 | 75 | -115/+395 | +35/-55 | +70/-70 | 90  | 105 | 105 |
| AUTOBRAKE 1   | 2560 | +55/-45 | 90 | -135/+455 | +80/-85 | +75/-75 | 90  | 345 | 420 |

## Medium Reported Braking Action

|               |      |         |    |           |          |         |     |     |     |
|---------------|------|---------|----|-----------|----------|---------|-----|-----|-----|
| MAX MANUAL    | 1925 | +35/-30 | 65 | -105/+375 | +85/-65  | +55/-55 | 65  | 275 | 750 |
| AUTOBRAKE MAX | 1925 | +40/-30 | 65 | -105/+375 | +85/-65  | +55/-55 | 70  | 270 | 745 |
| AUTOBRAKE 4   | 2010 | +40/-25 | 65 | -105/+385 | +60/-40  | +55/-60 | 100 | 225 | 710 |
| AUTOBRAKE 3   | 2260 | +40/-35 | 70 | -115/+415 | +45/-45  | +65/-65 | 105 | 100 | 490 |
| AUTOBRAKE 2   | 2425 | +50/-40 | 80 | -125/+440 | +65/-75  | +70/-70 | 90  | 160 | 410 |
| AUTOBRAKE 1   | 2565 | +55/-45 | 95 | -135/+470 | +100/-90 | +75/-75 | 90  | 370 | 550 |

## Poor Reported Braking Action

|               |      |         |     |           |           |         |     |     |      |
|---------------|------|---------|-----|-----------|-----------|---------|-----|-----|------|
| MAX MANUAL    | 2450 | +55/-45 | 90  | -150/+570 | +185/-125 | +70/-70 | 75  | 565 | 1815 |
| AUTOBRAKE MAX | 2455 | +55/-45 | 90  | -150/+570 | +190/-130 | +70/-70 | 75  | 565 | 1815 |
| AUTOBRAKE 4   | 2455 | +55/-40 | 90  | -150/+570 | +190/-120 | +70/-70 | 80  | 565 | 1815 |
| AUTOBRAKE 3   | 2550 | +55/-40 | 90  | -155/+580 | +160/-100 | +75/-75 | 105 | 480 | 1740 |
| AUTOBRAKE 2   | 2665 | +55/-45 | 95  | -160/+595 | +165/-125 | +80/-80 | 90  | 445 | 1650 |
| AUTOBRAKE 1   | 2745 | +60/-50 | 100 | -165/+610 | +190/-140 | +80/-80 | 85  | 565 | 1600 |

Reference distance is for sea level, standard day, no wind or slope, VREF20, 2 engine 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 55 m.

Actual (unfactored) distances are shown.

Includes distance from 50 ft above threshold (305 meters of air distance).

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**ADIRU/GPS DISAGREE (Flaps 25)**

**VREF25**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 220000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>220000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |                       |       |    |         |        |        |    |    |     |
|---------------|-----------------------|-------|----|---------|--------|--------|----|----|-----|
| MAX MANUAL    | 1155                  | 35/-5 | 30 | -50/180 | 20/-20 | 25/-25 | 45 | 50 | 120 |
| AUTOBRAKE MAX | Autobrake Inoperative |       |    |         |        |        |    |    |     |
| AUTOBRAKE 2   | Autobrake Inoperative |       |    |         |        |        |    |    |     |

**Good Reported Braking Action**

|               |                       |        |    |         |        |        |    |     |     |
|---------------|-----------------------|--------|----|---------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1600                  | 30/-15 | 45 | -85/300 | 55/-45 | 40/-40 | 55 | 165 | 430 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |         |        |        |    |     |     |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |         |        |        |    |     |     |

**Medium Reported Braking Action**

|               |                       |        |    |          |         |        |    |     |      |
|---------------|-----------------------|--------|----|----------|---------|--------|----|-----|------|
| MAX MANUAL    | 2020                  | 40/-25 | 65 | -120/450 | 115/-85 | 55/-55 | 65 | 345 | 1010 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |          |         |        |    |     |      |
| AUTOBRAKE 3   | Autobrake Inoperative |        |    |          |         |        |    |     |      |

**Poor Reported Braking Action**

|               |                       |        |    |          |          |        |    |     |      |
|---------------|-----------------------|--------|----|----------|----------|--------|----|-----|------|
| MAX MANUAL    | 2590                  | 60/-40 | 95 | -180/725 | 310/-170 | 75/-75 | 75 | 755 | 2845 |
| 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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.



## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### ADIRU/GPS DISAGREE (Flaps 30)

#### VREF30

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 220000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>220000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |                       |       |    |         |        |        |    |    |     |
|---------------|-----------------------|-------|----|---------|--------|--------|----|----|-----|
| MAX MANUAL    | 1110                  | 35/-5 | 25 | -50/175 | 20/-20 | 25/-25 | 40 | 45 | 110 |
| AUTOBRAKE MAX | Autobrake Inoperative |       |    |         |        |        |    |    |     |
| AUTOBRAKE 2   | Autobrake Inoperative |       |    |         |        |        |    |    |     |

#### Good Reported Braking Action

|               |                       |        |    |         |        |        |    |     |     |
|---------------|-----------------------|--------|----|---------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1530                  | 35/-10 | 40 | -80/295 | 55/-45 | 40/-40 | 55 | 150 | 395 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |         |        |        |    |     |     |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |         |        |        |    |     |     |

#### Medium Reported Braking Action

|               |                       |        |    |          |         |        |    |     |     |
|---------------|-----------------------|--------|----|----------|---------|--------|----|-----|-----|
| MAX MANUAL    | 1925                  | 45/-20 | 60 | -115/440 | 110/-80 | 50/-55 | 65 | 320 | 920 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |          |         |        |    |     |     |
| AUTOBRAKE 3   | Autobrake Inoperative |        |    |          |         |        |    |     |     |

#### Poor Reported Braking Action

|               |                       |        |    |          |          |        |    |     |      |
|---------------|-----------------------|--------|----|----------|----------|--------|----|-----|------|
| MAX MANUAL    | 2465                  | 60/-30 | 85 | -175/710 | 300/-160 | 70/-70 | 75 | 695 | 2580 |
| 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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**AIR DATA SYS (Flaps 20)**

**VREF20**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 220000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>220000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |      |        |    |          |        |        |     |    |    |
|---------------|------|--------|----|----------|--------|--------|-----|----|----|
| MAX MANUAL    | 1160 | 25/-10 | 25 | -45/150  | 15/-15 | 25/-25 | 50  | 35 | 75 |
| AUTOBRAKE MAX | 1390 | 20/-15 | 35 | -60/195  | 0/0    | 35/-35 | 70  | 0  | 0  |
| AUTOBRAKE 2   | 2455 | 45/-40 | 75 | -120/405 | 15/-35 | 70/-70 | 120 | 25 | 25 |

**Good Reported Braking Action**

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1625 | 25/-20 | 45 | -75/255  | 45/-35 | 40/-40 | 65  | 135 | 335 |
| AUTOBRAKE MAX | 1600 | 25/-20 | 45 | -75/250  | 40/-35 | 40/-40 | 70  | 130 | 325 |
| AUTOBRAKE 2   | 2455 | 45/-40 | 75 | -120/405 | 15/-35 | 70/-70 | 120 | 25  | 25  |

**Medium Reported Braking Action**

|               |      |        |    |          |         |        |     |     |     |
|---------------|------|--------|----|----------|---------|--------|-----|-----|-----|
| MAX MANUAL    | 2150 | 40/-35 | 70 | -110/400 | 100/-80 | 60/-60 | 80  | 345 | 985 |
| AUTOBRAKE MAX | 2135 | 40/-35 | 70 | -110/400 | 105/-85 | 60/-60 | 80  | 340 | 975 |
| AUTOBRAKE 3   | 2310 | 40/-30 | 70 | -120/420 | 60/-40  | 65/-70 | 120 | 180 | 815 |

**Poor Reported Braking Action**

|               |      |        |     |          |          |        |     |     |      |
|---------------|------|--------|-----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2705 | 60/-50 | 100 | -160/605 | 210/-145 | 80/-80 | 90  | 695 | 2370 |
| AUTOBRAKE MAX | 2700 | 60/-50 | 100 | -160/605 | 220/-150 | 80/-80 | 90  | 695 | 2370 |
| AUTOBRAKE 3   | 2730 | 60/-45 | 100 | -160/605 | 205/-130 | 80/-80 | 105 | 665 | 2340 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.



## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### Airspeed Unreliable (Flaps 20)

#### VREF20

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 220000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>220000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |      |        |    |          |        |        |     |    |    |
|---------------|------|--------|----|----------|--------|--------|-----|----|----|
| MAX MANUAL    | 1255 | 30/-15 | 30 | -45/155  | 15/-15 | 30/-30 | N/A | 40 | 90 |
| AUTOBRAKE MAX | 1525 | 20/-15 | 40 | -60/205  | 0/0    | 40/-40 | N/A | 0  | 0  |
| AUTOBRAKE 2   | 2690 | 50/-45 | 85 | -125/425 | 30/-45 | 80/-80 | N/A | 70 | 70 |

#### Good Reported Braking Action

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1755 | 30/-25 | 50 | -75/265  | 45/-40 | 45/-45 | N/A | 155 | 385 |
| AUTOBRAKE MAX | 1740 | 30/-20 | 50 | -75/265  | 45/-40 | 45/-45 | N/A | 150 | 380 |
| AUTOBRAKE 2   | 2690 | 50/-45 | 85 | -125/425 | 30/-45 | 80/-80 | N/A | 70  | 70  |

#### Medium Reported Braking Action

|               |      |        |    |          |         |        |     |     |      |
|---------------|------|--------|----|----------|---------|--------|-----|-----|------|
| MAX MANUAL    | 2315 | 45/-35 | 80 | -115/415 | 105/-85 | 65/-65 | N/A | 380 | 1090 |
| AUTOBRAKE MAX | 2300 | 45/-35 | 80 | -115/410 | 110/-90 | 65/-65 | N/A | 380 | 1080 |
| AUTOBRAKE 3   | 2550 | 45/-35 | 75 | -125/440 | 60/-50  | 75/-75 | N/A | 165 | 855  |

#### Poor Reported Braking Action

|               |      |        |     |          |          |        |     |     |      |
|---------------|------|--------|-----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2885 | 60/-50 | 110 | -165/620 | 220/-150 | 85/-85 | N/A | 745 | 2535 |
| AUTOBRAKE MAX | 2885 | 60/-50 | 110 | -165/620 | 225/-155 | 85/-85 | N/A | 745 | 2535 |
| AUTOBRAKE 3   | 2945 | 60/-50 | 105 | -170/625 | 205/-135 | 90/-90 | N/A | 685 | 2475 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**ANTISKID (Flaps 25)**

**VREF25**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 220000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>220000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |                       |        |    |          |        |        |    |     |     |
|---------------|-----------------------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1775                  | 35/-20 | 55 | -100/360 | 75/-60 | 50/-50 | 60 | 235 | 635 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |          |        |        |    |     |     |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |          |        |        |    |     |     |

**Good Reported Braking Action**

|               |                       |        |    |          |        |        |    |     |     |
|---------------|-----------------------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1775                  | 35/-20 | 55 | -100/360 | 75/-60 | 50/-50 | 60 | 235 | 635 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |          |        |        |    |     |     |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |          |        |        |    |     |     |

**Medium Reported Braking Action**

|               |                       |        |    |          |          |        |    |     |      |
|---------------|-----------------------|--------|----|----------|----------|--------|----|-----|------|
| MAX MANUAL    | 2250                  | 45/-30 | 80 | -145/550 | 170/-115 | 65/-65 | 70 | 485 | 1535 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |          |          |        |    |     |      |
| AUTOBRAKE 3   | Autobrake Inoperative |        |    |          |          |        |    |     |      |

**Poor Reported Braking Action**

|               |                       |        |     |           |          |        |    |      |      |
|---------------|-----------------------|--------|-----|-----------|----------|--------|----|------|------|
| MAX MANUAL    | 3005                  | 70/-50 | 115 | -235/1010 | 900/-260 | 90/-90 | 80 | 1335 | 2675 |
| 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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### ANTISKID (Flaps 30)

#### VREF30

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 220000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>220000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |                       |        |    |         |        |        |    |     |     |
|---------------|-----------------------|--------|----|---------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1695                  | 40/-15 | 50 | -95/350 | 75/-60 | 45/-45 | 60 | 215 | 575 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |         |        |        |    |     |     |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |         |        |        |    |     |     |

#### Good Reported Braking Action

|               |                       |        |    |         |        |        |    |     |     |
|---------------|-----------------------|--------|----|---------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1695                  | 40/-15 | 50 | -95/350 | 75/-60 | 45/-45 | 60 | 215 | 575 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |         |        |        |    |     |     |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |         |        |        |    |     |     |

#### Medium Reported Braking Action

|               |                       |        |    |          |          |        |    |     |      |
|---------------|-----------------------|--------|----|----------|----------|--------|----|-----|------|
| MAX MANUAL    | 2145                  | 50/-25 | 70 | -140/540 | 165/-110 | 60/-60 | 70 | 445 | 1380 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |          |          |        |    |     |      |
| AUTOBRAKE 3   | Autobrake Inoperative |        |    |          |          |        |    |     |      |

#### Poor Reported Braking Action

|               |                       |        |     |          |          |        |    |      |      |
|---------------|-----------------------|--------|-----|----------|----------|--------|----|------|------|
| MAX MANUAL    | 2865                  | 75/-40 | 105 | -230/990 | 865/-250 | 85/-85 | 75 | 1240 | 2480 |
| 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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**ENG SHUTDOWN L, R (Flaps 20)**

**VREF20**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 220000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>220000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |      |        |    |          |        |        |     |   |    |
|---------------|------|--------|----|----------|--------|--------|-----|---|----|
| MAX MANUAL    | 1015 | 30/-10 | 25 | -40/135  | 15/-10 | 25/-25 | 35  | 0 | 30 |
| AUTOBRAKE MAX | 1390 | 20/-15 | 35 | -60/195  | 0/0    | 35/-35 | 70  | 0 | 0  |
| AUTOBRAKE 2   | 2470 | 45/-35 | 75 | -120/405 | 5/-25  | 75/-75 | 125 | 0 | 0  |

**Good Reported Braking Action**

|               |      |        |    |          |        |        |     |   |     |
|---------------|------|--------|----|----------|--------|--------|-----|---|-----|
| MAX MANUAL    | 1495 | 25/-20 | 40 | -70/245  | 40/-35 | 40/-40 | 55  | 0 | 140 |
| AUTOBRAKE MAX | 1560 | 25/-20 | 45 | -70/250  | 40/-35 | 40/-40 | 65  | 0 | 150 |
| AUTOBRAKE 2   | 2470 | 45/-35 | 75 | -120/405 | 5/-25  | 75/-75 | 125 | 0 | 0   |

**Medium Reported Braking Action**

|               |      |        |    |          |         |        |     |   |     |
|---------------|------|--------|----|----------|---------|--------|-----|---|-----|
| MAX MANUAL    | 2115 | 40/-35 | 65 | -115/410 | 110/-85 | 60/-60 | 75  | 0 | 430 |
| AUTOBRAKE MAX | 2110 | 40/-35 | 70 | -115/410 | 115/-80 | 60/-60 | 85  | 0 | 430 |
| AUTOBRAKE 3   | 2315 | 45/-30 | 70 | -120/435 | 70/-50  | 70/-70 | 115 | 0 | 320 |

**Poor Reported Braking Action**

|               |      |        |     |          |          |        |     |   |      |
|---------------|------|--------|-----|----------|----------|--------|-----|---|------|
| MAX MANUAL    | 2835 | 60/-50 | 100 | -175/655 | 275/-180 | 85/-85 | 95  | 0 | 1060 |
| AUTOBRAKE MAX | 2835 | 60/-50 | 100 | -175/655 | 275/-180 | 85/-85 | 95  | 0 | 1060 |
| AUTOBRAKE 3   | 2865 | 60/-50 | 100 | -175/660 | 265/-165 | 85/-85 | 105 | 0 | 1070 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### ENG SHUTDOWN L, R (Flaps 30)

#### VREF30

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 220000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>220000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |      |        |    |          |        |        |     |   |    |
|---------------|------|--------|----|----------|--------|--------|-----|---|----|
| MAX MANUAL    | 915  | 25/0   | 20 | -35/125  | 10/-10 | 20/-20 | 35  | 0 | 20 |
| AUTOBRAKE MAX | 1215 | 25/0   | 25 | -50/180  | 0/0    | 30/-30 | 60  | 0 | 0  |
| AUTOBRAKE 2   | 2100 | 50/-10 | 55 | -110/370 | 10/-20 | 60/-60 | 110 | 0 | 0  |

#### Good Reported Braking Action

|               |      |        |    |          |        |        |     |   |     |
|---------------|------|--------|----|----------|--------|--------|-----|---|-----|
| MAX MANUAL    | 1315 | 25/-5  | 30 | -65/230  | 35/-30 | 35/-35 | 55  | 0 | 105 |
| AUTOBRAKE MAX | 1375 | 30/-5  | 35 | -65/235  | 35/-30 | 35/-35 | 60  | 0 | 115 |
| AUTOBRAKE 2   | 2100 | 50/-10 | 55 | -110/370 | 10/-20 | 60/-60 | 110 | 0 | 0   |

#### Medium Reported Braking Action

|               |      |        |    |          |        |        |     |   |     |
|---------------|------|--------|----|----------|--------|--------|-----|---|-----|
| MAX MANUAL    | 1830 | 40/-15 | 50 | -105/380 | 95/-75 | 50/-50 | 70  | 0 | 325 |
| AUTOBRAKE MAX | 1835 | 45/-10 | 55 | -105/380 | 95/-70 | 50/-50 | 80  | 0 | 320 |
| AUTOBRAKE 3   | 1995 | 45/-5  | 55 | -110/400 | 65/-50 | 55/-55 | 100 | 0 | 250 |

#### Poor Reported Braking Action

|               |      |        |    |          |          |        |    |   |     |
|---------------|------|--------|----|----------|----------|--------|----|---|-----|
| MAX MANUAL    | 2430 | 60/-25 | 80 | -160/610 | 235/-150 | 70/-70 | 85 | 0 | 790 |
| AUTOBRAKE MAX | 2435 | 60/-25 | 80 | -160/610 | 240/-155 | 70/-70 | 85 | 0 | 790 |
| AUTOBRAKE 3   | 2465 | 60/-20 | 80 | -160/615 | 230/-145 | 75/-75 | 90 | 0 | 800 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**FLAP / SLAT CONTROL (Flaps 20)**

**VREF20**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 220000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>220000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |      |        |    |          |        |        |    |     |     |
|---------------|------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1005 | 25/-10 | 25 | -40/135  | 10/-10 | 20/-20 | 35 | 25  | 55  |
| AUTOBRAKE MAX | 1390 | 20/-15 | 35 | -60/195  | 0/0    | 35/-35 | 70 | 0   | 0   |
| AUTOBRAKE 2   | 2375 | 45/-40 | 75 | -115/395 | 35/-55 | 70/-70 | 90 | 105 | 105 |

**Good Reported Braking Action**

|               |      |        |    |          |        |        |    |     |     |
|---------------|------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1430 | 25/-20 | 40 | -65/230  | 35/-30 | 35/-35 | 50 | 105 | 250 |
| AUTOBRAKE MAX | 1485 | 25/-20 | 40 | -70/240  | 30/-20 | 40/-40 | 65 | 105 | 265 |
| AUTOBRAKE 2   | 2375 | 45/-40 | 75 | -115/395 | 35/-55 | 70/-70 | 90 | 105 | 105 |

**Medium Reported Braking Action**

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1925 | 35/-30 | 60 | -105/375 | 85/-65 | 55/-55 | 65  | 275 | 750 |
| AUTOBRAKE MAX | 1925 | 35/-30 | 65 | -105/375 | 85/-65 | 55/-55 | 70  | 270 | 745 |
| AUTOBRAKE 3   | 2260 | 40/-35 | 70 | -115/415 | 45/-45 | 65/-65 | 105 | 100 | 490 |

**Poor Reported Braking Action**

|               |      |        |    |          |          |        |     |     |      |
|---------------|------|--------|----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2450 | 55/-45 | 90 | -150/570 | 185/-125 | 70/-70 | 75  | 565 | 1815 |
| AUTOBRAKE MAX | 2455 | 55/-45 | 90 | -150/570 | 190/-130 | 70/-70 | 75  | 565 | 1815 |
| AUTOBRAKE 3   | 2550 | 55/-40 | 90 | -155/580 | 160/-100 | 75/-75 | 105 | 480 | 1740 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.



## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### FLAPS DRIVE (Flaps ≤ 5)

#### VREF30 + 40

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 220000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>220000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |      |        |     |          |        |        |     |     |     |
|---------------|------|--------|-----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1150 | 45/-5  | 25  | -40/140  | 15/-10 | 25/-25 | 35  | 35  | 75  |
| AUTOBRAKE MAX | 1755 | 30/0   | 40  | -65/220  | 0/0    | 45/-50 | 80  | 0   | 0   |
| AUTOBRAKE 2   | 2945 | 65/-35 | 100 | -130/440 | 60/-70 | 85/-85 | 100 | 295 | 295 |

#### Good Reported Braking Action

|               |      |        |     |          |        |        |     |     |     |
|---------------|------|--------|-----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1670 | 30/-10 | 45  | -70/245  | 40/-35 | 45/-45 | 50  | 145 | 360 |
| AUTOBRAKE MAX | 1825 | 30/0   | 45  | -75/260  | 15/-10 | 50/-50 | 80  | 75  | 300 |
| AUTOBRAKE 2   | 2945 | 65/-35 | 100 | -130/440 | 60/-70 | 85/-85 | 100 | 295 | 295 |

#### Medium Reported Braking Action

|               |      |        |    |          |        |        |     |     |      |
|---------------|------|--------|----|----------|--------|--------|-----|-----|------|
| MAX MANUAL    | 2280 | 45/-20 | 75 | -110/400 | 90/-75 | 65/-65 | 65  | 385 | 1120 |
| AUTOBRAKE MAX | 2270 | 50/-20 | 75 | -110/400 | 95/-70 | 65/-65 | 75  | 380 | 1105 |
| AUTOBRAKE 3   | 2825 | 55/-25 | 85 | -130/460 | 65/-60 | 85/-85 | 110 | 170 | 675  |

#### Poor Reported Braking Action

|               |      |        |     |          |          |        |     |     |      |
|---------------|------|--------|-----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2910 | 65/-35 | 105 | -160/605 | 200/-140 | 85/-85 | 80  | 790 | 2800 |
| AUTOBRAKE MAX | 2910 | 65/-35 | 110 | -160/605 | 205/-140 | 85/-85 | 80  | 790 | 2800 |
| AUTOBRAKE 3   | 3115 | 70/-35 | 110 | -170/625 | 180/-120 | 95/-95 | 105 | 610 | 2620 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**FLAPS DRIVE (5 < Flaps < 20)**

**VREF30 + 20**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 220000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>220000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1045 | 35/-5  | 20 | -40/135  | 15/-10 | 25/-25 | 35  | 30  | 65  |
| AUTOBRAKE MAX | 1470 | 25/0   | 35 | -60/200  | 0/0    | 40/-40 | 70  | 0   | 0   |
| AUTOBRAKE 2   | 2515 | 55/-25 | 75 | -120/405 | 35/-50 | 75/-75 | 100 | 125 | 125 |

**Good Reported Braking Action**

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1500 | 30/-10 | 40 | -70/235  | 35/-30 | 40/-40 | 55  | 115 | 290 |
| AUTOBRAKE MAX | 1555 | 30/0   | 40 | -70/240  | 30/-15 | 40/-40 | 70  | 115 | 295 |
| AUTOBRAKE 2   | 2515 | 55/-25 | 75 | -120/405 | 35/-50 | 75/-75 | 100 | 125 | 125 |

**Medium Reported Braking Action**

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 2030 | 45/-20 | 65 | -105/380 | 85/-70 | 55/-55 | 70  | 315 | 890 |
| AUTOBRAKE MAX | 2025 | 45/-15 | 65 | -105/380 | 90/-70 | 55/-55 | 70  | 310 | 880 |
| AUTOBRAKE 3   | 2390 | 50/-15 | 65 | -120/425 | 45/-45 | 70/-70 | 110 | 110 | 590 |

**Poor Reported Braking Action**

|               |      |        |    |          |          |        |     |     |      |
|---------------|------|--------|----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2585 | 60/-30 | 90 | -155/585 | 190/-130 | 75/-75 | 80  | 645 | 2190 |
| AUTOBRAKE MAX | 2590 | 60/-30 | 90 | -155/585 | 195/-135 | 75/-75 | 80  | 650 | 2190 |
| AUTOBRAKE 3   | 2690 | 65/-25 | 90 | -160/595 | 175/-105 | 80/-80 | 105 | 550 | 2095 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### FLAPS DRIVE (Flaps ≥ 20)

#### VREF20

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 220000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>220000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |      |        |    |          |        |        |    |     |     |
|---------------|------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1005 | 25/-10 | 25 | -40/135  | 10/-10 | 20/-20 | 35 | 25  | 55  |
| AUTOBRAKE MAX | 1390 | 20/-15 | 35 | -60/195  | 0/0    | 35/-35 | 70 | 0   | 0   |
| AUTOBRAKE 2   | 2375 | 45/-40 | 75 | -115/395 | 35/-55 | 70/-70 | 90 | 105 | 105 |

#### Good Reported Braking Action

|               |      |        |    |          |        |        |    |     |     |
|---------------|------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1430 | 25/-20 | 40 | -65/230  | 35/-30 | 35/-35 | 50 | 105 | 250 |
| AUTOBRAKE MAX | 1485 | 25/-20 | 40 | -70/240  | 30/-20 | 40/-40 | 65 | 105 | 265 |
| AUTOBRAKE 2   | 2375 | 45/-40 | 75 | -115/395 | 35/-55 | 70/-70 | 90 | 105 | 105 |

#### Medium Reported Braking Action

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1925 | 35/-30 | 60 | -105/375 | 85/-65 | 55/-55 | 65  | 275 | 750 |
| AUTOBRAKE MAX | 1925 | 35/-30 | 65 | -105/375 | 85/-65 | 55/-55 | 70  | 270 | 745 |
| AUTOBRAKE 3   | 2260 | 40/-35 | 70 | -115/415 | 45/-45 | 65/-65 | 105 | 100 | 490 |

#### Poor Reported Braking Action

|               |      |        |    |          |          |        |     |     |      |
|---------------|------|--------|----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2450 | 55/-45 | 90 | -150/570 | 185/-125 | 70/-70 | 75  | 565 | 1815 |
| AUTOBRAKE MAX | 2455 | 55/-45 | 90 | -150/570 | 190/-130 | 70/-70 | 75  | 565 | 1815 |
| AUTOBRAKE 3   | 2550 | 55/-40 | 90 | -155/580 | 160/-100 | 75/-75 | 105 | 480 | 1740 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**FLAPS PRIMARY FAIL (Flaps 20)**

**VREF20**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 220000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>220000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |      |        |    |          |        |        |     |    |    |
|---------------|------|--------|----|----------|--------|--------|-----|----|----|
| MAX MANUAL    | 1145 | 25/-10 | 25 | -45/150  | 15/-15 | 25/-25 | 45  | 30 | 70 |
| AUTOBRAKE MAX | 1390 | 20/-15 | 35 | -60/195  | 0/0    | 35/-35 | 70  | 0  | 0  |
| AUTOBRAKE 2   | 2435 | 45/-40 | 75 | -120/400 | 20/-35 | 70/-70 | 115 | 40 | 40 |

**Good Reported Braking Action**

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1595 | 25/-20 | 45 | -70/250  | 40/-35 | 40/-40 | 65  | 125 | 315 |
| AUTOBRAKE MAX | 1580 | 25/-20 | 45 | -70/250  | 40/-35 | 40/-40 | 70  | 125 | 310 |
| AUTOBRAKE 2   | 2435 | 45/-40 | 75 | -120/400 | 20/-35 | 70/-70 | 115 | 40  | 40  |

**Medium Reported Braking Action**

|               |      |        |    |          |         |        |     |     |     |
|---------------|------|--------|----|----------|---------|--------|-----|-----|-----|
| MAX MANUAL    | 2110 | 40/-35 | 70 | -110/395 | 95/-75  | 60/-60 | 80  | 325 | 915 |
| AUTOBRAKE MAX | 2095 | 40/-35 | 70 | -110/395 | 100/-80 | 60/-60 | 80  | 320 | 905 |
| AUTOBRAKE 3   | 2305 | 40/-30 | 70 | -120/420 | 55/-40  | 65/-65 | 115 | 145 | 725 |

**Poor Reported Braking Action**

|               |      |        |     |          |          |        |     |     |      |
|---------------|------|--------|-----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2645 | 55/-45 | 95  | -160/595 | 205/-140 | 75/-75 | 90  | 650 | 2180 |
| AUTOBRAKE MAX | 2645 | 60/-45 | 100 | -160/595 | 210/-145 | 75/-75 | 90  | 650 | 2180 |
| AUTOBRAKE 3   | 2685 | 55/-45 | 95  | -160/600 | 195/-125 | 80/-80 | 105 | 610 | 2140 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### FLIGHT CONTROL MODE (Flaps 20)

#### VREF20

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 220000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>220000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |      |        |    |          |        |        |     |    |    |
|---------------|------|--------|----|----------|--------|--------|-----|----|----|
| MAX MANUAL    | 1160 | 25/-10 | 25 | -45/150  | 15/-15 | 25/-25 | 50  | 35 | 75 |
| AUTOBRAKE MAX | 1390 | 20/-15 | 35 | -60/195  | 0/0    | 35/-35 | 70  | 0  | 0  |
| AUTOBRAKE 2   | 2455 | 45/-40 | 75 | -120/405 | 15/-35 | 70/-70 | 120 | 25 | 25 |

#### Good Reported Braking Action

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1625 | 25/-20 | 45 | -75/255  | 45/-35 | 40/-40 | 65  | 135 | 335 |
| AUTOBRAKE MAX | 1600 | 25/-20 | 45 | -75/250  | 40/-35 | 40/-40 | 70  | 130 | 325 |
| AUTOBRAKE 2   | 2455 | 45/-40 | 75 | -120/405 | 15/-35 | 70/-70 | 120 | 25  | 25  |

#### Medium Reported Braking Action

|               |      |        |    |          |         |        |     |     |     |
|---------------|------|--------|----|----------|---------|--------|-----|-----|-----|
| MAX MANUAL    | 2150 | 40/-35 | 70 | -110/400 | 100/-80 | 60/-60 | 80  | 345 | 985 |
| AUTOBRAKE MAX | 2135 | 40/-35 | 70 | -110/400 | 105/-85 | 60/-60 | 80  | 340 | 975 |
| AUTOBRAKE 3   | 2310 | 40/-30 | 70 | -120/420 | 60/-40  | 65/-70 | 120 | 180 | 815 |

#### Poor Reported Braking Action

|               |      |        |     |          |          |        |     |     |      |
|---------------|------|--------|-----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2705 | 60/-50 | 100 | -160/605 | 210/-145 | 80/-80 | 90  | 695 | 2370 |
| AUTOBRAKE MAX | 2700 | 60/-50 | 100 | -160/605 | 220/-150 | 80/-80 | 90  | 695 | 2370 |
| AUTOBRAKE 3   | 2730 | 60/-45 | 100 | -160/605 | 205/-130 | 80/-80 | 105 | 665 | 2340 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**FLIGHT CONTROLS (Flaps 20)**

**VREF30 + 20**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 220000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>220000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |      |        |    |          |        |        |     |    |     |
|---------------|------|--------|----|----------|--------|--------|-----|----|-----|
| MAX MANUAL    | 1245 | 25/0   | 30 | -45/155  | 20/-20 | 30/-30 | 60  | 55 | 120 |
| AUTOBRAKE MAX | 1470 | 25/0   | 35 | -60/200  | 0/0    | 40/-40 | 70  | 0  | 10  |
| AUTOBRAKE 2   | 2615 | 55/-20 | 75 | -125/415 | 15/-35 | 75/-75 | 125 | 30 | 30  |

**Good Reported Braking Action**

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1760 | 35/-5  | 50 | -80/265  | 55/-45 | 45/-45 | 80  | 190 | 485 |
| AUTOBRAKE MAX | 1745 | 35/-5  | 50 | -80/265  | 55/-50 | 45/-45 | 80  | 185 | 475 |
| AUTOBRAKE 2   | 2615 | 55/-20 | 75 | -125/415 | 15/-35 | 75/-75 | 125 | 30  | 30  |

**Medium Reported Braking Action**

|               |      |        |    |          |         |        |     |     |      |
|---------------|------|--------|----|----------|---------|--------|-----|-----|------|
| MAX MANUAL    | 2320 | 50/-20 | 75 | -120/420 | 115/-90 | 65/-65 | 90  | 445 | 1320 |
| AUTOBRAKE MAX | 2320 | 50/-20 | 75 | -120/420 | 120/-95 | 65/-65 | 95  | 445 | 1320 |
| AUTOBRAKE 3   | 2460 | 50/-10 | 70 | -125/435 | 80/-50  | 70/-70 | 120 | 305 | 1180 |

**Poor Reported Braking Action**

|               |      |        |     |          |          |        |     |     |      |
|---------------|------|--------|-----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2890 | 70/-30 | 105 | -170/625 | 235/-160 | 85/-85 | 100 | 840 | 2990 |
| AUTOBRAKE MAX | 2895 | 70/-35 | 110 | -170/625 | 240/-165 | 85/-85 | 100 | 840 | 3000 |
| AUTOBRAKE 3   | 2920 | 70/-30 | 105 | -170/625 | 230/-145 | 85/-85 | 115 | 820 | 2975 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### HYD PRESS SYS C (Flaps 20)

#### VREF20

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 220000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>220000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |      |        |    |          |        |        |     |    |    |
|---------------|------|--------|----|----------|--------|--------|-----|----|----|
| MAX MANUAL    | 1145 | 25/-10 | 25 | -45/150  | 15/-15 | 25/-25 | 45  | 30 | 70 |
| AUTOBRAKE MAX | 1390 | 20/-15 | 35 | -60/195  | 0/0    | 35/-35 | 70  | 0  | 0  |
| AUTOBRAKE 2   | 2435 | 45/-40 | 75 | -120/400 | 20/-35 | 70/-70 | 115 | 40 | 40 |

#### Good Reported Braking Action

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1595 | 25/-20 | 45 | -70/250  | 40/-35 | 40/-40 | 65  | 125 | 315 |
| AUTOBRAKE MAX | 1580 | 25/-20 | 45 | -70/250  | 40/-35 | 40/-40 | 70  | 125 | 310 |
| AUTOBRAKE 2   | 2435 | 45/-40 | 75 | -120/400 | 20/-35 | 70/-70 | 115 | 40  | 40  |

#### Medium Reported Braking Action

|               |      |        |    |          |         |        |     |     |     |
|---------------|------|--------|----|----------|---------|--------|-----|-----|-----|
| MAX MANUAL    | 2110 | 40/-35 | 70 | -110/395 | 95/-75  | 60/-60 | 80  | 325 | 915 |
| AUTOBRAKE MAX | 2095 | 40/-35 | 70 | -110/395 | 100/-80 | 60/-60 | 80  | 320 | 905 |
| AUTOBRAKE 3   | 2305 | 40/-30 | 70 | -120/420 | 55/-40  | 65/-65 | 115 | 145 | 725 |

#### Poor Reported Braking Action

|               |      |        |     |          |          |        |     |     |      |
|---------------|------|--------|-----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2645 | 55/-45 | 95  | -160/595 | 205/-140 | 75/-75 | 90  | 650 | 2180 |
| AUTOBRAKE MAX | 2645 | 60/-45 | 100 | -160/595 | 210/-145 | 75/-75 | 90  | 650 | 2180 |
| AUTOBRAKE 3   | 2685 | 55/-45 | 95  | -160/600 | 195/-125 | 80/-80 | 105 | 610 | 2140 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

HYD PRESS SYS L (Flaps 25)

VREF25

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 220000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>220000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

Dry Runway

|               |      |        |    |          |        |        |     |   |    |
|---------------|------|--------|----|----------|--------|--------|-----|---|----|
| MAX MANUAL    | 1015 | 20/-5  | 25 | -40/140  | 15/-15 | 25/-25 | 40  | 0 | 30 |
| AUTOBRAKE MAX | 1285 | 20/-5  | 30 | -55/185  | 0/0    | 30/-30 | 65  | 0 | 0  |
| AUTOBRAKE 2   | 2260 | 40/-15 | 65 | -115/385 | 0/0    | 65/-65 | 135 | 0 | 0  |

Good Reported Braking Action

|               |      |        |    |          |        |        |     |   |     |
|---------------|------|--------|----|----------|--------|--------|-----|---|-----|
| MAX MANUAL    | 1500 | 25/-10 | 40 | -75/255  | 45/-40 | 40/-40 | 65  | 0 | 155 |
| AUTOBRAKE MAX | 1530 | 25/-10 | 45 | -75/255  | 40/-35 | 40/-40 | 70  | 0 | 160 |
| AUTOBRAKE 2   | 2260 | 40/-15 | 65 | -115/385 | 0/0    | 65/-65 | 135 | 0 | 0   |

Medium Reported Braking Action

|               |      |        |    |          |          |        |     |   |     |
|---------------|------|--------|----|----------|----------|--------|-----|---|-----|
| MAX MANUAL    | 2140 | 40/-20 | 70 | -120/435 | 125/-95  | 60/-60 | 85  | 0 | 485 |
| AUTOBRAKE MAX | 2140 | 40/-20 | 70 | -120/435 | 130/-100 | 60/-60 | 85  | 0 | 485 |
| AUTOBRAKE 3   | 2200 | 40/-15 | 70 | -125/445 | 110/-60  | 65/-65 | 115 | 0 | 475 |

Poor Reported Braking Action

|               |      |        |     |          |          |        |     |   |      |
|---------------|------|--------|-----|----------|----------|--------|-----|---|------|
| MAX MANUAL    | 2925 | 60/-35 | 105 | -190/735 | 345/-205 | 90/-90 | 100 | 0 | 1270 |
| AUTOBRAKE MAX | 2935 | 60/-35 | 105 | -190/735 | 350/-210 | 90/-90 | 100 | 0 | 1275 |
| AUTOBRAKE 3   | 2935 | 60/-35 | 105 | -190/735 | 350/-205 | 90/-90 | 105 | 0 | 1275 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.



## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### HYD PRESS SYS L (Flaps 30)

#### VREF30

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                             |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|-----------------------------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ    |
| BRAKING<br>CONFIGURATION | 220000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>220000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV<br><br>NO<br>REV |

#### Dry Runway

|               |      |      |    |          |        |        |     |   |    |
|---------------|------|------|----|----------|--------|--------|-----|---|----|
| MAX MANUAL    | 975  | 25/0 | 20 | -40/135  | 15/-15 | 20/-20 | 40  | 0 | 30 |
| AUTOBRAKE MAX | 1215 | 25/0 | 25 | -50/180  | 0/0    | 30/-30 | 65  | 0 | 0  |
| AUTOBRAKE 2   | 2115 | 50/0 | 55 | -110/370 | 0/0    | 60/-60 | 130 | 0 | 0  |

#### Good Reported Braking Action

|               |      |       |    |          |        |        |     |   |     |
|---------------|------|-------|----|----------|--------|--------|-----|---|-----|
| MAX MANUAL    | 1440 | 30/-5 | 35 | -70/250  | 45/-40 | 35/-35 | 65  | 0 | 140 |
| AUTOBRAKE MAX | 1460 | 30/-5 | 35 | -70/250  | 40/-35 | 40/-40 | 70  | 0 | 145 |
| AUTOBRAKE 2   | 2115 | 50/0  | 55 | -110/370 | 0/0    | 60/-60 | 130 | 0 | 0   |

#### Medium Reported Braking Action

|               |      |        |    |          |         |        |     |   |     |
|---------------|------|--------|----|----------|---------|--------|-----|---|-----|
| MAX MANUAL    | 2050 | 45/-15 | 60 | -120/425 | 125/-95 | 55/-60 | 85  | 0 | 445 |
| AUTOBRAKE MAX | 2050 | 45/-15 | 60 | -120/425 | 125/-95 | 60/-60 | 85  | 0 | 445 |
| AUTOBRAKE 3   | 2085 | 50/-5  | 60 | -120/430 | 115/-65 | 60/-60 | 105 | 0 | 450 |

#### Poor Reported Braking Action

|               |      |        |    |          |          |        |     |   |      |
|---------------|------|--------|----|----------|----------|--------|-----|---|------|
| MAX MANUAL    | 2795 | 65/-25 | 95 | -185/720 | 335/-200 | 85/-85 | 100 | 0 | 1170 |
| AUTOBRAKE MAX | 2805 | 65/-25 | 95 | -185/720 | 340/-205 | 85/-85 | 100 | 0 | 1175 |
| AUTOBRAKE 3   | 2805 | 65/-25 | 95 | -185/720 | 340/-200 | 85/-85 | 100 | 0 | 1175 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**HYD PRESS SYS L+C (Flaps 20)**

**VREF30 + 20**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 220000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>220000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |      |      |    |          |        |        |     |   |    |
|---------------|------|------|----|----------|--------|--------|-----|---|----|
| MAX MANUAL    | 1310 | 30/0 | 30 | -50/165  | 20/-20 | 30/-30 | 60  | 0 | 55 |
| AUTOBRAKE MAX | 1470 | 25/0 | 35 | -60/200  | 0/0    | 40/-40 | 70  | 0 | 0  |
| AUTOBRAKE 2   | 2645 | 55/0 | 70 | -125/420 | 0/0    | 80/-80 | 145 | 0 | 0  |

**Good Reported Braking Action**

|               |      |       |    |          |        |        |     |   |     |
|---------------|------|-------|----|----------|--------|--------|-----|---|-----|
| MAX MANUAL    | 1925 | 35/-5 | 50 | -85/295  | 65/-55 | 50/-50 | 85  | 0 | 250 |
| AUTOBRAKE MAX | 1880 | 40/-5 | 50 | -85/290  | 70/-55 | 50/-50 | 90  | 0 | 240 |
| AUTOBRAKE 2   | 2645 | 55/0  | 70 | -125/420 | 0/0    | 80/-80 | 145 | 0 | 0   |

**Medium Reported Braking Action**

|               |      |        |    |          |          |        |     |   |     |
|---------------|------|--------|----|----------|----------|--------|-----|---|-----|
| MAX MANUAL    | 2705 | 60/-15 | 85 | -140/495 | 170/-130 | 80/-80 | 110 | 0 | 750 |
| AUTOBRAKE MAX | 2685 | 60/-15 | 85 | -140/490 | 175/-135 | 80/-80 | 110 | 0 | 745 |
| AUTOBRAKE 3   | 2690 | 60/-10 | 85 | -140/490 | 175/-110 | 80/-80 | 115 | 0 | 745 |

**Poor Reported Braking Action**

|               |      |        |     |          |          |          |     |   |      |
|---------------|------|--------|-----|----------|----------|----------|-----|---|------|
| MAX MANUAL    | 3630 | 85/-35 | 130 | -220/810 | 430/-260 | 110/-110 | 125 | 0 | 1885 |
| AUTOBRAKE MAX | 3625 | 85/-35 | 130 | -215/810 | 445/-270 | 110/-110 | 125 | 0 | 1885 |
| AUTOBRAKE 3   | 3625 | 85/-35 | 130 | -215/810 | 445/-270 | 110/-110 | 125 | 0 | 1885 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.



## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### HYD PRESS SYS L+R (Flaps 20)

#### VREF30 + 20

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |
| BRAKING<br>CONFIGURATION | 220000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>220000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV<br>NO<br>REV  |

#### Dry Runway

|               |                       |      |    |         |        |        |    |   |   |
|---------------|-----------------------|------|----|---------|--------|--------|----|---|---|
| MAX MANUAL    | 1410                  | 30/0 | 35 | -60/195 | 35/-30 | 35/-35 | 65 | 0 | 0 |
| AUTOBRAKE MAX | Autobrake Inoperative |      |    |         |        |        |    |   |   |
| AUTOBRAKE 2   | Autobrake Inoperative |      |    |         |        |        |    |   |   |

#### Good Reported Braking Action

|               |                       |      |    |          |          |        |     |   |   |
|---------------|-----------------------|------|----|----------|----------|--------|-----|---|---|
| MAX MANUAL    | 2325                  | 45/0 | 60 | -110/385 | 125/-100 | 70/-70 | 110 | 0 | 0 |
| AUTOBRAKE MAX | Autobrake Inoperative |      |    |          |          |        |     |   |   |
| AUTOBRAKE 2   | Autobrake Inoperative |      |    |          |          |        |     |   |   |

#### Medium Reported Braking Action

|               |                       |        |     |          |          |          |     |   |   |
|---------------|-----------------------|--------|-----|----------|----------|----------|-----|---|---|
| MAX MANUAL    | 3725                  | 70/-10 | 110 | -205/725 | 435/-280 | 115/-115 | 150 | 0 | 0 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |     |          |          |          |     |   |   |
| AUTOBRAKE 3   | Autobrake Inoperative |        |     |          |          |          |     |   |   |

#### Poor Reported Braking Action

|               |                       |         |     |           |           |          |     |   |   |
|---------------|-----------------------|---------|-----|-----------|-----------|----------|-----|---|---|
| MAX MANUAL    | 5995                  | 100/-20 | 185 | -395/1490 | 2465/-760 | 195/-195 | 185 | 0 | 0 |
| 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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**HYD PRESS SYS R (Flaps 25)**

**VREF25**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 220000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>220000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |                       |       |    |         |        |        |    |   |    |
|---------------|-----------------------|-------|----|---------|--------|--------|----|---|----|
| MAX MANUAL    | 1115                  | 15/-5 | 25 | -45/160 | 20/-20 | 25/-25 | 50 | 0 | 50 |
| AUTOBRAKE MAX | Autobrake Inoperative |       |    |         |        |        |    |   |    |
| AUTOBRAKE 2   | Autobrake Inoperative |       |    |         |        |        |    |   |    |

**Good Reported Braking Action**

|               |                       |        |    |         |        |        |    |   |     |
|---------------|-----------------------|--------|----|---------|--------|--------|----|---|-----|
| MAX MANUAL    | 1645                  | 25/-15 | 45 | -85/290 | 60/-50 | 45/-45 | 70 | 0 | 210 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |         |        |        |    |   |     |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |         |        |        |    |   |     |

**Medium Reported Braking Action**

|               |                       |        |    |          |          |        |    |   |     |
|---------------|-----------------------|--------|----|----------|----------|--------|----|---|-----|
| MAX MANUAL    | 2305                  | 45/-25 | 75 | -135/495 | 160/-115 | 65/-65 | 85 | 0 | 610 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |          |          |        |    |   |     |
| AUTOBRAKE 3   | Autobrake Inoperative |        |    |          |          |        |    |   |     |

**Poor Reported Braking Action**

|               |                       |        |     |          |          |        |     |   |      |
|---------------|-----------------------|--------|-----|----------|----------|--------|-----|---|------|
| MAX MANUAL    | 3095                  | 60/-40 | 115 | -210/825 | 450/-240 | 95/-95 | 100 | 0 | 1530 |
| 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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.



## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### HYD PRESS SYS R (Flaps 30)

#### VREF30

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 220000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>220000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |                       |      |    |         |        |        |    |   |    |
|---------------|-----------------------|------|----|---------|--------|--------|----|---|----|
| MAX MANUAL    | 1065                  | 20/0 | 25 | -45/155 | 20/-15 | 25/-25 | 45 | 0 | 45 |
| AUTOBRAKE MAX | Autobrake Inoperative |      |    |         |        |        |    |   |    |
| AUTOBRAKE 2   | Autobrake Inoperative |      |    |         |        |        |    |   |    |

#### Good Reported Braking Action

|               |                       |       |    |         |        |        |    |   |     |
|---------------|-----------------------|-------|----|---------|--------|--------|----|---|-----|
| MAX MANUAL    | 1555                  | 30/-5 | 40 | -80/285 | 55/-45 | 40/-40 | 65 | 0 | 185 |
| AUTOBRAKE MAX | Autobrake Inoperative |       |    |         |        |        |    |   |     |
| AUTOBRAKE 2   | Autobrake Inoperative |       |    |         |        |        |    |   |     |

#### Medium Reported Braking Action

|               |                       |        |    |          |          |        |    |   |     |
|---------------|-----------------------|--------|----|----------|----------|--------|----|---|-----|
| MAX MANUAL    | 2165                  | 50/-15 | 65 | -130/480 | 150/-110 | 60/-60 | 85 | 0 | 530 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |          |          |        |    |   |     |
| AUTOBRAKE 3   | Autobrake Inoperative |        |    |          |          |        |    |   |     |

#### Poor Reported Braking Action

|               |                       |        |     |          |          |        |    |   |      |
|---------------|-----------------------|--------|-----|----------|----------|--------|----|---|------|
| MAX MANUAL    | 2890                  | 65/-30 | 100 | -205/800 | 420/-225 | 85/-85 | 95 | 0 | 1320 |
| 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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**HYD PRESS SYS R+C (Flaps 20)**

**VREF30 + 20**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 220000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>220000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |                       |      |    |         |        |        |    |   |     |
|---------------|-----------------------|------|----|---------|--------|--------|----|---|-----|
| MAX MANUAL    | 1610                  | 30/0 | 40 | -65/225 | 40/-35 | 40/-40 | 75 | 0 | 130 |
| AUTOBRAKE MAX | Autobrake Inoperative |      |    |         |        |        |    |   |     |
| AUTOBRAKE 2   | Autobrake Inoperative |      |    |         |        |        |    |   |     |

**Good Reported Braking Action**

|               |                       |        |    |          |         |        |     |   |     |
|---------------|-----------------------|--------|----|----------|---------|--------|-----|---|-----|
| MAX MANUAL    | 2340                  | 50/-10 | 70 | -115/390 | 110/-90 | 65/-65 | 100 | 0 | 480 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |          |         |        |     |   |     |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |          |         |        |     |   |     |

**Medium Reported Braking Action**

|               |                       |        |     |          |          |        |     |   |      |
|---------------|-----------------------|--------|-----|----------|----------|--------|-----|---|------|
| MAX MANUAL    | 3205                  | 70/-25 | 110 | -180/640 | 275/-190 | 95/-95 | 120 | 0 | 1275 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |     |          |          |        |     |   |      |
| AUTOBRAKE 3   | Autobrake Inoperative |        |     |          |          |        |     |   |      |

**Poor Reported Braking Action**

|               |                       |         |     |           |          |          |     |   |      |
|---------------|-----------------------|---------|-----|-----------|----------|----------|-----|---|------|
| MAX MANUAL    | 4195                  | 100/-45 | 160 | -270/1055 | 810/-370 | 130/-130 | 135 | 0 | 3040 |
| 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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### NAV AIR DATA SYS (Flaps 20)

#### VREF20

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 220000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>220000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |      |        |    |          |        |        |     |    |    |
|---------------|------|--------|----|----------|--------|--------|-----|----|----|
| MAX MANUAL    | 1160 | 25/-10 | 25 | -45/150  | 15/-15 | 25/-25 | 50  | 35 | 75 |
| AUTOBRAKE MAX | 1390 | 20/-15 | 35 | -60/195  | 0/0    | 35/-35 | 70  | 0  | 0  |
| AUTOBRAKE 2   | 2455 | 45/-40 | 75 | -120/405 | 15/-35 | 70/-70 | 120 | 25 | 25 |

#### Good Reported Braking Action

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1625 | 25/-20 | 45 | -75/255  | 45/-35 | 40/-40 | 65  | 135 | 335 |
| AUTOBRAKE MAX | 1600 | 25/-20 | 45 | -75/250  | 40/-35 | 40/-40 | 70  | 130 | 325 |
| AUTOBRAKE 2   | 2455 | 45/-40 | 75 | -120/405 | 15/-35 | 70/-70 | 120 | 25  | 25  |

#### Medium Reported Braking Action

|               |      |        |    |          |         |        |     |     |     |
|---------------|------|--------|----|----------|---------|--------|-----|-----|-----|
| MAX MANUAL    | 2150 | 40/-35 | 70 | -110/400 | 100/-80 | 60/-60 | 80  | 345 | 985 |
| AUTOBRAKE MAX | 2135 | 40/-35 | 70 | -110/400 | 105/-85 | 60/-60 | 80  | 340 | 975 |
| AUTOBRAKE 3   | 2310 | 40/-30 | 70 | -120/420 | 60/-40  | 65/-70 | 120 | 180 | 815 |

#### Poor Reported Braking Action

|               |      |        |     |          |          |        |     |     |      |
|---------------|------|--------|-----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2705 | 60/-50 | 100 | -160/605 | 210/-145 | 80/-80 | 90  | 695 | 2370 |
| AUTOBRAKE MAX | 2700 | 60/-50 | 100 | -160/605 | 220/-150 | 80/-80 | 90  | 695 | 2370 |
| AUTOBRAKE 3   | 2730 | 60/-45 | 100 | -160/605 | 205/-130 | 80/-80 | 105 | 665 | 2340 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**PITCH DOWN AUTHORITY (Flaps 25)**

**VREF25**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 220000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>220000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |      |        |    |          |        |        |     |    |    |
|---------------|------|--------|----|----------|--------|--------|-----|----|----|
| MAX MANUAL    | 1095 | 25/-5  | 25 | -40/145  | 15/-10 | 25/-25 | 45  | 15 | 35 |
| AUTOBRAKE MAX | 1285 | 20/-5  | 30 | -55/185  | 0/0    | 30/-30 | 65  | 0  | 0  |
| AUTOBRAKE 2   | 2220 | 40/-25 | 65 | -110/380 | 15/-35 | 65/-65 | 100 | 40 | 40 |

**Good Reported Braking Action**

|               |      |        |    |          |        |        |     |    |     |
|---------------|------|--------|----|----------|--------|--------|-----|----|-----|
| MAX MANUAL    | 1490 | 20/-10 | 40 | -70/240  | 35/-30 | 35/-35 | 55  | 80 | 190 |
| AUTOBRAKE MAX | 1475 | 20/-10 | 40 | -70/240  | 40/-35 | 35/-35 | 60  | 75 | 185 |
| AUTOBRAKE 2   | 2220 | 40/-20 | 65 | -110/380 | 25/-35 | 65/-65 | 105 | 40 | 40  |

**Medium Reported Braking Action**

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1940 | 35/-20 | 60 | -105/375 | 80/-65 | 50/-50 | 70  | 220 | 595 |
| AUTOBRAKE MAX | 1935 | 35/-20 | 60 | -105/375 | 85/-70 | 50/-50 | 70  | 215 | 590 |
| AUTOBRAKE 3   | 2135 | 35/-15 | 60 | -115/405 | 60/-40 | 60/-60 | 110 | 85  | 405 |

**Poor Reported Braking Action**

|               |      |        |    |          |          |        |    |     |      |
|---------------|------|--------|----|----------|----------|--------|----|-----|------|
| MAX MANUAL    | 2420 | 50/-30 | 80 | -150/565 | 175/-120 | 65/-65 | 75 | 470 | 1485 |
| AUTOBRAKE MAX | 2430 | 50/-30 | 80 | -150/565 | 180/-125 | 70/-70 | 75 | 470 | 1480 |
| AUTOBRAKE 3   | 2485 | 45/-25 | 80 | -150/575 | 165/-110 | 70/-70 | 95 | 415 | 1425 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.



## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### PITCH DOWN AUTHORITY (Flaps 30)

#### VREF30

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 220000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>220000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |      |        |    |          |        |        |     |    |    |
|---------------|------|--------|----|----------|--------|--------|-----|----|----|
| MAX MANUAL    | 1055 | 25/0   | 20 | -40/140  | 15/-10 | 20/-20 | 45  | 15 | 30 |
| AUTOBRAKE MAX | 1215 | 25/5   | 25 | -50/180  | 5/0    | 30/-30 | 65  | 0  | 0  |
| AUTOBRAKE 2   | 2090 | 45/-15 | 55 | -110/370 | 10/-30 | 60/-60 | 100 | 20 | 20 |

#### Good Reported Braking Action

|               |      |        |    |          |        |        |     |    |     |
|---------------|------|--------|----|----------|--------|--------|-----|----|-----|
| MAX MANUAL    | 1425 | 25/-5  | 35 | -65/235  | 35/-30 | 35/-35 | 55  | 70 | 170 |
| AUTOBRAKE MAX | 1415 | 25/-5  | 35 | -65/235  | 35/-30 | 35/-35 | 60  | 70 | 165 |
| AUTOBRAKE 2   | 2090 | 45/-10 | 55 | -110/370 | 15/-30 | 60/-60 | 100 | 20 | 20  |

#### Medium Reported Braking Action

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1850 | 40/-15 | 50 | -100/370 | 75/-60 | 45/-50 | 70  | 200 | 535 |
| AUTOBRAKE MAX | 1845 | 40/-10 | 50 | -100/365 | 80/-65 | 50/-50 | 70  | 195 | 530 |
| AUTOBRAKE 3   | 2010 | 40/-5  | 50 | -110/390 | 60/-40 | 55/-55 | 110 | 85  | 380 |

#### Poor Reported Braking Action

|               |      |        |    |          |          |        |    |     |      |
|---------------|------|--------|----|----------|----------|--------|----|-----|------|
| MAX MANUAL    | 2305 | 50/-25 | 70 | -145/555 | 170/-115 | 65/-65 | 75 | 425 | 1335 |
| AUTOBRAKE MAX | 2310 | 50/-25 | 75 | -145/555 | 175/-120 | 65/-65 | 75 | 425 | 1330 |
| AUTOBRAKE 3   | 2350 | 50/-20 | 70 | -145/560 | 165/-100 | 65/-65 | 95 | 390 | 1300 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**PITCH UP AUTHORITY (Flaps ≤ 15)**

**VREF30 + 40**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 220000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>220000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |      |        |    |          |        |        |    |     |     |
|---------------|------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1190 | 40/-5  | 25 | -45/145  | 15/-15 | 30/-30 | 35 | 35  | 80  |
| AUTOBRAKE MAX | 1755 | 30/0   | 40 | -65/220  | 0/0    | 45/-50 | 80 | 0   | 0   |
| AUTOBRAKE 2   | 2875 | 60/-35 | 95 | -130/430 | 70/-75 | 85/-85 | 85 | 320 | 345 |

**Good Reported Braking Action**

|               |      |        |    |          |        |        |    |     |     |
|---------------|------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1700 | 30/-10 | 45 | -75/250  | 40/-35 | 45/-45 | 55 | 140 | 350 |
| AUTOBRAKE MAX | 1840 | 30/0   | 50 | -75/265  | 20/-15 | 50/-50 | 80 | 90  | 310 |
| AUTOBRAKE 2   | 2875 | 60/-35 | 95 | -130/430 | 70/-75 | 85/-85 | 85 | 320 | 345 |

**Medium Reported Braking Action**

|               |      |        |    |          |        |        |    |     |      |
|---------------|------|--------|----|----------|--------|--------|----|-----|------|
| MAX MANUAL    | 2280 | 45/-20 | 75 | -110/400 | 90/-75 | 65/-65 | 65 | 360 | 1005 |
| AUTOBRAKE MAX | 2290 | 50/-20 | 75 | -110/400 | 90/-70 | 65/-65 | 75 | 360 | 1010 |
| AUTOBRAKE 3   | 2795 | 55/-30 | 85 | -130/455 | 70/-75 | 80/-80 | 90 | 205 | 635  |

**Poor Reported Braking Action**

|               |      |        |     |          |          |        |    |     |      |
|---------------|------|--------|-----|----------|----------|--------|----|-----|------|
| MAX MANUAL    | 2870 | 65/-35 | 105 | -160/600 | 200/-140 | 85/-85 | 75 | 710 | 2350 |
| AUTOBRAKE MAX | 2870 | 65/-35 | 105 | -160/600 | 200/-140 | 85/-85 | 75 | 710 | 2350 |
| AUTOBRAKE 3   | 3085 | 70/-35 | 105 | -165/625 | 175/-135 | 90/-90 | 90 | 575 | 2195 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### PITCH UP AUTHORITY (Flaps ≥ 20)

#### VREF30 + 20

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |
| BRAKING<br>CONFIGURATION | 220000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>220000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV<br>NO<br>REV  |

#### Dry Runway

|               |      |        |    |          |        |        |    |     |     |
|---------------|------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1055 | 30/-5  | 25 | -40/135  | 15/-10 | 25/-25 | 35 | 25  | 60  |
| AUTOBRAKE MAX | 1470 | 25/0   | 35 | -60/200  | 0/0    | 40/-40 | 70 | 0   | 0   |
| AUTOBRAKE 2   | 2475 | 55/-25 | 75 | -120/400 | 45/-60 | 70/-70 | 85 | 160 | 160 |

#### Good Reported Braking Action

|               |      |        |    |          |        |        |    |     |     |
|---------------|------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1500 | 30/-10 | 40 | -70/235  | 35/-30 | 40/-40 | 55 | 110 | 270 |
| AUTOBRAKE MAX | 1565 | 30/0   | 40 | -70/245  | 30/-15 | 40/-40 | 70 | 110 | 280 |
| AUTOBRAKE 2   | 2475 | 55/-25 | 75 | -120/400 | 45/-60 | 70/-70 | 85 | 160 | 160 |

#### Medium Reported Braking Action

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 2005 | 45/-20 | 60 | -105/380 | 85/-70 | 55/-55 | 65  | 285 | 785 |
| AUTOBRAKE MAX | 2005 | 45/-15 | 60 | -105/380 | 90/-65 | 55/-55 | 70  | 285 | 780 |
| AUTOBRAKE 3   | 2380 | 50/-20 | 70 | -120/425 | 55/-55 | 70/-70 | 100 | 120 | 500 |

#### Poor Reported Braking Action

|               |      |        |    |          |          |        |     |     |      |
|---------------|------|--------|----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2535 | 60/-30 | 90 | -150/575 | 185/-130 | 75/-75 | 75  | 580 | 1850 |
| AUTOBRAKE MAX | 2540 | 60/-30 | 90 | -150/575 | 190/-130 | 75/-75 | 75  | 580 | 1855 |
| AUTOBRAKE 3   | 2670 | 60/-30 | 90 | -155/590 | 160/-110 | 80/-80 | 100 | 475 | 1760 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.



ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

PRI FLIGHT COMPUTERS (Flaps 20)

VREF20

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 220000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>220000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

Dry Runway

|               |      |        |    |          |        |        |     |    |    |
|---------------|------|--------|----|----------|--------|--------|-----|----|----|
| MAX MANUAL    | 1160 | 25/-10 | 25 | -45/150  | 15/-15 | 25/-25 | 50  | 35 | 75 |
| AUTOBRAKE MAX | 1390 | 20/-15 | 35 | -60/195  | 0/0    | 35/-35 | 70  | 0  | 0  |
| AUTOBRAKE 2   | 2455 | 45/-40 | 75 | -120/405 | 15/-35 | 70/-70 | 120 | 25 | 25 |

Good Reported Braking Action

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1625 | 25/-20 | 45 | -75/255  | 45/-35 | 40/-40 | 65  | 135 | 335 |
| AUTOBRAKE MAX | 1600 | 25/-20 | 45 | -75/250  | 40/-35 | 40/-40 | 70  | 130 | 325 |
| AUTOBRAKE 2   | 2455 | 45/-40 | 75 | -120/405 | 15/-35 | 70/-70 | 120 | 25  | 25  |

Medium Reported Braking Action

|               |      |        |    |          |         |        |     |     |     |
|---------------|------|--------|----|----------|---------|--------|-----|-----|-----|
| MAX MANUAL    | 2150 | 40/-35 | 70 | -110/400 | 100/-80 | 60/-60 | 80  | 345 | 985 |
| AUTOBRAKE MAX | 2135 | 40/-35 | 70 | -110/400 | 105/-85 | 60/-60 | 80  | 340 | 975 |
| AUTOBRAKE 3   | 2310 | 40/-30 | 70 | -120/420 | 60/-40  | 65/-70 | 120 | 180 | 815 |

Poor Reported Braking Action

|               |      |        |     |          |          |        |     |     |      |
|---------------|------|--------|-----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2705 | 60/-50 | 100 | -160/605 | 210/-145 | 80/-80 | 90  | 695 | 2370 |
| AUTOBRAKE MAX | 2700 | 60/-50 | 100 | -160/605 | 220/-150 | 80/-80 | 90  | 695 | 2370 |
| AUTOBRAKE 3   | 2730 | 60/-45 | 100 | -160/605 | 205/-130 | 80/-80 | 105 | 665 | 2340 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.



## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### SLATS DRIVE (Flaps 20)

#### VREF30 + 30

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 220000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>220000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |      |        |    |          |        |        |    |     |     |
|---------------|------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1135 | 35/-5  | 25 | -40/145  | 15/-15 | 25/-25 | 40 | 30  | 75  |
| AUTOBRAKE MAX | 1610 | 30/0   | 40 | -65/210  | 0/0    | 40/-45 | 75 | 0   | 0   |
| AUTOBRAKE 2   | 2675 | 55/-30 | 85 | -125/415 | 60/-70 | 80/-80 | 85 | 230 | 235 |

#### Good Reported Braking Action

|               |      |        |    |          |        |        |    |     |     |
|---------------|------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1615 | 30/-10 | 45 | -70/245  | 40/-35 | 40/-40 | 55 | 125 | 310 |
| AUTOBRAKE MAX | 1705 | 30/0   | 45 | -75/255  | 25/-15 | 45/-45 | 75 | 110 | 305 |
| AUTOBRAKE 2   | 2675 | 55/-30 | 85 | -125/415 | 60/-70 | 80/-80 | 85 | 230 | 235 |

#### Medium Reported Braking Action

|               |      |        |    |          |        |        |    |     |     |
|---------------|------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 2155 | 45/-20 | 70 | -110/390 | 90/-75 | 60/-60 | 65 | 320 | 870 |
| AUTOBRAKE MAX | 2160 | 45/-20 | 70 | -110/390 | 90/-70 | 60/-60 | 75 | 320 | 870 |
| AUTOBRAKE 3   | 2595 | 55/-25 | 75 | -125/440 | 65/-70 | 75/-75 | 90 | 155 | 555 |

#### Poor Reported Braking Action

|               |      |        |    |          |          |        |    |     |      |
|---------------|------|--------|----|----------|----------|--------|----|-----|------|
| MAX MANUAL    | 2710 | 65/-35 | 95 | -155/590 | 195/-135 | 80/-80 | 75 | 630 | 2020 |
| AUTOBRAKE MAX | 2715 | 65/-35 | 95 | -155/590 | 195/-135 | 80/-80 | 75 | 630 | 2020 |
| AUTOBRAKE 3   | 2890 | 65/-35 | 95 | -165/610 | 170/-130 | 85/-85 | 90 | 510 | 1905 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**SPOILERS (Flaps 25)**

**VREF25**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 220000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>220000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |      |        |    |          |        |        |     |    |    |
|---------------|------|--------|----|----------|--------|--------|-----|----|----|
| MAX MANUAL    | 975  | 20/-5  | 20 | -40/130  | 10/-10 | 20/-20 | 40  | 25 | 55 |
| AUTOBRAKE MAX | 1285 | 20/-5  | 30 | -55/185  | 0/0    | 30/-30 | 65  | 0  | 0  |
| AUTOBRAKE 2   | 2200 | 40/-25 | 70 | -110/380 | 25/-40 | 65/-65 | 100 | 60 | 60 |

**Good Reported Braking Action**

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1375 | 20/-10 | 40 | -65/230  | 35/-30 | 35/-35 | 55  | 100 | 245 |
| AUTOBRAKE MAX | 1410 | 25/-10 | 40 | -65/235  | 30/-25 | 35/-35 | 60  | 105 | 255 |
| AUTOBRAKE 2   | 2200 | 40/-25 | 70 | -110/380 | 25/-40 | 65/-65 | 100 | 60  | 60  |

**Medium Reported Braking Action**

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1840 | 35/-20 | 60 | -100/370 | 85/-65 | 50/-50 | 65  | 260 | 720 |
| AUTOBRAKE MAX | 1840 | 35/-20 | 60 | -100/370 | 85/-70 | 50/-50 | 70  | 260 | 715 |
| AUTOBRAKE 3   | 2085 | 35/-20 | 60 | -110/400 | 40/-35 | 60/-60 | 105 | 105 | 530 |

**Poor Reported Braking Action**

|               |      |        |    |          |          |        |     |     |      |
|---------------|------|--------|----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2325 | 50/-30 | 85 | -145/560 | 180/-125 | 65/-65 | 75  | 535 | 1720 |
| AUTOBRAKE MAX | 2335 | 50/-30 | 85 | -145/560 | 185/-125 | 65/-65 | 75  | 535 | 1725 |
| AUTOBRAKE 3   | 2380 | 50/-25 | 80 | -150/570 | 170/-95  | 70/-70 | 105 | 490 | 1680 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### SPOILERS (Flaps 30)

#### VREF30

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 220000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>220000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |      |        |    |          |        |        |    |    |    |
|---------------|------|--------|----|----------|--------|--------|----|----|----|
| MAX MANUAL    | 940  | 20/0   | 20 | -35/130  | 10/-10 | 20/-20 | 40 | 20 | 50 |
| AUTOBRAKE MAX | 1215 | 20/0   | 25 | -50/180  | 0/0    | 30/-30 | 65 | 0  | 0  |
| AUTOBRAKE 2   | 2070 | 45/-15 | 60 | -105/365 | 20/-35 | 60/-60 | 95 | 40 | 40 |

#### Good Reported Braking Action

|               |      |        |    |          |        |        |    |    |     |
|---------------|------|--------|----|----------|--------|--------|----|----|-----|
| MAX MANUAL    | 1320 | 25/-5  | 35 | -65/225  | 35/-30 | 30/-30 | 55 | 90 | 220 |
| AUTOBRAKE MAX | 1345 | 25/-5  | 35 | -65/225  | 30/-25 | 35/-35 | 60 | 95 | 230 |
| AUTOBRAKE 2   | 2070 | 45/-15 | 60 | -105/365 | 20/-35 | 60/-60 | 95 | 40 | 40  |

#### Medium Reported Braking Action

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1755 | 40/-15 | 50 | -100/360 | 80/-65 | 45/-45 | 65  | 235 | 645 |
| AUTOBRAKE MAX | 1755 | 40/-15 | 50 | -100/360 | 80/-65 | 45/-45 | 65  | 235 | 645 |
| AUTOBRAKE 3   | 1960 | 40/-10 | 50 | -105/385 | 40/-30 | 55/-55 | 105 | 100 | 495 |

#### Poor Reported Braking Action

|               |      |        |    |          |          |        |     |     |      |
|---------------|------|--------|----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2215 | 55/-25 | 75 | -145/550 | 175/-120 | 60/-65 | 75  | 485 | 1545 |
| AUTOBRAKE MAX | 2220 | 55/-25 | 75 | -145/550 | 180/-120 | 65/-65 | 75  | 485 | 1550 |
| AUTOBRAKE 3   | 2255 | 55/-20 | 70 | -145/555 | 165/-90  | 65/-65 | 100 | 455 | 1520 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**STABILIZER (Flaps 20)**

**VREF30 + 20**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 220000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>220000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |      |        |    |          |        |        |    |     |     |
|---------------|------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1055 | 30/-5  | 25 | -40/135  | 15/-10 | 25/-25 | 35 | 25  | 60  |
| AUTOBRAKE MAX | 1470 | 25/0   | 35 | -60/200  | 0/0    | 40/-40 | 70 | 0   | 0   |
| AUTOBRAKE 2   | 2475 | 55/-25 | 75 | -120/400 | 45/-60 | 70/-70 | 85 | 160 | 160 |

**Good Reported Braking Action**

|               |      |        |    |          |        |        |    |     |     |
|---------------|------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1500 | 30/-10 | 40 | -70/235  | 35/-30 | 40/-40 | 55 | 110 | 270 |
| AUTOBRAKE MAX | 1565 | 30/0   | 40 | -70/245  | 30/-15 | 40/-40 | 70 | 110 | 280 |
| AUTOBRAKE 2   | 2475 | 55/-25 | 75 | -120/400 | 45/-60 | 70/-70 | 85 | 160 | 160 |

**Medium Reported Braking Action**

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 2005 | 45/-20 | 60 | -105/380 | 85/-70 | 55/-55 | 65  | 285 | 785 |
| AUTOBRAKE MAX | 2005 | 45/-15 | 60 | -105/380 | 90/-65 | 55/-55 | 70  | 285 | 780 |
| AUTOBRAKE 3   | 2380 | 50/-20 | 70 | -120/425 | 55/-55 | 70/-70 | 100 | 120 | 500 |

**Poor Reported Braking Action**

|               |      |        |    |          |          |        |     |     |      |
|---------------|------|--------|----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2535 | 60/-30 | 90 | -150/575 | 185/-130 | 75/-75 | 75  | 580 | 1850 |
| AUTOBRAKE MAX | 2540 | 60/-30 | 90 | -150/575 | 190/-130 | 75/-75 | 75  | 580 | 1855 |
| AUTOBRAKE 3   | 2670 | 60/-30 | 90 | -155/590 | 160/-110 | 80/-80 | 100 | 475 | 1760 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.





ADVISORY INFORMATION

Recommended Brake Cooling Schedule  
Reference Brake Energy (Millions of Foot Pounds)

|                     |             | BRAKES ON SPEED (KIAS)      |      |      |      |      |      |      |      |      |      |      |      |      |      |       |       |       |       |
|---------------------|-------------|-----------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|
|                     |             | 80                          |      |      | 100  |      |      | 120  |      |      | 140  |      |      | 160  |      |       | 180   |       |       |
| WEIGHT<br>(1000 KG) | OAT<br>(°C) | PRESSURE ALTITUDE (1000 FT) |      |      |      |      |      |      |      |      |      |      |      |      |      |       |       |       |       |
|                     |             | 0                           | 4    | 8    | 0    | 4    | 8    | 0    | 4    | 8    | 0    | 4    | 8    | 0    | 4    | 8     | 0     | 4     | 8     |
| 360                 | 0           | 23.3                        | 25.7 | 28.3 | 33.8 | 37.7 | 41.9 | 46.1 | 51.6 | 57.8 | 59.8 | 67.3 | 75.6 | 74.5 | 84.0 | 94.5  | 89.8  | 101.1 | 113.6 |
|                     | 10          | 23.9                        | 26.4 | 29.2 | 34.8 | 38.8 | 43.2 | 47.5 | 53.2 | 59.6 | 61.7 | 69.4 | 78.0 | 76.9 | 86.6 | 97.4  | 92.6  | 104.1 | 116.9 |
|                     | 15          | 24.4                        | 26.9 | 29.7 | 35.5 | 39.5 | 44.0 | 48.4 | 54.2 | 60.7 | 62.8 | 70.6 | 79.4 | 78.3 | 88.1 | 99.1  | 94.2  | 105.9 | 118.8 |
|                     | 20          | 24.8                        | 27.4 | 30.2 | 36.1 | 40.2 | 44.8 | 49.2 | 55.2 | 61.8 | 63.9 | 71.9 | 80.8 | 79.6 | 89.6 | 100.8 | 95.8  | 107.6 | 120.6 |
|                     | 30          | 25.5                        | 28.1 | 31.0 | 37.1 | 41.3 | 46.1 | 50.6 | 56.7 | 63.6 | 65.8 | 74.0 | 83.1 | 81.9 | 92.2 | 103.6 | 98.5  | 110.6 | 123.9 |
|                     | 40          | 25.7                        | 28.4 | 31.4 | 37.7 | 42.0 | 46.8 | 51.5 | 57.8 | 64.8 | 67.1 | 75.5 | 84.9 | 83.7 | 94.2 | 105.8 | 100.7 | 113.0 | 126.4 |
| 340                 | 0           | 22.2                        | 24.5 | 27.0 | 32.3 | 35.9 | 39.9 | 43.9 | 49.1 | 55.0 | 56.9 | 64.0 | 71.9 | 71.0 | 79.9 | 90.0  | 85.6  | 96.4  | 108.4 |
|                     | 10          | 22.9                        | 25.2 | 27.8 | 33.2 | 37.0 | 41.1 | 45.2 | 50.6 | 56.7 | 58.7 | 66.0 | 74.2 | 73.2 | 82.4 | 92.8  | 88.3  | 99.3  | 111.6 |
|                     | 15          | 23.3                        | 25.7 | 28.3 | 33.9 | 37.7 | 41.9 | 46.1 | 51.6 | 57.7 | 59.8 | 67.2 | 75.5 | 74.5 | 83.9 | 94.4  | 89.8  | 101.0 | 113.4 |
|                     | 20          | 23.7                        | 26.2 | 28.8 | 34.5 | 38.4 | 42.7 | 46.9 | 52.5 | 58.8 | 60.8 | 68.4 | 76.8 | 75.8 | 85.4 | 96.0  | 91.3  | 102.7 | 115.3 |
|                     | 30          | 24.3                        | 26.8 | 29.6 | 35.4 | 39.4 | 43.9 | 48.2 | 54.0 | 60.5 | 62.6 | 70.3 | 79.0 | 78.0 | 87.8 | 98.7  | 94.0  | 105.6 | 118.4 |
|                     | 40          | 24.6                        | 27.1 | 30.0 | 35.9 | 40.0 | 44.6 | 49.0 | 55.0 | 61.6 | 63.8 | 71.8 | 80.7 | 79.7 | 89.7 | 100.8 | 96.0  | 107.9 | 120.9 |
| 320                 | 0           | 21.2                        | 23.4 | 25.7 | 30.7 | 34.2 | 37.9 | 41.7 | 46.6 | 52.2 | 54.0 | 60.7 | 68.1 | 67.3 | 75.8 | 85.3  | 81.3  | 91.5  | 103.0 |
|                     | 10          | 21.8                        | 24.0 | 26.5 | 31.6 | 35.2 | 39.1 | 43.0 | 48.1 | 53.8 | 55.7 | 62.6 | 70.3 | 69.5 | 78.2 | 88.0  | 83.8  | 94.4  | 106.1 |
|                     | 15          | 22.2                        | 24.5 | 27.0 | 32.2 | 35.8 | 39.8 | 43.8 | 49.0 | 54.8 | 56.7 | 63.7 | 71.5 | 70.7 | 79.6 | 89.5  | 85.3  | 96.0  | 107.9 |
|                     | 20          | 22.6                        | 24.9 | 27.5 | 32.8 | 36.5 | 40.5 | 44.6 | 49.8 | 55.7 | 57.7 | 64.8 | 72.8 | 72.0 | 81.0 | 91.1  | 86.8  | 97.6  | 109.7 |
|                     | 30          | 23.2                        | 25.6 | 28.2 | 33.7 | 37.5 | 41.6 | 45.8 | 51.2 | 57.3 | 59.4 | 66.7 | 74.9 | 74.0 | 83.3 | 93.7  | 89.3  | 100.4 | 112.7 |
|                     | 40          | 23.4                        | 25.8 | 28.5 | 34.2 | 38.0 | 42.3 | 46.6 | 52.2 | 58.4 | 60.5 | 68.0 | 76.5 | 75.6 | 85.1 | 95.7  | 91.2  | 102.6 | 115.1 |
| 300                 | 0           | 20.2                        | 22.2 | 24.5 | 29.2 | 32.4 | 36.0 | 39.5 | 44.1 | 49.3 | 51.1 | 57.3 | 64.3 | 63.7 | 71.6 | 80.6  | 76.8  | 86.6  | 97.5  |
|                     | 10          | 20.8                        | 22.9 | 25.1 | 30.0 | 33.4 | 37.0 | 40.7 | 45.5 | 50.8 | 52.7 | 59.1 | 66.4 | 65.7 | 73.9 | 83.1  | 79.3  | 89.3  | 100.4 |
|                     | 15          | 21.2                        | 23.3 | 25.6 | 30.6 | 34.0 | 37.7 | 41.5 | 46.3 | 51.8 | 53.6 | 60.2 | 67.6 | 66.8 | 75.2 | 84.6  | 80.7  | 90.8  | 102.1 |
|                     | 20          | 21.6                        | 23.7 | 26.1 | 31.2 | 34.6 | 38.4 | 42.2 | 47.2 | 52.7 | 54.6 | 61.3 | 68.8 | 68.0 | 76.5 | 86.1  | 82.1  | 92.4  | 103.8 |
|                     | 30          | 22.1                        | 24.3 | 26.8 | 32.0 | 35.5 | 39.4 | 43.4 | 48.5 | 54.2 | 56.1 | 63.0 | 70.7 | 70.0 | 78.8 | 88.5  | 84.4  | 95.0  | 106.7 |
|                     | 40          | 22.3                        | 24.6 | 27.1 | 32.4 | 36.0 | 40.1 | 44.1 | 49.3 | 55.2 | 57.2 | 64.3 | 72.2 | 71.4 | 80.4 | 90.5  | 86.3  | 97.1  | 109.0 |
| 260                 | 0           | 18.2                        | 20.0 | 21.9 | 26.1 | 28.9 | 32.0 | 35.1 | 39.1 | 43.6 | 45.2 | 50.6 | 56.6 | 56.1 | 63.1 | 70.9  | 67.7  | 76.2  | 85.8  |
|                     | 10          | 18.7                        | 20.6 | 22.5 | 26.9 | 29.7 | 32.9 | 36.2 | 40.3 | 44.9 | 46.5 | 52.1 | 58.4 | 57.9 | 65.1 | 73.1  | 69.8  | 78.6  | 88.5  |
|                     | 15          | 19.1                        | 20.9 | 23.0 | 27.4 | 30.3 | 33.6 | 36.8 | 41.1 | 45.8 | 47.4 | 53.1 | 59.5 | 58.9 | 66.2 | 74.4  | 71.1  | 80.0  | 90.0  |
|                     | 20          | 19.4                        | 21.3 | 23.4 | 27.9 | 30.9 | 34.2 | 37.5 | 41.8 | 46.6 | 48.3 | 54.1 | 60.6 | 60.0 | 67.4 | 75.7  | 72.4  | 81.4  | 91.6  |
|                     | 30          | 19.9                        | 21.9 | 24.0 | 28.6 | 31.7 | 35.1 | 38.5 | 43.0 | 47.9 | 49.6 | 55.6 | 62.3 | 61.7 | 69.4 | 77.9  | 74.4  | 83.8  | 94.2  |
|                     | 40          | 20.1                        | 22.1 | 24.2 | 28.9 | 32.1 | 35.6 | 39.1 | 43.7 | 48.7 | 50.5 | 56.6 | 63.5 | 62.9 | 70.8 | 79.6  | 76.0  | 85.6  | 96.2  |
| 220                 | 0           | 16.3                        | 17.8 | 19.5 | 23.1 | 25.4 | 28.1 | 30.7 | 34.1 | 37.9 | 39.2 | 43.7 | 48.9 | 48.4 | 54.2 | 60.8  | 58.2  | 65.4  | 73.5  |
|                     | 10          | 16.7                        | 18.3 | 20.0 | 23.7 | 26.2 | 28.9 | 31.6 | 35.1 | 39.0 | 40.3 | 45.1 | 50.4 | 49.9 | 55.9 | 62.7  | 60.0  | 67.4  | 75.8  |
|                     | 15          | 17.1                        | 18.7 | 20.4 | 24.2 | 26.7 | 29.4 | 32.2 | 35.8 | 39.8 | 41.1 | 45.9 | 51.3 | 50.8 | 57.0 | 63.9  | 61.1  | 68.7  | 77.2  |
|                     | 20          | 17.4                        | 19.0 | 20.8 | 24.6 | 27.1 | 30.0 | 32.8 | 36.4 | 40.5 | 41.8 | 46.7 | 52.2 | 51.7 | 58.0 | 65.0  | 62.2  | 69.9  | 78.5  |
|                     | 30          | 17.8                        | 19.5 | 21.3 | 25.2 | 27.8 | 30.7 | 33.7 | 37.4 | 41.6 | 43.0 | 48.1 | 53.7 | 53.2 | 59.6 | 66.9  | 63.9  | 71.9  | 80.8  |
|                     | 40          | 17.9                        | 19.6 | 21.5 | 25.5 | 28.2 | 31.1 | 34.1 | 38.0 | 42.3 | 43.7 | 48.9 | 54.7 | 54.1 | 60.8 | 68.2  | 65.2  | 73.4  | 82.5  |
| 180                 | 0           | 14.4                        | 15.7 | 17.1 | 20.0 | 22.0 | 24.2 | 26.3 | 29.1 | 32.2 | 33.1 | 36.8 | 41.0 | 40.4 | 45.2 | 50.5  | 48.2  | 54.0  | 60.6  |
|                     | 10          | 14.8                        | 16.1 | 17.6 | 20.6 | 22.6 | 24.9 | 27.0 | 29.9 | 33.1 | 34.1 | 37.9 | 42.2 | 41.6 | 46.5 | 52.0  | 49.7  | 55.7  | 62.5  |
|                     | 15          | 15.1                        | 16.4 | 17.9 | 21.0 | 23.0 | 25.3 | 27.5 | 30.5 | 33.7 | 34.7 | 38.6 | 43.0 | 42.4 | 47.4 | 53.0  | 50.6  | 56.7  | 63.6  |
|                     | 20          | 15.4                        | 16.7 | 18.2 | 21.3 | 23.5 | 25.8 | 28.0 | 31.0 | 34.4 | 35.3 | 39.3 | 43.8 | 43.2 | 48.3 | 53.9  | 51.5  | 57.8  | 64.8  |
|                     | 30          | 15.7                        | 17.1 | 18.7 | 21.9 | 24.1 | 26.5 | 28.8 | 31.8 | 35.3 | 36.3 | 40.4 | 45.0 | 44.4 | 49.6 | 55.5  | 53.0  | 59.4  | 66.6  |
|                     | 40          | 15.8                        | 17.2 | 18.8 | 22.1 | 24.3 | 26.8 | 29.1 | 32.3 | 35.8 | 36.8 | 41.0 | 45.7 | 45.1 | 50.5 | 56.5  | 53.9  | 60.5  | 68.0  |

To correct for wind, enter table with the brakes on speed minus one half the headwind or plus 1.5 times the tailwind.

If ground speed is used for brakes on speed, ignore wind and enter table with sea level, 15°C.

**ADVISORY INFORMATION**

**Recommended Brake Cooling Schedule**  
**Event Adjusted Brake Energy (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   | 100  | 110   | 120   |
| LANDING | RTO MAX MAN | 10                                                         | 20   | 30   | 40   | 50   | 60   | 70   | 80   | 90   | 100  | 110   | 120   |
|         | MAX MAN     | 3.6                                                        | 13.6 | 23.5 | 33.2 | 42.8 | 52.3 | 61.8 | 71.4 | 81.0 | 90.6 | 100.5 | 110.4 |
|         | MAX AUTO    | 3.5                                                        | 12.5 | 21.4 | 30.2 | 39.0 | 47.8 | 56.8 | 66.0 | 75.5 | 85.5 | 95.9  | 106.8 |
|         | AUTOBRAKE 4 | 3.2                                                        | 11.7 | 20.0 | 28.0 | 36.0 | 44.0 | 52.2 | 60.6 | 69.4 | 78.7 | 88.6  | 99.2  |
|         | AUTOBRAKE 3 | 2.7                                                        | 11.0 | 18.8 | 26.3 | 33.7 | 41.0 | 48.4 | 56.1 | 64.2 | 72.8 | 82.0  | 92.2  |
|         | AUTOBRAKE 2 | 2.3                                                        | 10.2 | 17.5 | 24.5 | 31.2 | 37.9 | 44.6 | 51.5 | 58.9 | 66.7 | 75.2  | 84.6  |
|         | AUTOBRAKE 1 | 1.9                                                        | 9.0  | 15.6 | 21.8 | 27.8 | 33.8 | 39.8 | 45.9 | 52.4 | 59.4 | 66.9  | 75.1  |

**2 Engine Reverse Thrust**

|         |             | REFERENCE BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS) |      |      |      |      |      |      |      |      |      |      |      |
|---------|-------------|------------------------------------------------------------|------|------|------|------|------|------|------|------|------|------|------|
| EVENT   |             | 10                                                         | 20   | 30   | 40   | 50   | 60   | 70   | 80   | 90   | 100  | 110  | 120  |
| LANDING | RTO MAX MAN | 10                                                         | 20   | 30   | 40   | 50   | 60   | 70   | 80   | 90   | 100  | 110  | 120  |
|         | MAX MAN     | 3.4                                                        | 12.0 | 21.2 | 30.6 | 39.7 | 48.6 | 57.4 | 65.9 | 74.4 | 82.8 | 91.3 | 99.7 |
|         | MAX AUTO    | 2.0                                                        | 8.8  | 15.9 | 23.2 | 30.5 | 38.0 | 45.7 | 53.7 | 62.1 | 71.0 | 80.6 | 90.9 |
|         | AUTOBRAKE 4 | 1.3                                                        | 5.6  | 10.9 | 16.6 | 22.5 | 28.3 | 34.3 | 40.7 | 47.5 | 54.9 | 63.0 | 72.0 |
|         | AUTOBRAKE 3 | 0.8                                                        | 3.1  | 7.0  | 11.6 | 16.2 | 20.9 | 25.8 | 30.9 | 36.6 | 42.7 | 49.6 | 57.3 |
|         | AUTOBRAKE 2 | 0.0                                                        | 2.3  | 5.0  | 7.8  | 10.8 | 14.0 | 17.4 | 21.2 | 25.6 | 30.4 | 36.0 | 42.4 |
|         | AUTOBRAKE 1 | 0.0                                                        | 1.6  | 3.3  | 5.2  | 7.2  | 9.4  | 11.8 | 14.4 | 17.4 | 20.8 | 24.7 | 29.2 |

**Cooling Time (Minutes)**

|                       |                         | EVENT ADJUSTED BRAKE ENERGY (MILLIONS OF FOOT POUNDS) |     |     |     |     |     |     |         |                        |            |
|-----------------------|-------------------------|-------------------------------------------------------|-----|-----|-----|-----|-----|-----|---------|------------------------|------------|
|                       |                         | 16 & BELOW                                            | 17  | 18  | 20  | 24  | 28  | 32  | 35      | 36 TO 44               | 45 & ABOVE |
| GEAR DOWN<br>INFLIGHT | NO SPECIAL<br>PROCEDURE | 1                                                     | 2   | 3   | 4   | 6   | 7   | 7   | CAUTION | FUSE PLUG<br>MELT ZONE |            |
|                       | GROUND                  | REQUIRED                                              | 11  | 18  | 26  | 42  | 55  | 66  |         |                        | 73         |
|                       | BTMS                    | UP TO 2.4                                             | 2.4 | 2.6 | 2.9 | 3.4 | 4.0 | 4.5 |         |                        | 4.9        |

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 for each taxi mile.

For one brake deactivated, increase brake energy by 10 percent.

For two brakes deactivated, increase brake energy by 20 percent.

When in caution zone, wheel fuse plugs may melt. Delay takeoff and inspect after one hour. If overheat occurs after takeoff, extend gear soon for at least 8 minutes.

When in fuse plug melt zone, clear runway immediately. Unless required, do not set parking brake. Do not 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 EICAS may be used 10 to 15 minutes after airplane has come to a complete stop, or inflight with gear retracted, to determine recommended cooling schedule. (When inflight with gear extended, the BTMS indications may vary between individual brakes, due to airstream effects.)

## ADVISORY INFORMATION

### Approach or Landing Climb Limited Weight

Valid for approach with flaps 20 and landing with flaps 30

| AIRPORT OAT |     | APPROACH OR LANDING CLIMB LIMITED WEIGHT (1000 KG) |       |       |       |       |       |
|-------------|-----|----------------------------------------------------|-------|-------|-------|-------|-------|
|             |     | AIRPORT PRESSURE ALTITUDE (FT)                     |       |       |       |       |       |
| °C          | °F  | -2000                                              | 0     | 2000  | 4000  | 6000  | 8000  |
| 54          | 129 | 297.3                                              | 279.1 |       |       |       |       |
| 52          | 126 | 306.3                                              | 287.0 |       |       |       |       |
| 50          | 122 | 315.2                                              | 294.5 | 269.7 |       |       |       |
| 48          | 118 | 323.5                                              | 303.4 | 276.9 |       |       |       |
| 46          | 115 | 331.8                                              | 312.4 | 284.1 | 259.6 |       |       |
| 44          | 111 | 340.4                                              | 321.1 | 291.5 | 267.7 |       |       |
| 42          | 108 | 352.1                                              | 329.0 | 299.1 | 275.0 | 251.6 |       |
| 40          | 104 | 359.1                                              | 337.3 | 307.2 | 281.4 | 257.0 |       |
| 38          | 100 | 366.2                                              | 349.6 | 316.0 | 287.8 | 262.8 | 233.8 |
| 36          | 97  | 369.0                                              | 356.4 | 323.2 | 293.4 | 269.2 | 238.4 |
| 34          | 93  | 369.3                                              | 363.2 | 330.4 | 299.7 | 274.4 | 243.0 |
| 32          | 90  | 369.5                                              | 365.7 | 338.2 | 306.4 | 278.7 | 247.1 |
| 30          | 86  | 369.8                                              | 365.9 | 346.1 | 312.9 | 282.9 | 250.9 |
| 28          | 82  | 370.1                                              | 366.0 | 352.5 | 318.7 | 287.3 | 254.6 |
| 26          | 79  | 370.3                                              | 366.1 | 352.7 | 322.6 | 292.2 | 258.2 |
| 24          | 75  | 370.6                                              | 366.3 | 352.8 | 326.0 | 297.0 | 263.1 |
| 22          | 72  | 370.8                                              | 366.4 | 352.9 | 327.4 | 300.3 | 268.1 |
| 20          | 68  | 371.1                                              | 366.5 | 352.9 | 327.5 | 302.5 | 272.4 |
| 18          | 64  | 371.3                                              | 366.7 | 353.0 | 327.6 | 304.7 | 275.2 |
| 16          | 61  | 371.6                                              | 366.8 | 353.1 | 327.6 | 304.7 | 276.9 |
| 14          | 57  | 371.8                                              | 366.9 | 353.2 | 327.7 | 304.8 | 278.5 |
| 12          | 54  | 372.0                                              | 367.0 | 353.3 | 327.8 | 304.9 | 278.6 |
| 10          | 50  | 372.2                                              | 367.2 | 353.3 | 327.9 | 304.9 | 278.7 |
| 8           | 46  | 372.3                                              | 367.3 | 353.4 | 327.9 | 304.9 | 278.7 |
| 6           | 43  | 372.5                                              | 367.4 | 350.4 | 328.0 | 304.9 | 272.8 |
| 4           | 40  | 372.6                                              | 367.4 | 341.5 | 313.7 | 286.7 | 254.9 |
| 2           | 36  | 372.7                                              | 367.5 | 341.6 | 313.8 | 286.8 | 254.9 |
| 0           | 32  | 372.8                                              | 367.5 | 341.6 | 313.8 | 286.8 | 255.0 |
| -40         | -40 | 373.4                                              | 367.8 | 341.6 | 313.8 | 286.8 | 255.0 |

Based on engine bleed for packs on, engine anti-ice off, and wing anti-ice off.

With engine bleed for packs off, increase weight by 1250 kg.

With engine anti-ice on, decrease weight by 150 kg.

With engine and wing anti-ice on, decrease weight by 2350 kg.

When operating in icing conditions during any part of the flight with forecast landing temperature below 10°C, decrease weight by 26950 kg.

ADVISORY INFORMATION

Approach or Landing Climb Limited Weight  
Valid for approach with flaps 20 and landing with flaps 25

| AIRPORT OAT |     | APPROACH OR LANDING CLIMB LIMITED WEIGHT (1000 KG) |       |       |       |       |       |
|-------------|-----|----------------------------------------------------|-------|-------|-------|-------|-------|
|             |     | AIRPORT PRESSURE ALTITUDE (FT)                     |       |       |       |       |       |
| °C          | °F  | -2000                                              | 0     | 2000  | 4000  | 6000  | 8000  |
| 54          | 129 | 302.7                                              | 284.5 |       |       |       |       |
| 52          | 126 | 310.0                                              | 292.5 |       |       |       |       |
| 50          | 122 | 317.6                                              | 300.2 | 275.6 |       |       |       |
| 48          | 118 | 325.1                                              | 307.8 | 282.4 |       |       |       |
| 46          | 115 | 332.9                                              | 315.3 | 289.8 | 267.1 |       |       |
| 44          | 111 | 340.7                                              | 322.9 | 297.4 | 273.6 |       |       |
| 42          | 108 | 351.0                                              | 330.3 | 304.4 | 280.1 | 258.9 |       |
| 40          | 104 | 357.8                                              | 337.9 | 311.1 | 286.7 | 264.5 |       |
| 38          | 100 | 365.0                                              | 348.4 | 318.5 | 293.4 | 269.9 | 241.1 |
| 36          | 97  | 367.8                                              | 355.1 | 325.0 | 299.2 | 275.1 | 245.9 |
| 34          | 93  | 368.0                                              | 361.9 | 331.6 | 305.0 | 279.9 | 250.6 |
| 32          | 90  | 368.3                                              | 364.3 | 338.6 | 310.6 | 284.3 | 254.9 |
| 30          | 86  | 368.5                                              | 364.5 | 345.5 | 315.9 | 288.7 | 259.0 |
| 28          | 82  | 368.8                                              | 364.6 | 351.2 | 320.8 | 293.2 | 262.9 |
| 26          | 79  | 369.1                                              | 364.8 | 351.4 | 324.4 | 298.1 | 266.5 |
| 24          | 75  | 369.3                                              | 364.9 | 351.5 | 327.7 | 302.6 | 270.7 |
| 22          | 72  | 369.6                                              | 365.0 | 351.6 | 329.0 | 305.5 | 274.7 |
| 20          | 68  | 369.8                                              | 365.2 | 351.6 | 329.1 | 307.3 | 278.2 |
| 18          | 64  | 370.1                                              | 365.3 | 351.7 | 329.1 | 309.0 | 281.0 |
| 16          | 61  | 370.3                                              | 365.4 | 351.8 | 329.2 | 309.1 | 282.8 |
| 14          | 57  | 370.5                                              | 365.5 | 351.9 | 329.3 | 309.1 | 284.4 |
| 12          | 54  | 370.7                                              | 365.7 | 351.9 | 329.3 | 309.2 | 284.5 |
| 10          | 50  | 370.9                                              | 365.8 | 352.0 | 329.4 | 309.2 | 284.5 |
| 8           | 46  | 371.1                                              | 365.9 | 352.1 | 329.5 | 309.3 | 284.6 |
| 6           | 43  | 371.2                                              | 366.0 | 352.1 | 329.5 | 309.3 | 284.5 |
| 4           | 40  | 371.3                                              | 366.0 | 352.2 | 329.6 | 309.3 | 278.4 |
| 2           | 36  | 371.4                                              | 366.1 | 352.2 | 329.6 | 309.4 | 278.4 |
| 0           | 32  | 371.5                                              | 366.1 | 352.3 | 329.7 | 309.4 | 278.4 |
| -40         | -40 | 372.1                                              | 366.4 | 352.4 | 329.8 | 309.5 | 278.5 |

Based on engine bleed for packs on, engine anti-ice off, and wing anti-ice off.  
With engine bleed for packs off, increase weight by 1400 kg.  
With engine anti-ice on, decrease weight by 100 kg.  
With engine and wing anti-ice on, decrease weight by 2300 kg.  
When operating in icing conditions during any part of the flight with forecast landing temperature below 10°C, decrease weight by 24500 kg.



## Performance Inflight - QRH

## Chapter PI-QRH

## Engine Inoperative

## Section 22

## ENGINE INOP

## Initial Max Continuous %N1

Based on .84M, engine bleed for packs on and anti-ice off

| TAT<br>(°C) | PRESSURE ALTITUDE (1000 FT) |       |       |       |       |       |       |       |       |
|-------------|-----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
|             | 27                          | 29    | 31    | 33    | 35    | 37    | 39    | 41    | 43    |
| 20          | 97.4                        | 97.0  | 96.7  | 96.3  | 95.9  | 95.9  | 95.6  | 95.3  | 95.0  |
| 15          | 98.2                        | 97.8  | 97.3  | 97.0  | 96.6  | 96.3  | 96.0  | 95.7  | 95.4  |
| 10          | 99.2                        | 98.9  | 98.3  | 97.7  | 97.2  | 97.0  | 96.6  | 96.3  | 96.0  |
| 5           | 100.2                       | 100.1 | 99.7  | 98.8  | 98.1  | 97.8  | 97.4  | 97.1  | 96.8  |
| 0           | 99.3                        | 100.9 | 101.0 | 99.9  | 99.3  | 98.8  | 98.3  | 97.9  | 97.6  |
| -5          | 98.4                        | 99.9  | 101.2 | 101.3 | 100.5 | 100.2 | 99.7  | 99.3  | 98.8  |
| -10         | 97.4                        | 99.0  | 100.3 | 101.6 | 101.3 | 101.3 | 100.7 | 100.3 | 100.0 |
| -15         | 96.5                        | 98.1  | 99.3  | 100.6 | 101.0 | 102.0 | 101.1 | 100.8 | 100.5 |
| -20         | 95.6                        | 97.1  | 98.3  | 99.6  | 100.1 | 101.0 | 100.1 | 99.8  | 99.5  |
| -25         | 94.6                        | 96.1  | 97.4  | 98.6  | 99.1  | 100.0 | 99.1  | 98.8  | 98.5  |
| -30         | 93.7                        | 95.2  | 96.4  | 97.6  | 98.1  | 99.0  | 98.1  | 97.8  | 97.5  |
| -35         | 92.7                        | 94.2  | 95.4  | 96.6  | 97.0  | 97.9  | 97.1  | 96.8  | 96.5  |
| -40         | 91.7                        | 93.2  | 94.4  | 95.6  | 96.0  | 96.9  | 96.1  | 95.8  | 95.5  |

# ENGINE INOP

## Max Continuous %N1

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

### 37000 FT to 27000 FT Pressure Altitudes

| 37000 FT PRESS ALT |      |      |      |       |       |       |       |       |       |       |       |       | TAT (°C) |  |
|--------------------|------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|--|
| CIAS               | M    | -50  | -45  | -40   | -35   | -30   | -25   | -20   | -15   | -10   | -5    | 0     | 5        |  |
| 280                | 0.86 | 94.3 | 95.4 | 96.4  | 97.4  | 98.4  | 99.5  | 100.5 | 101.4 | 101.2 | 100.2 | 98.9  | 97.7     |  |
| 240                | 0.74 | 96.1 | 97.2 | 98.3  | 99.3  | 100.4 | 101.4 | 102.1 | 101.9 | 100.9 | 99.5  | 98.1  | 97.1     |  |
| 200                | 0.63 | 95.7 | 96.7 | 97.8  | 98.8  | 99.9  | 100.8 | 101.4 | 100.9 | 100.0 | 98.5  | 97.0  | 96.3     |  |
| 35000 FT PRESS ALT |      |      |      |       |       |       |       |       |       |       |       |       | TAT (°C) |  |
| CIAS               | M    | -50  | -45  | -40   | -35   | -30   | -25   | -20   | -15   | -10   | -5    | 0     | 5        |  |
| 280                | 0.82 | 94.6 | 95.6 | 96.6  | 97.7  | 98.7  | 99.7  | 100.7 | 101.7 | 101.4 | 100.4 | 99.2  | 98.1     |  |
| 240                | 0.71 | 95.1 | 96.2 | 97.2  | 98.3  | 99.3  | 100.3 | 101.3 | 101.8 | 100.9 | 99.8  | 98.3  | 97.2     |  |
| 200                | 0.60 | 94.8 | 95.8 | 96.9  | 97.9  | 98.9  | 99.9  | 100.9 | 101.0 | 100.2 | 98.8  | 97.1  | 96.1     |  |
| 33000 FT PRESS ALT |      |      |      |       |       |       |       |       |       |       |       |       | TAT (°C) |  |
| CIAS               | M    | -50  | -45  | -40   | -35   | -30   | -25   | -20   | -15   | -10   | -5    | 0     | 5        |  |
| 320                | 0.89 | 91.4 | 92.4 | 93.4  | 94.4  | 95.4  | 96.4  | 97.4  | 98.3  | 99.3  | 100.2 | 99.8  | 98.8     |  |
| 280                | 0.79 | 95.0 | 96.0 | 97.1  | 98.1  | 99.2  | 100.2 | 101.2 | 102.2 | 102.4 | 101.0 | 100.0 | 98.7     |  |
| 240                | 0.68 | 95.6 | 96.7 | 97.8  | 98.8  | 99.8  | 100.9 | 101.9 | 102.4 | 101.8 | 100.2 | 98.9  | 97.5     |  |
| 200                | 0.58 | 95.9 | 97.0 | 98.0  | 99.1  | 100.1 | 101.1 | 101.6 | 101.6 | 101.0 | 99.3  | 97.9  | 96.4     |  |
| 31000 FT PRESS ALT |      |      |      |       |       |       |       |       |       |       |       |       | TAT (°C) |  |
| CIAS               | M    | -45  | -40  | -35   | -30   | -25   | -20   | -15   | -10   | -5    | 0     | 5     | 10       |  |
| 320                | 0.85 | 92.7 | 93.8 | 94.8  | 95.7  | 96.7  | 97.7  | 98.7  | 99.6  | 100.5 | 100.8 | 99.7  | 98.4     |  |
| 280                | 0.76 | 96.3 | 97.4 | 98.4  | 99.5  | 100.5 | 101.5 | 102.5 | 103.5 | 102.0 | 100.6 | 99.1  | 98.0     |  |
| 240                | 0.66 | 97.4 | 98.4 | 99.5  | 100.5 | 101.5 | 102.6 | 103.3 | 103.0 | 101.0 | 99.5  | 98.1  | 96.9     |  |
| 200                | 0.55 | 97.6 | 98.7 | 99.7  | 100.8 | 101.8 | 102.6 | 102.8 | 102.0 | 100.7 | 98.7  | 97.2  | 96.1     |  |
| 29000 FT PRESS ALT |      |      |      |       |       |       |       |       |       |       |       |       | TAT (°C) |  |
| CIAS               | M    | -40  | -35  | -30   | -25   | -20   | -15   | -10   | -5    | 0     | 5     | 10    | 15       |  |
| 320                | 0.82 | 93.8 | 94.8 | 95.8  | 96.8  | 97.8  | 98.7  | 99.7  | 100.6 | 101.6 | 100.1 | 98.9  | 97.8     |  |
| 280                | 0.73 | 96.6 | 97.6 | 98.6  | 99.6  | 100.6 | 101.6 | 102.6 | 102.5 | 101.0 | 99.5  | 98.1  | 97.1     |  |
| 240                | 0.63 | 98.1 | 99.2 | 100.2 | 101.3 | 102.3 | 103.3 | 103.1 | 101.6 | 99.8  | 98.4  | 97.1  | 96.0     |  |
| 200                | 0.53 | 98.6 | 99.7 | 100.7 | 101.7 | 102.7 | 103.2 | 102.7 | 101.2 | 99.4  | 97.7  | 96.3  | 96.2     |  |
| 27000 FT PRESS ALT |      |      |      |       |       |       |       |       |       |       |       |       | TAT (°C) |  |
| CIAS               | M    | -40  | -35  | -30   | -25   | -20   | -15   | -10   | -5    | 0     | 5     | 10    | 15       |  |
| 360                | 0.88 | 90.2 | 91.2 | 92.1  | 93.0  | 94.0  | 94.9  | 95.8  | 96.7  | 97.6  | 98.5  | 99.2  | 98.1     |  |
| 320                | 0.79 | 93.4 | 94.4 | 95.3  | 96.3  | 97.3  | 98.2  | 99.2  | 100.1 | 101.1 | 100.6 | 99.2  | 98.1     |  |
| 280                | 0.70 | 95.4 | 96.4 | 97.4  | 98.4  | 99.4  | 100.4 | 101.3 | 102.3 | 101.3 | 99.7  | 98.2  | 97.1     |  |
| 240                | 0.60 | 97.2 | 98.2 | 99.2  | 100.3 | 101.3 | 102.3 | 103.0 | 102.0 | 99.9  | 98.5  | 97.2  | 96.2     |  |
| 200                | 0.51 | 98.4 | 99.4 | 100.4 | 101.5 | 102.5 | 103.2 | 102.7 | 101.8 | 99.9  | 98.1  | 96.5  | 95.6     |  |

## %N1 Adjustments for Engine Bleed

| BLEED CONFIGURATION     | PRESSURE ALTITUDE (1000 FT) |      |      |      |      |      |
|-------------------------|-----------------------------|------|------|------|------|------|
|                         | 37                          | 35   | 33   | 31   | 29   | 27   |
| ENGINE A/I ON           | -0.2                        | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 |
| WING A/I ON - PACKS ON  | -0.4                        | -0.4 | -0.4 | -0.3 | -0.3 | -0.3 |
| WING A/I ON - PACKS OFF | -0.6                        | -0.5 | -0.5 | -0.5 | -0.5 | -0.4 |

## ENGINE INOP

### Max Continuous %N1

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

#### 25000 FT to 18000 FT Pressure Altitudes

| 25000 FT PRESS ALT |      |      | TAT (°C) |       |       |       |       |       |       |       |       |       |       |
|--------------------|------|------|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| CIAS               | M    | -35  | -30      | -25   | -20   | -15   | -10   | -5    | 0     | 5     | 10    | 15    | 20    |
| 360                | 0.85 | 91.2 | 92.2     | 93.1  | 94.1  | 95.0  | 95.9  | 96.8  | 97.7  | 98.6  | 99.5  | 98.9  | 98.1  |
| 320                | 0.76 | 93.9 | 94.8     | 95.8  | 96.8  | 97.7  | 98.7  | 99.6  | 100.5 | 101.1 | 99.6  | 98.5  | 97.6  |
| 280                | 0.67 | 95.5 | 96.5     | 97.5  | 98.5  | 99.4  | 100.4 | 101.3 | 101.5 | 100.4 | 98.8  | 97.5  | 96.7  |
| 240                | 0.58 | 97.4 | 98.5     | 99.5  | 100.5 | 101.5 | 102.4 | 102.3 | 100.9 | 99.3  | 97.8  | 96.7  | 95.9  |
| 200                | 0.49 | 99.3 | 100.3    | 101.4 | 102.4 | 103.4 | 103.1 | 102.0 | 100.6 | 98.5  | 97.1  | 96.1  | 95.9  |
| 24000 FT PRESS ALT |      |      | TAT (°C) |       |       |       |       |       |       |       |       |       |       |
| CIAS               | M    | -35  | -30      | -25   | -20   | -15   | -10   | -5    | 0     | 5     | 10    | 15    | 20    |
| 360                | 0.83 | 91.3 | 92.3     | 93.2  | 94.2  | 95.1  | 96.0  | 96.9  | 97.8  | 98.7  | 99.6  | 99.4  | 98.4  |
| 320                | 0.75 | 93.6 | 94.6     | 95.6  | 96.5  | 97.5  | 98.4  | 99.4  | 100.3 | 101.2 | 100.0 | 98.8  | 97.8  |
| 280                | 0.66 | 95.4 | 96.4     | 97.4  | 98.3  | 99.3  | 100.3 | 101.2 | 101.8 | 100.7 | 99.1  | 97.8  | 96.9  |
| 240                | 0.57 | 97.3 | 98.3     | 99.3  | 100.3 | 101.3 | 102.2 | 102.6 | 101.4 | 99.8  | 98.3  | 97.1  | 96.2  |
| 200                | 0.48 | 98.8 | 99.9     | 100.9 | 101.9 | 102.9 | 103.4 | 102.3 | 101.0 | 98.9  | 97.4  | 96.3  | 95.6  |
| 22000 FT PRESS ALT |      |      | TAT (°C) |       |       |       |       |       |       |       |       |       |       |
| CIAS               | M    | -30  | -25      | -20   | -15   | -10   | -5    | 0     | 5     | 10    | 15    | 20    | 25    |
| 360                | 0.80 | 92.1 | 93.0     | 94.0  | 94.9  | 95.8  | 96.7  | 97.6  | 98.5  | 99.4  | 100.0 | 99.0  | 98.3  |
| 320                | 0.72 | 94.3 | 95.3     | 96.3  | 97.2  | 98.1  | 99.1  | 100.0 | 100.9 | 100.7 | 99.3  | 98.2  | 97.5  |
| 280                | 0.63 | 96.1 | 97.1     | 98.1  | 99.0  | 100.0 | 100.9 | 101.9 | 101.3 | 99.8  | 98.4  | 97.3  | 96.6  |
| 240                | 0.55 | 97.7 | 98.7     | 99.7  | 100.7 | 101.7 | 102.7 | 102.3 | 100.9 | 99.3  | 97.7  | 96.8  | 96.1  |
| 200                | 0.46 | 99.5 | 100.5    | 101.5 | 102.5 | 103.5 | 103.0 | 101.5 | 99.9  | 97.9  | 96.8  | 95.9  | 95.8  |
| 20000 FT PRESS ALT |      |      | TAT (°C) |       |       |       |       |       |       |       |       |       |       |
| CIAS               | M    | -30  | -25      | -20   | -15   | -10   | -5    | 0     | 5     | 10    | 15    | 20    | 25    |
| 360                | 0.77 | 93.7 | 94.6     | 95.6  | 96.5  | 97.4  | 98.4  | 99.3  | 100.2 | 101.1 | 102.0 | 101.3 | 100.1 |
| 320                | 0.69 | 95.9 | 96.9     | 97.8  | 98.8  | 99.7  | 100.7 | 101.6 | 102.6 | 103.5 | 101.8 | 100.4 | 99.1  |
| 280                | 0.61 | 97.7 | 98.7     | 99.6  | 100.6 | 101.6 | 102.6 | 103.5 | 104.3 | 102.8 | 100.9 | 99.4  | 98.3  |
| 240                | 0.53 | 98.5 | 99.5     | 100.5 | 101.5 | 102.4 | 103.4 | 104.3 | 104.1 | 102.4 | 100.7 | 98.7  | 97.2  |
| 200                | 0.44 | 98.0 | 99.0     | 99.9  | 100.9 | 101.9 | 102.9 | 103.8 | 102.6 | 100.5 | 98.0  | 96.2  | 95.3  |
| 18000 FT PRESS ALT |      |      | TAT (°C) |       |       |       |       |       |       |       |       |       |       |
| CIAS               | M    | -25  | -20      | -15   | -10   | -5    | 0     | 5     | 10    | 15    | 20    | 25    | 30    |
| 360                | 0.75 | 94.4 | 95.4     | 96.3  | 97.2  | 98.2  | 99.1  | 100   | 100.9 | 101.8 | 102.0 | 100.6 | 99.4  |
| 320                | 0.67 | 96.7 | 97.7     | 98.6  | 99.6  | 100.5 | 101.4 | 102.4 | 103.3 | 102.9 | 101.2 | 99.7  | 98.6  |
| 280                | 0.59 | 98.5 | 99.5     | 100.5 | 101.5 | 102.4 | 103.4 | 104.3 | 104.0 | 102.3 | 100.4 | 98.9  | 97.8  |
| 240                | 0.51 | 99.6 | 100.6    | 101.6 | 102.6 | 103.6 | 104.5 | 104.9 | 103.9 | 101.9 | 100.0 | 98.4  | 97.2  |
| 200                | 0.42 | 97.2 | 98.2     | 99.2  | 100.1 | 101.1 | 101.9 | 102.0 | 100.8 | 98.8  | 97.3  | 95.8  | 94.4  |

### %N1 Adjustments for Engine Bleed

| BLEED CONFIGURATION     | PRESSURE ALTITUDE (1000 FT) |      |      |      |      |
|-------------------------|-----------------------------|------|------|------|------|
|                         | 25                          | 24   | 22   | 20   | 18   |
| ENGINE A/I ON           | -0.2                        | -0.2 | -0.2 | -0.2 | -0.2 |
| WING A/I ON - PACKS ON  | -0.3                        | -0.3 | -0.3 | -0.2 | -0.3 |
| WING A/I ON - PACKS OFF | -0.4                        | -0.4 | -0.4 | -0.3 | -0.5 |

## ENGINE INOP

### Max Continuous %N1

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

#### 16000 FT to 5000 FT Pressure Altitudes

| 16000 FT PRESS ALT |      |      | TAT (°C) |       |       |       |       |       |       |       |       |       |       |
|--------------------|------|------|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| KLAS               | M    | -25  | -20      | -15   | -10   | -5    | 0     | 5     | 10    | 15    | 20    | 25    | 30    |
| 360                | 0.72 | 94.8 | 95.8     | 96.7  | 97.6  | 98.6  | 99.5  | 100.4 | 101.3 | 102.2 | 103.1 | 101.7 | 100.2 |
| 320                | 0.64 | 96.9 | 97.9     | 98.8  | 99.8  | 100.7 | 101.7 | 102.6 | 103.5 | 104.4 | 102.7 | 100.9 | 99.4  |
| 280                | 0.57 | 98.7 | 99.7     | 100.7 | 101.6 | 102.6 | 103.5 | 104.5 | 105.4 | 104.1 | 102.2 | 100.3 | 98.8  |
| 240                | 0.49 | 99.1 | 100.1    | 101.1 | 102.0 | 103.0 | 104.0 | 104.9 | 104.5 | 103.0 | 100.9 | 99.2  | 97.9  |
| 200                | 0.41 | 96.2 | 97.2     | 98.1  | 99.1  | 100.0 | 100.9 | 101.5 | 101.3 | 99.8  | 98.3  | 97.0  | 95.4  |
| 14000 FT PRESS ALT |      |      | TAT (°C) |       |       |       |       |       |       |       |       |       |       |
| KLAS               | M    | -20  | -15      | -10   | -5    | 0     | 5     | 10    | 15    | 20    | 25    | 30    | 35    |
| 360                | 0.69 | 94.9 | 95.9     | 96.8  | 97.7  | 98.6  | 99.5  | 100.4 | 101.3 | 102.2 | 102.2 | 100.8 | 99.5  |
| 320                | 0.62 | 97.1 | 98.1     | 99.0  | 99.9  | 100.9 | 101.8 | 102.7 | 103.6 | 103.4 | 101.5 | 100.0 | 98.9  |
| 280                | 0.54 | 99.2 | 100.1    | 101.1 | 102.1 | 103.0 | 103.9 | 104.9 | 104.9 | 103.0 | 101.0 | 99.5  | 98.4  |
| 240                | 0.47 | 97.3 | 98.2     | 99.2  | 100.1 | 101.0 | 102.0 | 102.7 | 102.5 | 100.6 | 99.0  | 97.8  | 96.7  |
| 200                | 0.39 | 96.1 | 97.0     | 98.0  | 98.9  | 99.8  | 100.7 | 101.4 | 100.7 | 99.0  | 97.6  | 96.5  | 95.6  |
| 12000 FT PRESS ALT |      |      | TAT (°C) |       |       |       |       |       |       |       |       |       |       |
| KLAS               | M    | -15  | -10      | -5    | 0     | 5     | 10    | 15    | 20    | 25    | 30    | 35    | 40    |
| 360                | 0.67 | 95.4 | 96.3     | 97.2  | 98.1  | 99.0  | 99.9  | 100.8 | 101.6 | 102.5 | 101.3 | 100.0 | 99.0  |
| 320                | 0.60 | 97.3 | 98.2     | 99.2  | 100.1 | 101.0 | 101.9 | 102.8 | 103.7 | 102.3 | 100.6 | 99.4  | 98.4  |
| 280                | 0.52 | 99.7 | 100.6    | 101.6 | 102.5 | 103.5 | 104.4 | 105.3 | 104.0 | 102.0 | 100.2 | 99.1  | 98.1  |
| 240                | 0.45 | 96.5 | 97.4     | 98.3  | 99.3  | 100.2 | 101.1 | 101.4 | 100.6 | 99.2  | 98.0  | 96.9  | 96.0  |
| 200                | 0.38 | 96.7 | 97.7     | 98.6  | 99.5  | 100.4 | 101.2 | 101.3 | 100.2 | 98.7  | 97.4  | 96.4  | 95.8  |
| 10000 FT PRESS ALT |      |      | TAT (°C) |       |       |       |       |       |       |       |       |       |       |
| KLAS               | M    | -15  | -10      | -5    | 0     | 5     | 10    | 15    | 20    | 25    | 30    | 35    | 40    |
| 360                | 0.65 | 94.2 | 95.2     | 96.1  | 96.9  | 97.8  | 98.7  | 99.6  | 100.4 | 101.3 | 101.5 | 100.2 | 99.1  |
| 320                | 0.58 | 96.1 | 97.1     | 98.0  | 98.9  | 99.8  | 100.7 | 101.6 | 102.4 | 102.6 | 101.0 | 99.7  | 98.6  |
| 280                | 0.51 | 98.5 | 99.4     | 100.4 | 101.3 | 102.2 | 103.1 | 104.0 | 104.6 | 102.3 | 100.5 | 99.4  | 98.4  |
| 240                | 0.43 | 95.6 | 96.6     | 97.5  | 98.4  | 99.3  | 100.2 | 101.0 | 101.1 | 100.3 | 99.1  | 97.8  | 96.9  |
| 200                | 0.36 | 96.6 | 97.5     | 98.4  | 99.3  | 100.2 | 101.1 | 101.6 | 101.2 | 100.1 | 98.5  | 97.5  | 96.6  |
| 5000 FT PRESS ALT  |      |      | TAT (°C) |       |       |       |       |       |       |       |       |       |       |
| KLAS               | M    | -10  | -5       | 0     | 5     | 10    | 15    | 20    | 25    | 30    | 35    | 40    | 45    |
| 360                | 0.59 | 92.6 | 93.5     | 94.3  | 95.2  | 96.0  | 96.9  | 97.7  | 98.5  | 99.4  | 100.2 | 99.3  | 98.5  |
| 320                | 0.53 | 94.0 | 94.9     | 95.8  | 96.7  | 97.5  | 98.4  | 99.2  | 100.1 | 100.9 | 100.1 | 99.1  | 98.2  |
| 280                | 0.46 | 95.0 | 95.9     | 96.8  | 97.6  | 98.5  | 99.4  | 100.2 | 101.1 | 100.9 | 99.8  | 98.8  | 97.8  |
| 240                | 0.40 | 95.7 | 96.6     | 97.5  | 98.4  | 99.3  | 100.2 | 101.0 | 101.6 | 100.5 | 99.4  | 98.3  | 97.4  |
| 200                | 0.33 | 97.0 | 97.9     | 98.8  | 99.7  | 100.6 | 101.5 | 102.4 | 101.7 | 100.3 | 99.1  | 98.1  | 97.3  |

### %N1 Adjustments for Engine Bleed

| BLEED CONFIGURATION     | PRESSURE ALTITUDE (1000 FT) |      |      |      |      |
|-------------------------|-----------------------------|------|------|------|------|
|                         | 16                          | 14   | 12   | 10   | 5    |
| ENGINE A/I ON           | -0.3                        | -0.2 | -0.4 | -0.5 | -0.5 |
| WING A/I ON - PACKS ON  | -0.4                        | -0.5 | -0.6 | -0.7 | -0.8 |
| WING A/I ON - PACKS OFF | -0.6                        | -0.7 | -0.8 | -0.9 | -1.1 |





**ENGINE INOP**

**MAX CONTINUOUS THRUST**

**Driftdown Speed/Level Off Altitude**

**100 ft/min residual rate of climb**

**Includes APU fuel burn**

| WEIGHT (1000 KG)       |              | OPTIMUM<br>DRIFTDOWN<br>SPEED<br>(KIAS) | LEVEL OFF PRESSURE ALTITUDE (FT) |            |            |
|------------------------|--------------|-----------------------------------------|----------------------------------|------------|------------|
| START<br>DRIFT<br>DOWN | LEVEL<br>OFF |                                         | ISA + 10°C<br>& BELOW            | ISA + 15°C | ISA + 20°C |
| 360                    | 350          | 301                                     | 18000                            | 16900      | 15700      |
| 340                    | 331          | 293                                     | 19500                            | 18400      | 17300      |
| 320                    | 312          | 285                                     | 20900                            | 20200      | 19100      |
| 300                    | 291          | 276                                     | 22400                            | 21500      | 20600      |
| 280                    | 272          | 266                                     | 24200                            | 23200      | 22000      |
| 260                    | 252          | 257                                     | 26200                            | 25300      | 24000      |
| 240                    | 233          | 248                                     | 28500                            | 27700      | 26300      |
| 220                    | 214          | 238                                     | 30500                            | 30000      | 28900      |
| 200                    | 195          | 227                                     | 32300                            | 32000      | 31300      |
| 180                    | 175          | 215                                     | 34300                            | 34100      | 33800      |
| 160                    | 155          | 203                                     | 36500                            | 36400      | 36200      |

**ENGINE INOP**

**MAX CONTINUOUS THRUST**

**Driftdown/LRC Cruise Range Capability  
Ground to Air Miles Conversion**

| AIR DISTANCE (NM)        |      |      |      |      | GROUND<br>DISTANCE<br>(NM) | AIR DISTANCE (NM)        |      |      |      |      |
|--------------------------|------|------|------|------|----------------------------|--------------------------|------|------|------|------|
| HEADWIND COMPONENT (KTS) |      |      |      |      |                            | TAILWIND COMPONENT (KTS) |      |      |      |      |
| 100                      | 80   | 60   | 40   | 20   |                            | 20                       | 40   | 60   | 80   | 100  |
| 134                      | 125  | 118  | 111  | 105  | 100                        | 95                       | 90   | 86   | 82   | 79   |
| 268                      | 251  | 236  | 222  | 210  | 200                        | 190                      | 181  | 173  | 166  | 159  |
| 402                      | 376  | 354  | 333  | 316  | 300                        | 285                      | 272  | 260  | 249  | 239  |
| 535                      | 501  | 471  | 445  | 421  | 400                        | 380                      | 363  | 347  | 332  | 319  |
| 668                      | 626  | 588  | 555  | 526  | 500                        | 476                      | 454  | 434  | 416  | 399  |
| 800                      | 750  | 706  | 666  | 631  | 600                        | 571                      | 545  | 521  | 499  | 479  |
| 932                      | 874  | 823  | 777  | 736  | 700                        | 666                      | 636  | 608  | 583  | 560  |
| 1064                     | 998  | 940  | 888  | 841  | 800                        | 762                      | 727  | 696  | 667  | 640  |
| 1196                     | 1122 | 1057 | 998  | 946  | 900                        | 857                      | 818  | 783  | 751  | 721  |
| 1327                     | 1246 | 1173 | 1109 | 1051 | 1000                       | 952                      | 910  | 870  | 835  | 801  |
| 1459                     | 1369 | 1290 | 1220 | 1156 | 1100                       | 1048                     | 1001 | 958  | 918  | 882  |
| 1590                     | 1493 | 1407 | 1330 | 1262 | 1200                       | 1143                     | 1092 | 1045 | 1002 | 963  |
| 1722                     | 1617 | 1524 | 1441 | 1367 | 1300                       | 1239                     | 1183 | 1133 | 1086 | 1043 |
| 1854                     | 1741 | 1641 | 1552 | 1472 | 1400                       | 1334                     | 1275 | 1220 | 1170 | 1124 |
| 1986                     | 1865 | 1758 | 1662 | 1577 | 1500                       | 1430                     | 1366 | 1307 | 1254 | 1205 |
| 2118                     | 1989 | 1875 | 1773 | 1682 | 1600                       | 1525                     | 1457 | 1395 | 1338 | 1285 |
| 2250                     | 2113 | 1992 | 1884 | 1787 | 1700                       | 1620                     | 1548 | 1482 | 1421 | 1365 |
| 2383                     | 2238 | 2109 | 1995 | 1892 | 1800                       | 1716                     | 1639 | 1569 | 1505 | 1446 |

**Driftdown/Cruise Fuel and Time**

| AIR<br>DIST<br>(NM) | FUEL REQUIRED (1000 KG)                |      |      |      |      |      |      |      |      |      |      | TIME<br>(HR:MIN) |
|---------------------|----------------------------------------|------|------|------|------|------|------|------|------|------|------|------------------|
|                     | WEIGHT AT START OF DRIFTDOWN (1000 KG) |      |      |      |      |      |      |      |      |      |      |                  |
|                     | 160                                    | 180  | 200  | 220  | 240  | 260  | 280  | 300  | 320  | 340  | 360  |                  |
| 100                 | 1.0                                    | 1.1  | 1.2  | 1.4  | 1.4  | 1.6  | 1.7  | 1.7  | 1.8  | 1.9  | 2.0  | 0:15             |
| 200                 | 2.3                                    | 2.5  | 2.8  | 3.0  | 3.2  | 3.4  | 3.6  | 3.8  | 4.1  | 4.3  | 4.5  | 0:31             |
| 300                 | 3.6                                    | 3.9  | 4.4  | 4.8  | 5.1  | 5.4  | 5.8  | 6.1  | 6.5  | 6.9  | 7.2  | 0:46             |
| 400                 | 4.9                                    | 5.4  | 6.0  | 6.6  | 7.0  | 7.5  | 7.9  | 8.4  | 8.9  | 9.5  | 10.0 | 1:01             |
| 500                 | 6.2                                    | 6.8  | 7.5  | 8.2  | 8.8  | 9.4  | 10.0 | 10.6 | 11.2 | 11.9 | 12.6 | 1:16             |
| 600                 | 7.4                                    | 8.1  | 9.0  | 9.8  | 10.6 | 11.3 | 12.0 | 12.7 | 13.4 | 14.3 | 15.2 | 1:30             |
| 700                 | 8.6                                    | 9.4  | 10.4 | 11.4 | 12.3 | 13.1 | 13.9 | 14.8 | 15.6 | 16.6 | 17.7 | 1:45             |
| 800                 | 9.7                                    | 10.7 | 11.9 | 13.0 | 14.0 | 14.9 | 15.9 | 16.8 | 17.8 | 19.0 | 20.2 | 1:59             |
| 900                 | 10.9                                   | 12.0 | 13.3 | 14.5 | 15.6 | 16.8 | 17.8 | 18.9 | 20.0 | 21.3 | 22.7 | 2:14             |
| 1000                | 12.1                                   | 13.3 | 14.7 | 16.1 | 17.3 | 18.5 | 19.7 | 20.9 | 22.1 | 23.6 | 25.2 | 2:28             |
| 1100                | 13.2                                   | 14.6 | 16.1 | 17.6 | 19.0 | 20.3 | 21.6 | 22.9 | 24.3 | 25.9 | 27.6 | 2:43             |
| 1200                | 14.4                                   | 15.9 | 17.5 | 19.1 | 20.6 | 22.1 | 23.5 | 24.9 | 26.4 | 28.1 | 30.0 | 2:57             |
| 1300                | 15.5                                   | 17.2 | 18.9 | 20.6 | 22.3 | 23.8 | 25.4 | 26.9 | 28.5 | 30.4 | 32.4 | 3:11             |
| 1400                | 16.6                                   | 18.4 | 20.3 | 22.1 | 23.9 | 25.6 | 27.2 | 28.9 | 30.6 | 32.6 | 34.8 | 3:26             |
| 1500                | 17.7                                   | 19.6 | 21.7 | 23.6 | 25.5 | 27.3 | 29.1 | 30.9 | 32.7 | 34.8 | 37.2 | 3:40             |
| 1600                | 18.8                                   | 20.9 | 23.0 | 25.1 | 27.1 | 29.0 | 30.9 | 32.8 | 34.8 | 37.0 | 39.5 | 3:55             |
| 1700                | 19.9                                   | 22.1 | 24.4 | 26.6 | 28.7 | 30.7 | 32.8 | 34.8 | 36.8 | 39.2 | 41.9 | 4:10             |
| 1800                | 21.0                                   | 23.3 | 25.7 | 28.0 | 30.2 | 32.4 | 34.6 | 36.7 | 38.9 | 41.4 | 44.2 | 4:24             |

Includes APU fuel burn.

Driftdown at optimum driftdown speed and cruise at LRC speed.

# ENGINE INOP

## MAX CONTINUOUS THRUST

### Long Range Cruise Altitude Capability

100 ft/min residual rate of climb

| WEIGHT<br>(1000 KG) | PRESSURE ALTITUDE (FT) |            |            |
|---------------------|------------------------|------------|------------|
|                     | ISA + 10°C<br>& BELOW  | ISA + 15°C | ISA + 20°C |
| 360                 | 15600                  | 14200      | 12700      |
| 350                 | 16000                  | 14700      | 13200      |
| 340                 | 16900                  | 15200      | 13700      |
| 330                 | 17800                  | 16300      | 14600      |
| 320                 | 18800                  | 17300      | 15600      |
| 310                 | 19800                  | 18300      | 16600      |
| 300                 | 20500                  | 19300      | 17700      |
| 290                 | 21100                  | 20200      | 18700      |
| 280                 | 21800                  | 20800      | 19800      |
| 270                 | 22700                  | 21500      | 20600      |
| 260                 | 23600                  | 22300      | 21200      |
| 250                 | 24600                  | 23400      | 21900      |
| 240                 | 25800                  | 24600      | 23100      |
| 230                 | 27100                  | 25900      | 24300      |
| 220                 | 28500                  | 27300      | 25600      |
| 210                 | 29900                  | 28600      | 27100      |
| 200                 | 30900                  | 30000      | 28500      |
| 190                 | 31900                  | 31200      | 30100      |
| 180                 | 32900                  | 32500      | 31400      |
| 170                 | 34000                  | 33700      | 32800      |
| 160                 | 35200                  | 35100      | 34300      |

With engine anti-ice on, no altitude capability adjustment is required.

With engine and wing anti-ice on, decrease altitude capability by 300 ft.

**ENGINE INOP**

**MAX CONTINUOUS THRUST**

**Long Range Cruise Control**

| WEIGHT<br>(1000 KG) |        | PRESSURE ALTITUDE (1000 FT) |       |       |      |      |      |      |      |      |      |
|---------------------|--------|-----------------------------|-------|-------|------|------|------|------|------|------|------|
|                     |        | 10                          | 15    | 17    | 19   | 21   | 23   | 25   | 27   | 29   | 31   |
| 360                 | %N1    | 90.9                        | 96.3  |       |      |      |      |      |      |      |      |
|                     | MACH   | .602                        | .664  |       |      |      |      |      |      |      |      |
|                     | KIAS   | 334                         | 337   |       |      |      |      |      |      |      |      |
|                     | FF/ENG | 10070                       | 10778 |       |      |      |      |      |      |      |      |
| 340                 | %N1    | 89.9                        | 94.9  | 97.6  |      |      |      |      |      |      |      |
|                     | MACH   | .602                        | .664  | .683  |      |      |      |      |      |      |      |
|                     | KIAS   | 334                         | 337   | 335   |      |      |      |      |      |      |      |
|                     | FF/ENG | 9696                        | 10338 | 10505 |      |      |      |      |      |      |      |
| 320                 | %N1    | 88.7                        | 92.9  | 94.8  | 97.7 |      |      |      |      |      |      |
|                     | MACH   | .602                        | .653  | .670  | .689 |      |      |      |      |      |      |
|                     | KIAS   | 334                         | 332   | 328   | 325  |      |      |      |      |      |      |
|                     | FF/ENG | 9267                        | 9589  | 9644  | 9735 |      |      |      |      |      |      |
| 300                 | %N1    | 86.8                        | 91.0  | 92.7  | 94.7 | 97.9 |      |      |      |      |      |
|                     | MACH   | .592                        | .638  | .657  | .674 | .694 |      |      |      |      |      |
|                     | KIAS   | 329                         | 324   | 321   | 317  | 315  |      |      |      |      |      |
|                     | FF/ENG | 8693                        | 8874  | 8919  | 8944 | 9073 |      |      |      |      |      |
| 280                 | %N1    | 85.0                        | 89.2  | 90.8  | 92.6 | 94.8 | 98.3 |      |      |      |      |
|                     | MACH   | .574                        | .622  | .641  | .660 | .677 | .700 |      |      |      |      |
|                     | KIAS   | 319                         | 315   | 313   | 310  | 306  | 305  |      |      |      |      |
|                     | FF/ENG | 8068                        | 8218  | 8264  | 8284 | 8332 | 8544 |      |      |      |      |
| 260                 | %N1    | 82.9                        | 87.2  | 88.8  | 90.5 | 92.3 | 94.7 | 98.4 |      |      |      |
|                     | MACH   | .557                        | .605  | .623  | .643 | .662 | .679 | .704 |      |      |      |
|                     | KIAS   | 309                         | 306   | 304   | 302  | 299  | 295  | 294  |      |      |      |
|                     | FF/ENG | 7484                        | 7593  | 7619  | 7642 | 7676 | 7747 | 8011 |      |      |      |
| 240                 | %N1    | 80.8                        | 84.8  | 86.8  | 88.3 | 90.0 | 91.8 | 94.5 | 98.3 |      |      |
|                     | MACH   | .540                        | .585  | .605  | .624 | .644 | .663 | .681 | .707 |      |      |
|                     | KIAS   | 299                         | 296   | 295   | 293  | 291  | 288  | 284  | 283  |      |      |
|                     | FF/ENG | 6926                        | 6949  | 7005  | 7013 | 7041 | 7088 | 7163 | 7427 |      |      |
| 220                 | %N1    | 78.6                        | 82.5  | 84.2  | 86.1 | 87.7 | 89.4 | 91.2 | 93.8 | 97.8 |      |
|                     | MACH   | .522                        | .564  | .584  | .604 | .623 | .644 | .663 | .681 | .708 |      |
|                     | KIAS   | 289                         | 285   | 284   | 283  | 281  | 279  | 276  | 272  | 272  |      |
|                     | FF/ENG | 6372                        | 6314  | 6372  | 6413 | 6419 | 6456 | 6501 | 6563 | 6820 |      |
| 200                 | %N1    | 76.2                        | 79.9  | 81.7  | 83.4 | 85.3 | 86.9 | 88.6 | 90.4 | 93.0 | 96.9 |
|                     | MACH   | .503                        | .543  | .561  | .581 | .601 | .621 | .642 | .661 | .680 | .706 |
|                     | KIAS   | 278                         | 274   | 272   | 271  | 270  | 268  | 267  | 264  | 260  | 260  |
|                     | FF/ENG | 5827                        | 5717  | 5752  | 5795 | 5829 | 5836 | 5870 | 5906 | 5957 | 6195 |
| 180                 | %N1    | 73.8                        | 77.2  | 78.9  | 80.7 | 82.3 | 84.2 | 85.8 | 87.5 | 89.3 | 91.9 |
|                     | MACH   | .484                        | .521  | .538  | .556 | .575 | .596 | .616 | .638 | .658 | .677 |
|                     | KIAS   | 268                         | 263   | 261   | 259  | 258  | 257  | 256  | 254  | 251  | 248  |
|                     | FF/ENG | 5301                        | 5135  | 5167  | 5198 | 5215 | 5244 | 5254 | 5279 | 5309 | 5352 |
| 160                 | %N1    | 71.0                        | 74.3  | 76.0  | 77.6 | 79.3 | 81.0 | 82.7 | 84.5 | 86.1 | 88.0 |
|                     | MACH   | .464                        | .498  | .514  | .530 | .548 | .567 | .589 | .609 | .631 | .652 |
|                     | KIAS   | 257                         | 251   | 249   | 247  | 246  | 244  | 243  | 242  | 240  | 238  |
|                     | FF/ENG | 4797                        | 4574  | 4596  | 4632 | 4637 | 4636 | 4658 | 4673 | 4689 | 4716 |

# ENGINE INOP

## MAX CONTINUOUS THRUST

### Long Range Cruise Diversion Fuel and Time

#### Ground to Air Miles Conversion

| AIR DISTANCE (NM)        |      |      |      |      | GROUND<br>DISTANCE<br>(NM) | AIR DISTANCE (NM)        |      |      |      |      |
|--------------------------|------|------|------|------|----------------------------|--------------------------|------|------|------|------|
| HEADWIND COMPONENT (KTS) |      |      |      |      |                            | TAILWIND COMPONENT (KTS) |      |      |      |      |
| 100                      | 80   | 60   | 40   | 20   |                            | 20                       | 40   | 60   | 80   | 100  |
| 284                      | 263  | 244  | 227  | 213  | 200                        | 190                      | 181  | 173  | 166  | 159  |
| 565                      | 523  | 485  | 453  | 425  | 400                        | 381                      | 364  | 348  | 334  | 321  |
| 847                      | 784  | 728  | 680  | 638  | 600                        | 572                      | 546  | 522  | 501  | 482  |
| 1129                     | 1045 | 970  | 906  | 850  | 800                        | 763                      | 729  | 698  | 669  | 643  |
| 1413                     | 1308 | 1214 | 1133 | 1063 | 1000                       | 954                      | 911  | 872  | 836  | 804  |
| 1697                     | 1570 | 1457 | 1361 | 1276 | 1200                       | 1145                     | 1094 | 1047 | 1004 | 965  |
| 1982                     | 1834 | 1701 | 1588 | 1489 | 1400                       | 1336                     | 1276 | 1221 | 1171 | 1125 |
| 2268                     | 2097 | 1945 | 1815 | 1702 | 1600                       | 1526                     | 1458 | 1395 | 1338 | 1286 |
| 2554                     | 2362 | 2190 | 2043 | 1915 | 1800                       | 1717                     | 1640 | 1569 | 1505 | 1446 |
| 2842                     | 2626 | 2434 | 2270 | 2128 | 2000                       | 1908                     | 1822 | 1743 | 1671 | 1606 |

### Reference Fuel and Time Required at Check Point

| AIR<br>DIST<br>(NM) | PRESSURE ALTITUDE (1000 FT) |                  |                   |                  |                   |                  |                   |                  |                   |                  |
|---------------------|-----------------------------|------------------|-------------------|------------------|-------------------|------------------|-------------------|------------------|-------------------|------------------|
|                     | 10                          |                  | 14                |                  | 18                |                  | 22                |                  | 26                |                  |
|                     | FUEL<br>(1000 KG)           | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) |
| 200                 | 3.8                         | 0:39             | 3.3               | 0:38             | 3.0               | 0:36             | 2.7               | 0:36             | 2.5               | 0:35             |
| 400                 | 8.0                         | 1:13             | 7.3               | 1:10             | 6.8               | 1:08             | 6.4               | 1:05             | 6.1               | 1:03             |
| 600                 | 12.1                        | 1:48             | 11.2              | 1:44             | 10.6              | 1:39             | 10.0              | 1:35             | 9.7               | 1:32             |
| 800                 | 16.2                        | 2:23             | 15.1              | 2:17             | 14.3              | 2:11             | 13.6              | 2:06             | 13.2              | 2:01             |
| 1000                | 20.2                        | 2:59             | 18.9              | 2:50             | 18.0              | 2:43             | 17.1              | 2:36             | 16.7              | 2:30             |
| 1200                | 24.2                        | 3:34             | 22.7              | 3:24             | 21.7              | 3:15             | 20.7              | 3:06             | 20.2              | 2:59             |
| 1400                | 28.2                        | 4:10             | 26.5              | 3:58             | 25.3              | 3:47             | 24.1              | 3:37             | 23.6              | 3:29             |
| 1600                | 32.1                        | 4:46             | 30.2              | 4:33             | 28.9              | 4:19             | 27.6              | 4:08             | 26.9              | 3:58             |
| 1800                | 36.0                        | 5:22             | 33.8              | 5:07             | 32.4              | 4:52             | 31.0              | 4:39             | 30.2              | 4:28             |
| 2000                | 39.8                        | 5:59             | 37.5              | 5:42             | 36.0              | 5:25             | 34.4              | 5:10             | 33.5              | 4:58             |

### Fuel Required Adjustment (1000 KG)

| REFERENCE FUEL REQUIRED<br>(1000 KG) | WEIGHT AT CHECK POINT (1000 KG) |      |      |      |      |     |     |     |     |      |      |  |
|--------------------------------------|---------------------------------|------|------|------|------|-----|-----|-----|-----|------|------|--|
|                                      | 150                             | 170  | 190  | 210  | 230  | 250 | 270 | 290 | 310 | 330  | 350  |  |
| 5                                    | -1.0                            | -0.8 | -0.6 | -0.4 | -0.2 | 0.0 | 0.3 | 0.7 | 1.1 | 1.7  | 2.4  |  |
| 10                                   | -2.1                            | -1.7 | -1.3 | -0.9 | -0.4 | 0.0 | 0.7 | 1.5 | 2.5 | 3.7  | 5.0  |  |
| 15                                   | -3.3                            | -2.6 | -2.0 | -1.3 | -0.7 | 0.0 | 1.0 | 2.3 | 3.8 | 5.6  | 7.6  |  |
| 20                                   | -4.4                            | -3.5 | -2.7 | -1.8 | -0.9 | 0.0 | 1.4 | 3.1 | 5.1 | 7.4  | 9.9  |  |
| 25                                   | -5.5                            | -4.4 | -3.4 | -2.2 | -1.1 | 0.0 | 1.8 | 3.9 | 6.3 | 9.1  | 12.2 |  |
| 30                                   | -6.7                            | -5.4 | -4.0 | -2.7 | -1.3 | 0.0 | 2.1 | 4.6 | 7.5 | 10.7 | 14.3 |  |
| 35                                   | -7.8                            | -6.3 | -4.7 | -3.2 | -1.6 | 0.0 | 2.5 | 5.3 | 8.6 | 12.2 | 16.2 |  |
| 40                                   | -8.9                            | -7.2 | -5.4 | -3.6 | -1.8 | 0.0 | 2.8 | 6.0 | 9.7 | 13.7 | 18.1 |  |

Includes APU fuel burn.

**ENGINE INOP**

**MAX CONTINUOUS THRUST**

**Holding  
Flaps Up**

| WEIGHT<br>(1000 KG) |        | PRESSURE ALTITUDE (FT) |      |       |       |       |       |       |
|---------------------|--------|------------------------|------|-------|-------|-------|-------|-------|
|                     |        | 1500                   | 5000 | 10000 | 15000 | 20000 | 25000 | 30000 |
| 360                 | %N1    | 80.5                   | 83.9 | 88.6  | 93.4  |       |       |       |
|                     | KIAS   | 264                    | 264  | 265   | 269   |       |       |       |
|                     | FF/ENG | 9070                   | 9130 | 9370  | 9670  |       |       |       |
| 340                 | %N1    | 78.7                   | 81.9 | 86.7  | 91.4  | 100.4 |       |       |
|                     | KIAS   | 260                    | 260  | 260   | 260   | 299   |       |       |
|                     | FF/ENG | 8520                   | 8560 | 8730  | 8950  | 10320 |       |       |
| 320                 | %N1    | 76.7                   | 79.7 | 84.6  | 89.2  | 96.4  |       |       |
|                     | KIAS   | 253                    | 253  | 253   | 253   | 289   |       |       |
|                     | FF/ENG | 7930                   | 7940 | 8050  | 8210  | 9240  |       |       |
| 300                 | %N1    | 74.7                   | 77.7 | 82.3  | 87.1  | 92.4  |       |       |
|                     | KIAS   | 244                    | 244  | 244   | 244   | 259   |       |       |
|                     | FF/ENG | 7380                   | 7360 | 7430  | 7550  | 8120  |       |       |
| 280                 | %N1    | 72.8                   | 75.7 | 80.1  | 85.0  | 90.1  |       |       |
|                     | KIAS   | 238                    | 238  | 238   | 238   | 238   |       |       |
|                     | FF/ENG | 6880                   | 6850 | 6880  | 6950  | 7350  |       |       |
| 260                 | %N1    | 70.7                   | 73.6 | 77.8  | 82.8  | 87.8  | 95.1  |       |
|                     | KIAS   | 229                    | 229  | 229   | 229   | 229   | 262   |       |
|                     | FF/ENG | 6380                   | 6340 | 6330  | 6380  | 6690  | 7470  |       |
| 240                 | %N1    | 68.5                   | 71.5 | 75.6  | 80.3  | 85.4  | 90.5  |       |
|                     | KIAS   | 223                    | 223  | 223   | 223   | 223   | 228   |       |
|                     | FF/ENG | 5910                   | 5870 | 5820  | 5850  | 6110  | 6420  |       |
| 220                 | %N1    | 66.2                   | 69.1 | 73.2  | 77.7  | 82.8  | 87.7  | 96.7  |
|                     | KIAS   | 217                    | 217  | 217   | 217   | 217   | 217   | 242   |
|                     | FF/ENG | 5440                   | 5400 | 5330  | 5350  | 5530  | 5760  | 6550  |
| 200                 | %N1    | 64.1                   | 66.7 | 71.0  | 75.3  | 80.1  | 85.0  | 91.2  |
|                     | KIAS   | 217                    | 217  | 217   | 217   | 217   | 217   | 226   |
|                     | FF/ENG | 5010                   | 4970 | 4910  | 4900  | 5040  | 5200  | 5550  |
| 180                 | %N1    | 62.0                   | 64.6 | 68.6  | 72.9  | 77.6  | 82.5  | 87.2  |
|                     | KIAS   | 217                    | 217  | 217   | 217   | 217   | 217   | 217   |
|                     | FF/ENG | 4630                   | 4580 | 4520  | 4500  | 4630  | 4730  | 4880  |
| 160                 | %N1    | 59.9                   | 62.6 | 66.3  | 70.7  | 75.2  | 80.0  | 84.7  |
|                     | KIAS   | 217                    | 217  | 217   | 217   | 217   | 217   | 217   |
|                     | FF/ENG | 4300                   | 4240 | 4160  | 4140  | 4250  | 4340  | 4450  |

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

# ENGINE INOP

## ADVISORY INFORMATION

### Gear Down Landing Rate of Climb Available

#### Flaps 20

| TAT (°C) | RATE OF CLIMB (FT/MIN) |     |      |      |      |      |
|----------|------------------------|-----|------|------|------|------|
|          | PRESSURE ALTITUDE (FT) |     |      |      |      |      |
|          | -2000                  | 0   | 2000 | 4000 | 6000 | 8000 |
| 52       | 460                    | 370 |      |      |      |      |
| 50       | 510                    | 420 | 260  |      |      |      |
| 48       | 560                    | 470 | 310  |      |      |      |
| 46       | 600                    | 510 | 360  | 210  |      |      |
| 44       | 650                    | 560 | 400  | 260  |      |      |
| 42       | 690                    | 610 | 450  | 300  | 150  |      |
| 40       | 720                    | 660 | 490  | 340  | 190  |      |
| 38       | 730                    | 700 | 540  | 380  | 220  | 20   |
| 36       | 730                    | 720 | 580  | 410  | 250  | 50   |
| 34       | 730                    | 730 | 610  | 450  | 280  | 80   |
| 32       | 740                    | 730 | 650  | 490  | 310  | 100  |
| 30       | 740                    | 730 | 650  | 520  | 350  | 130  |
| 20       | 760                    | 750 | 660  | 550  | 420  | 240  |
| 10       | 780                    | 770 | 620  | 440  | 300  | 150  |
| 0        | 800                    | 780 | 610  | 410  | 210  | -30  |
| -20      | 830                    | 810 | 630  | 430  | 220  | -30  |
| -40      | 870                    | 850 | 650  | 440  | 220  | -30  |

Rate of climb capability shown is valid for 220000 kg, gear down at VREF20 + 5.

Decrease rate of climb 40 ft/min per 5000 kg greater than 220000 kg.

Increase rate of climb 50 ft/min per 5000 kg less than 220000 kg.

#### Flaps 25

| TAT (°C) | RATE OF CLIMB (FT/MIN) |     |      |      |      |      |
|----------|------------------------|-----|------|------|------|------|
|          | PRESSURE ALTITUDE (FT) |     |      |      |      |      |
|          | -2000                  | 0   | 2000 | 4000 | 6000 | 8000 |
| 52       | 140                    | 50  |      |      |      |      |
| 50       | 190                    | 100 | -60  |      |      |      |
| 48       | 230                    | 140 | -10  |      |      |      |
| 46       | 280                    | 190 | 30   | -110 |      |      |
| 44       | 320                    | 230 | 70   | -70  |      |      |
| 42       | 360                    | 280 | 120  | -30  | -170 |      |
| 40       | 400                    | 320 | 160  | 10   | -140 |      |
| 38       | 400                    | 360 | 200  | 40   | -110 | -310 |
| 36       | 400                    | 390 | 230  | 80   | -90  | -280 |
| 34       | 400                    | 390 | 270  | 110  | -60  | -260 |
| 32       | 410                    | 390 | 300  | 140  | -30  | -240 |
| 30       | 410                    | 400 | 310  | 170  | 0    | -210 |
| 20       | 420                    | 410 | 320  | 200  | 80   | -110 |
| 10       | 440                    | 420 | 300  | 200  | -110 | -280 |
| 0        | 450                    | 420 | 250  | 60   | -140 | -380 |
| -20      | 470                    | 440 | 260  | 60   | -150 | -390 |
| -40      | 490                    | 460 | 270  | 60   | -150 | -410 |

Rate of climb capability shown is valid for 220000 kg, gear down at VREF25 + 5.

Decrease rate of climb 40 ft/min per 5000 kg greater than 220000 kg.

Increase rate of climb 50 ft/min per 5000 kg less than 220000 kg.



ENGINE INOP

ADVISORY INFORMATION

Gear Down Landing Rate of Climb Available  
Flaps 30

| TAT (°C) | RATE OF CLIMB (FT/MIN) |      |      |      |      |      |
|----------|------------------------|------|------|------|------|------|
|          | PRESSURE ALTITUDE (FT) |      |      |      |      |      |
|          | -2000                  | 0    | 2000 | 4000 | 6000 | 8000 |
| 52       | -100                   | -190 |      |      |      |      |
| 50       | -50                    | -150 | -300 |      |      |      |
| 48       | -10                    | -110 | -260 |      |      |      |
| 46       | 30                     | -60  | -220 | -360 |      |      |
| 44       | 70                     | -20  | -180 | -320 |      |      |
| 42       | 110                    | 20   | -140 | -280 | -420 |      |
| 40       | 140                    | 60   | -100 | -250 | -400 |      |
| 38       | 150                    | 100  | -60  | -210 | -370 | -560 |
| 36       | 150                    | 130  | -30  | -190 | -340 | -540 |
| 34       | 150                    | 130  | 10   | -150 | -320 | -510 |
| 32       | 150                    | 130  | 30   | -120 | -290 | -490 |
| 30       | 150                    | 140  | 50   | -90  | -260 | -470 |
| 20       | 160                    | 140  | 50   | -60  | -190 | -370 |
| 10       | 170                    | 150  | 10   | -110 | -220 | -610 |
| 0        | 180                    | 150  | -20  | -210 | -410 | -640 |
| -20      | 180                    | 160  | -30  | -220 | -420 | -660 |
| -40      | 190                    | 160  | -30  | -230 | -440 | -690 |

Rate of climb capability shown is valid for 220000 kg, gear down at VREF30 + 5.  
Decrease rate of climb 40 ft/min per 5000 kg greater than 220000 kg.  
Increase rate of climb 40 ft/min per 5000 kg less than 220000 kg.



**Performance Inflight - QRH****Chapter PI-QRH****Gear Down****Section 23****GEAR DOWN****220 KIAS Max Climb %N1**

| TAT<br>(°C) | PRESSURE ALTITUDE (1000 FT) |      |      |      |      |       |       |       |       |       |       |       |       |       |       |
|-------------|-----------------------------|------|------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|             | 0                           | 5    | 10   | 12   | 14   | 16    | 18    | 20    | 22    | 24    | 26    | 28    | 30    | 32    | 34    |
| 55          | 88.2                        | 88.3 | 91.4 | 91.1 | 92.1 | 91.3  | 94.0  | 95.2  | 95.4  | 98.1  | 99.9  | 101.1 | 102.4 | 102.9 | 103.4 |
| 50          | 89.5                        | 88.8 | 90.7 | 90.4 | 91.4 | 92.1  | 93.3  | 94.5  | 94.7  | 97.3  | 99.2  | 100.3 | 101.6 | 102.1 | 102.6 |
| 45          | 90.5                        | 90.1 | 90.0 | 89.7 | 90.7 | 91.4  | 92.6  | 93.8  | 93.9  | 96.6  | 98.4  | 99.6  | 100.8 | 101.3 | 101.8 |
| 40          | 91.6                        | 91.2 | 91.2 | 89.7 | 89.9 | 90.7  | 91.9  | 93.0  | 93.2  | 95.8  | 97.6  | 98.8  | 100.0 | 100.5 | 101.0 |
| 35          | 92.6                        | 92.3 | 92.2 | 92.1 | 90.6 | 89.9  | 91.1  | 92.3  | 92.5  | 95.0  | 96.8  | 98.0  | 99.2  | 99.7  | 100.2 |
| 30          | 93.0                        | 93.2 | 93.2 | 93.0 | 92.2 | 91.2  | 90.9  | 91.5  | 91.7  | 94.3  | 96.0  | 97.2  | 98.4  | 98.9  | 99.4  |
| 25          | 92.2                        | 94.2 | 94.1 | 94.0 | 93.7 | 92.8  | 92.1  | 92.0  | 91.1  | 93.5  | 95.2  | 96.4  | 97.6  | 98.0  | 98.5  |
| 20          | 91.4                        | 94.2 | 95.1 | 95.0 | 94.9 | 94.4  | 93.4  | 93.0  | 92.8  | 93.6  | 94.4  | 95.6  | 96.8  | 97.2  | 97.7  |
| 15          | 90.7                        | 93.4 | 96.7 | 96.4 | 96.3 | 96.1  | 94.8  | 94.1  | 94.5  | 94.8  | 95.2  | 95.3  | 96.0  | 96.4  | 96.9  |
| 10          | 89.9                        | 92.6 | 96.3 | 97.9 | 98.1 | 98.1  | 96.8  | 95.5  | 96.5  | 96.2  | 96.4  | 96.4  | 96.6  | 96.1  | 96.0  |
| 5           | 89.1                        | 91.7 | 95.4 | 97.1 | 98.9 | 100.3 | 99.0  | 97.9  | 98.2  | 97.8  | 97.8  | 97.9  | 97.9  | 97.3  | 96.8  |
| 0           | 88.3                        | 90.9 | 94.6 | 96.2 | 98.0 | 100.1 | 100.8 | 100.3 | 100.1 | 99.7  | 99.4  | 99.4  | 99.5  | 98.6  | 98.1  |
| -5          | 87.4                        | 90.1 | 93.7 | 95.3 | 97.1 | 99.1  | 99.9  | 100.8 | 101.9 | 101.5 | 101.1 | 101.1 | 101.1 | 100.2 | 99.6  |
| -10         | 86.6                        | 89.2 | 92.8 | 94.4 | 96.1 | 98.2  | 98.9  | 99.8  | 101.4 | 102.8 | 102.6 | 102.6 | 103.0 | 101.6 | 100.8 |
| -15         | 85.8                        | 88.4 | 91.9 | 93.5 | 95.2 | 97.3  | 98.0  | 98.9  | 100.4 | 101.8 | 102.5 | 103.2 | 103.8 | 102.5 | 101.4 |
| -20         | 85.0                        | 87.5 | 91.1 | 92.6 | 94.3 | 96.3  | 97.0  | 97.9  | 99.4  | 100.8 | 101.5 | 102.2 | 103.3 | 102.4 | 101.3 |

**Anti-ice Adjustment**

| BLEED CONFIGURATION              | PRESSURE ALTITUDE (1000 FT) |      |      |      |      |      |      |      |
|----------------------------------|-----------------------------|------|------|------|------|------|------|------|
|                                  | 0                           | 5    | 10   | 15   | 20   | 25   | 30   | 35   |
| 2 PACKS ON - 1 BLEED SOURCE      | -0.4                        | -0.5 | -0.4 | -0.3 | -0.2 | -0.3 | -0.3 | -0.4 |
| 1 PACK ON - 1 OR 2 BLEED SOURCES | -0.4                        | -0.5 | -0.4 | -0.3 | -0.2 | -0.3 | -0.3 | -0.4 |
| ENGINE ANTI-ICE ON               | -0.3                        | -0.5 | -0.4 | -0.3 | -0.1 | -0.2 | -0.2 | -0.2 |
| ENGINE AND WING ANTI-ICE ON*     | -0.6                        | -0.8 | -0.7 | -0.5 | -0.2 | -0.3 | -0.3 | -0.4 |
| ENGINE AND WING ANTI-ICE ON**    | -1.1                        | -0.9 | -0.9 | -0.6 | -0.3 | -0.4 | -0.5 | -0.5 |

\* Packs on or off with 2 bleed sources.

\*\* Packs off with 1 bleed source.



## GEAR DOWN

### Long Range Cruise Altitude Capability

Max Climb Thrust, 300 ft/min residual rate of climb

| WEIGHT<br>(1000 KG) | PRESSURE ALTITUDE (FT) |            |            |
|---------------------|------------------------|------------|------------|
|                     | ISA + 10°C<br>& BELOW  | ISA + 15°C | ISA + 20°C |
| 360                 | 18500                  | 16600      | 14200      |
| 350                 | 19200                  | 17300      | 14800      |
| 340                 | 19700                  | 18000      | 15500      |
| 330                 | 20600                  | 18900      | 16300      |
| 320                 | 21700                  | 20100      | 17600      |
| 310                 | 22800                  | 21300      | 19000      |
| 300                 | 23900                  | 22400      | 20300      |
| 290                 | 25000                  | 23500      | 21800      |
| 280                 | 26000                  | 24600      | 23000      |
| 270                 | 27100                  | 25900      | 24300      |
| 260                 | 28200                  | 27200      | 25700      |
| 250                 | 29400                  | 28600      | 27100      |
| 240                 | 30400                  | 30000      | 28500      |
| 230                 | 31200                  | 30800      | 29900      |
| 220                 | 32000                  | 31700      | 31000      |
| 210                 | 32800                  | 32600      | 32000      |
| 200                 | 33500                  | 33200      | 32700      |
| 190                 | 34000                  | 33900      | 33400      |
| 180                 | 34600                  | 34500      | 34100      |
| 170                 | 35200                  | 35100      | 34700      |
| 160                 | 35800                  | 35700      | 35300      |



# GEAR DOWN

## Long Range Cruise Control

| WEIGHT<br>(1000 KG) |        | PRESSURE ALTITUDE (1000 FT) |      |      |      |      |      |      |      |      |      |
|---------------------|--------|-----------------------------|------|------|------|------|------|------|------|------|------|
|                     |        | 10                          | 15   | 17   | 19   | 21   | 23   | 25   | 27   | 29   | 31   |
| 360                 | %N1    | 84.4                        | 88.7 | 90.7 | 93.0 |      |      |      |      |      |      |
|                     | MACH   | .488                        | .535 | .556 | .578 |      |      |      |      |      |      |
|                     | KIAS   | 270                         | 270  | 270  | 270  |      |      |      |      |      |      |
|                     | FF/ENG | 7524                        | 7653 | 7775 | 7993 |      |      |      |      |      |      |
| 340                 | %N1    | 83.5                        | 87.8 | 89.7 | 91.8 |      |      |      |      |      |      |
|                     | MACH   | .488                        | .535 | .556 | .578 |      |      |      |      |      |      |
|                     | KIAS   | 270                         | 270  | 270  | 270  |      |      |      |      |      |      |
|                     | FF/ENG | 7296                        | 7405 | 7486 | 7646 |      |      |      |      |      |      |
| 320                 | %N1    | 82.6                        | 86.7 | 88.3 | 90.0 | 92.1 |      |      |      |      |      |
|                     | MACH   | .488                        | .534 | .550 | .568 | .588 |      |      |      |      |      |
|                     | KIAS   | 270                         | 269  | 267  | 265  | 264  |      |      |      |      |      |
|                     | FF/ENG | 7058                        | 7105 | 7101 | 7142 | 7267 |      |      |      |      |      |
| 300                 | %N1    | 81.2                        | 84.9 | 86.6 | 88.2 | 89.9 | 92.1 |      |      |      |      |
|                     | MACH   | .481                        | .520 | .537 | .554 | .572 | .594 |      |      |      |      |
|                     | KIAS   | 266                         | 262  | 260  | 258  | 257  | 256  |      |      |      |      |
|                     | FF/ENG | 6725                        | 6632 | 6624 | 6623 | 6679 | 6806 |      |      |      |      |
| 280                 | %N1    | 79.3                        | 83.1 | 84.9 | 86.4 | 87.9 | 89.7 | 92.3 |      |      |      |
|                     | MACH   | .468                        | .507 | .523 | .540 | .557 | .576 | .598 |      |      |      |
|                     | KIAS   | 259                         | 255  | 253  | 252  | 250  | 248  | 248  |      |      |      |
|                     | FF/ENG | 6283                        | 6189 | 6167 | 6168 | 6164 | 6230 | 6361 |      |      |      |
| 260                 | %N1    | 77.2                        | 81.1 | 82.9 | 84.6 | 86.0 | 87.6 | 89.4 | 92.3 | 96.7 |      |
|                     | MACH   | .453                        | .492 | .508 | .525 | .542 | .559 | .579 | .602 | .628 |      |
|                     | KIAS   | 251                         | 248  | 246  | 244  | 243  | 241  | 239  | 239  | 239  |      |
|                     | FF/ENG | 5831                        | 5754 | 5724 | 5709 | 5711 | 5706 | 5778 | 5910 | 6239 |      |
| 240                 | %N1    | 75.0                        | 79.0 | 80.8 | 82.4 | 84.1 | 85.5 | 87.1 | 89.0 | 92.0 |      |
|                     | MACH   | .438                        | .476 | .492 | .508 | .525 | .543 | .561 | .581 | .605 |      |
|                     | KIAS   | 242                         | 240  | 238  | 237  | 235  | 233  | 231  | 230  | 230  |      |
|                     | FF/ENG | 5377                        | 5317 | 5292 | 5266 | 5254 | 5253 | 5252 | 5320 | 5450 |      |
| 220                 | %N1    | 72.6                        | 76.7 | 78.4 | 80.2 | 81.7 | 83.4 | 84.9 | 86.4 | 88.4 | 91.5 |
|                     | MACH   | .421                        | .459 | .475 | .491 | .508 | .525 | .543 | .561 | .582 | .606 |
|                     | KIAS   | 232                         | 231  | 230  | 228  | 227  | 225  | 224  | 222  | 221  | 220  |
|                     | FF/ENG | 4925                        | 4872 | 4859 | 4836 | 4811 | 4800 | 4799 | 4799 | 4859 | 4983 |
| 200                 | %N1    | 69.9                        | 74.1 | 75.8 | 77.5 | 79.3 | 80.9 | 82.7 | 84.4 | 86.3 | 88.5 |
|                     | MACH   | .403                        | .441 | .456 | .473 | .489 | .506 | .526 | .548 | .571 | .596 |
|                     | KIAS   | 223                         | 221  | 220  | 219  | 218  | 217  | 217  | 216  | 217  | 217  |
|                     | FF/ENG | 4476                        | 4425 | 4418 | 4408 | 4384 | 4360 | 4387 | 4432 | 4481 | 4565 |
| 180                 | %N1    | 67.8                        | 72.2 | 74.1 | 75.9 | 77.9 | 79.8 | 81.5 | 83.3 | 85.1 | 87.0 |
|                     | MACH   | .392                        | .431 | .448 | .466 | .485 | .505 | .526 | .548 | .571 | .596 |
|                     | KIAS   | 217                         | 217  | 217  | 217  | 217  | 217  | 217  | 216  | 217  | 217  |
|                     | FF/ENG | 4152                        | 4138 | 4141 | 4159 | 4170 | 4182 | 4208 | 4249 | 4283 | 4335 |
| 160                 | %N1    | 66.8                        | 71.3 | 73.1 | 74.9 | 76.9 | 78.7 | 80.5 | 82.4 | 84.1 | 85.9 |
|                     | MACH   | .392                        | .431 | .448 | .466 | .485 | .505 | .526 | .548 | .571 | .596 |
|                     | KIAS   | 217                         | 217  | 217  | 217  | 217  | 217  | 217  | 216  | 217  | 217  |
|                     | FF/ENG | 4013                        | 3995 | 3994 | 4006 | 4019 | 4031 | 4053 | 4088 | 4125 | 4159 |

**GEAR DOWN**

**Long Range Cruise Enroute Fuel and Time  
Ground to Air Miles Conversion**

| AIR DISTANCE (NM)        |      |      |      |      | GROUND<br>DISTANCE<br>(NM) | AIR DISTANCE (NM)        |      |      |      |      |
|--------------------------|------|------|------|------|----------------------------|--------------------------|------|------|------|------|
| HEADWIND COMPONENT (KTS) |      |      |      |      |                            | TAILWIND COMPONENT (KTS) |      |      |      |      |
| 100                      | 80   | 60   | 40   | 20   |                            | 20                       | 40   | 60   | 80   | 100  |
| 310                      | 280  | 254  | 233  | 216  | 200                        | 189                      | 179  | 170  | 162  | 155  |
| 622                      | 562  | 510  | 467  | 431  | 400                        | 378                      | 358  | 340  | 324  | 311  |
| 936                      | 845  | 766  | 702  | 648  | 600                        | 567                      | 538  | 511  | 487  | 466  |
| 1253                     | 1131 | 1024 | 937  | 864  | 800                        | 757                      | 718  | 682  | 650  | 621  |
| 1573                     | 1418 | 1283 | 1173 | 1081 | 1000                       | 946                      | 897  | 852  | 812  | 776  |
| 1896                     | 1706 | 1542 | 1409 | 1298 | 1200                       | 1135                     | 1076 | 1022 | 973  | 930  |
| 2222                     | 1997 | 1803 | 1646 | 1515 | 1400                       | 1324                     | 1254 | 1191 | 1134 | 1084 |
| 2552                     | 2291 | 2066 | 1884 | 1733 | 1600                       | 1513                     | 1433 | 1361 | 1296 | 1238 |
| 2883                     | 2586 | 2329 | 2122 | 1951 | 1800                       | 1702                     | 1612 | 1530 | 1457 | 1392 |
| 3215                     | 2881 | 2593 | 2361 | 2169 | 2000                       | 1890                     | 1790 | 1699 | 1618 | 1545 |
| 3547                     | 3177 | 2857 | 2600 | 2387 | 2200                       | 2079                     | 1968 | 1868 | 1778 | 1699 |
| 3880                     | 3472 | 3120 | 2838 | 2604 | 2400                       | 2268                     | 2147 | 2038 | 1940 | 1853 |
| 4213                     | 3768 | 3384 | 3076 | 2822 | 2600                       | 2457                     | 2326 | 2207 | 2101 | 2007 |
| 4545                     | 4063 | 3648 | 3315 | 3040 | 2800                       | 2646                     | 2505 | 2377 | 2262 | 2161 |
| 4878                     | 4359 | 3912 | 3554 | 3258 | 3000                       | 2835                     | 2683 | 2546 | 2424 | 2315 |
| 5211                     | 4655 | 4176 | 3792 | 3476 | 3200                       | 3023                     | 2862 | 2716 | 2585 | 2468 |
| 5544                     | 4951 | 4440 | 4031 | 3694 | 3400                       | 3212                     | 3041 | 2885 | 2746 | 2622 |
| 5876                     | 5246 | 4703 | 4269 | 3912 | 3600                       | 3401                     | 3220 | 3055 | 2907 | 2776 |
| 6209                     | 5541 | 4967 | 4507 | 4130 | 3800                       | 3590                     | 3398 | 3224 | 3068 | 2930 |
| 6542                     | 5837 | 5230 | 4746 | 4348 | 4000                       | 3778                     | 3576 | 3393 | 3229 | 3084 |

**Reference Fuel and Time Required at Check Point**

| AIR<br>DIST( NM) | PRESSURE ALTITUDE (1000 FT) |                  |                   |                  |                   |                  |                   |                  |                   |                  |
|------------------|-----------------------------|------------------|-------------------|------------------|-------------------|------------------|-------------------|------------------|-------------------|------------------|
|                  | 10                          |                  | 14                |                  | 20                |                  | 24                |                  | 28                |                  |
|                  | FUEL<br>(1000 KG)           | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) |
| 200              | 7.4                         | 0:46             | 6.7               | 0:44             | 5.8               | 0:42             | 5.3               | 0:41             | 5.0               | 0:39             |
| 400              | 15.0                        | 1:29             | 13.9              | 1:25             | 12.4              | 1:20             | 11.6              | 1:17             | 11.1              | 1:13             |
| 600              | 22.6                        | 2:13             | 21.1              | 2:06             | 19.0              | 1:58             | 17.9              | 1:53             | 17.2              | 1:48             |
| 800              | 30.0                        | 2:57             | 28.0              | 2:48             | 25.4              | 2:37             | 24.0              | 2:30             | 23.0              | 2:23             |
| 1000             | 37.3                        | 3:42             | 34.9              | 3:30             | 31.8              | 3:15             | 30.1              | 3:07             | 28.9              | 2:57             |
| 1200             | 44.4                        | 4:28             | 41.6              | 4:14             | 38.0              | 3:55             | 35.9              | 3:44             | 34.5              | 3:33             |
| 1400             | 51.5                        | 5:14             | 48.3              | 4:57             | 44.1              | 4:35             | 41.8              | 4:22             | 40.1              | 4:09             |
| 1600             | 58.3                        | 6:01             | 54.7              | 5:41             | 50.1              | 5:15             | 47.5              | 5:00             | 45.6              | 4:45             |
| 1800             | 65.1                        | 6:49             | 61.2              | 6:26             | 56.1              | 5:56             | 53.1              | 5:38             | 51.0              | 5:21             |
| 2000             | 71.7                        | 7:37             | 67.5              | 7:11             | 61.9              | 6:37             | 58.7              | 6:17             | 56.3              | 5:57             |
| 2200             | 78.3                        | 8:25             | 73.7              | 7:56             | 67.7              | 7:18             | 64.2              | 6:55             | 61.6              | 6:33             |
| 2400             | 84.8                        | 9:13             | 79.9              | 8:41             | 73.4              | 7:59             | 69.6              | 7:34             | 66.8              | 7:09             |
| 2600             | 91.3                        | 10:00            | 86.0              | 9:26             | 79.1              | 8:40             | 75.0              | 8:12             | 72.0              | 7:45             |
| 2800             | 97.6                        | 10:48            | 92.0              | 10:11            | 84.6              | 9:21             | 80.3              | 8:51             | 77.1              | 8:21             |
| 3000             | 104.0                       | 11:36            | 98.0              | 10:56            | 90.2              | 10:02            | 85.6              | 9:29             | 82.1              | 8:57             |
| 3200             | 110.2                       | 12:24            | 103.9             | 11:41            | 95.7              | 10:43            | 90.8              | 10:08            | 87.1              | 9:33             |
| 3400             | 116.5                       | 13:12            | 109.8             | 12:27            | 101.1             | 11:24            | 96.0              | 10:46            | 92.1              | 10:09            |
| 3600             | 122.6                       | 14:00            | 115.6             | 13:12            | 106.5             | 12:05            | 101.1             | 11:25            | 97.0              | 10:45            |
| 3800             | 128.7                       | 14:48            | 121.4             | 13:57            | 111.9             | 12:46            | 106.2             | 12:03            | 101.9             | 11:21            |
| 4000             | 134.8                       | 15:36            | 127.2             | 14:42            | 117.2             | 13:27            | 111.3             | 12:42            | 106.8             | 11:57            |

## GEAR DOWN

### Long Range Cruise Enroute Fuel and Time

#### Fuel Required Adjustment (1000 KG)

| REFERENCE FUEL REQUIRED<br>(1000 KG) | WEIGHT AT CHECK POINT (1000 KG) |       |       |      |      |     |     |      |      |      |      |
|--------------------------------------|---------------------------------|-------|-------|------|------|-----|-----|------|------|------|------|
|                                      | 150                             | 170   | 190   | 210  | 230  | 250 | 270 | 290  | 310  | 330  | 350  |
| 10                                   | -1.8                            | -1.6  | -1.3  | -0.9 | -0.4 | 0.0 | 0.8 | 1.8  | 2.9  | 4.1  | 5.5  |
| 20                                   | -3.6                            | -3.2  | -2.6  | -1.8 | -0.9 | 0.0 | 1.6 | 3.4  | 5.5  | 7.9  | 10.5 |
| 30                                   | -5.3                            | -4.7  | -3.8  | -2.7 | -1.4 | 0.0 | 2.2 | 4.9  | 7.9  | 11.3 | 15.1 |
| 40                                   | -6.8                            | -6.0  | -5.0  | -3.5 | -1.8 | 0.0 | 2.9 | 6.2  | 10.1 | 14.4 | 19.2 |
| 50                                   | -8.3                            | -7.3  | -6.0  | -4.2 | -2.2 | 0.0 | 3.4 | 7.4  | 12.0 | 17.1 | 22.9 |
| 60                                   | -9.5                            | -8.4  | -6.9  | -4.9 | -2.5 | 0.0 | 3.9 | 8.4  | 13.7 | 19.6 | 26.1 |
| 70                                   | -10.7                           | -9.5  | -7.8  | -5.5 | -2.8 | 0.0 | 4.3 | 9.3  | 15.1 | 21.6 | 28.9 |
| 80                                   | -11.7                           | -10.4 | -8.5  | -6.1 | -3.1 | 0.0 | 4.6 | 10.1 | 16.3 | 23.4 | 31.2 |
| 90                                   | -12.6                           | -11.2 | -9.2  | -6.5 | -3.4 | 0.0 | 4.9 | 10.7 | 17.3 | 24.8 | 33.1 |
| 100                                  | -13.4                           | -11.9 | -9.8  | -7.0 | -3.7 | 0.0 | 5.1 | 11.1 | 18.0 | 25.9 | 34.6 |
| 110                                  | -14.1                           | -12.5 | -10.3 | -7.3 | -3.9 | 0.0 | 5.2 | 11.4 | 18.5 | 26.6 | 35.6 |
| 120                                  | -14.6                           | -12.9 | -10.7 | -7.6 | -4.0 | 0.0 | 5.3 | 11.6 | 18.8 | 27.0 | 36.1 |
| 130                                  | -15.0                           | -13.3 | -11.0 | -7.9 | -4.2 | 0.0 | 5.3 | 11.6 | 18.8 | 27.0 | 36.2 |
| 140                                  | -15.2                           | -13.5 | -11.2 | -8.1 | -4.3 | 0.0 | 5.2 | 11.5 | 18.6 | 26.7 | 35.8 |

Based on Long Range Cruise and VREF30+80 descent.

#### Descent at VREF30 + 80

| PRESSURE ALTITUDE<br>(1000 FT) | 17 | 19 | 21 | 23 | 25 | 27 | 29 | 31 | 33 | 35 |
|--------------------------------|----|----|----|----|----|----|----|----|----|----|
| DISTANCE (NM)                  | 35 | 40 | 44 | 48 | 52 | 57 | 61 | 65 | 69 | 74 |
| TIME (MINUTES)                 | 11 | 12 | 13 | 14 | 15 | 15 | 16 | 17 | 18 | 18 |

**GEAR DOWN**

**Holding  
Flaps Up**

| WEIGHT<br>(1000 KG) |        | PRESSURE ALTITUDE (FT) |      |       |       |       |       |       |
|---------------------|--------|------------------------|------|-------|-------|-------|-------|-------|
|                     |        | 1500                   | 5000 | 10000 | 15000 | 20000 | 25000 | 30000 |
| 360                 | %N1    | 76.1                   |      |       |       |       |       |       |
|                     | KIAS   | 264                    |      |       |       |       |       |       |
|                     | FF/ENG | 7750                   |      |       |       |       |       |       |
| 340                 | %N1    | 74.6                   | 77.7 |       |       |       |       |       |
|                     | KIAS   | 260                    | 260  |       |       |       |       |       |
|                     | FF/ENG | 7360                   | 7350 |       |       |       |       |       |
| 320                 | %N1    | 72.8                   | 75.8 |       |       |       |       |       |
|                     | KIAS   | 253                    | 253  |       |       |       |       |       |
|                     | FF/ENG | 6890                   | 6870 |       |       |       |       |       |
| 300                 | %N1    | 70.6                   | 73.7 | 78.1  |       |       |       |       |
|                     | KIAS   | 244                    | 244  | 244   |       |       |       |       |
|                     | FF/ENG | 6380                   | 6370 | 6340  |       |       |       |       |
| 280                 | %N1    | 68.8                   | 72.0 | 76.3  |       |       |       |       |
|                     | KIAS   | 238                    | 238  | 238   |       |       |       |       |
|                     | FF/ENG | 5970                   | 5960 | 5920  |       |       |       |       |
| 260                 | %N1    | 66.7                   | 69.7 | 74.1  | 78.6  |       |       |       |
|                     | KIAS   | 229                    | 229  | 229   | 229   |       |       |       |
|                     | FF/ENG | 5520                   | 5510 | 5470  | 5490  |       |       |       |
| 240                 | %N1    | 64.9                   | 67.7 | 72.2  | 76.7  |       |       |       |
|                     | KIAS   | 223                    | 223  | 223   | 223   |       |       |       |
|                     | FF/ENG | 5150                   | 5130 | 5100  | 5100  |       |       |       |
| 220                 | %N1    | 63.1                   | 65.8 | 70.1  | 74.6  | 79.4  |       |       |
|                     | KIAS   | 217                    | 217  | 217   | 217   | 217   |       |       |
|                     | FF/ENG | 4800                   | 4770 | 4730  | 4730  | 4770  |       |       |
| 200                 | %N1    | 61.9                   | 64.7 | 68.8  | 73.3  | 78.0  | 82.7  |       |
|                     | KIAS   | 217                    | 217  | 217   | 217   | 217   | 217   |       |
|                     | FF/ENG | 4610                   | 4570 | 4520  | 4520  | 4550  | 4610  |       |
| 180                 | %N1    | 61.0                   | 63.8 | 67.8  | 72.2  | 76.9  | 81.5  | 86.0  |
|                     | KIAS   | 217                    | 217  | 217   | 217   | 217   | 217   | 217   |
|                     | FF/ENG | 4450                   | 4410 | 4360  | 4350  | 4370  | 4420  | 4520  |
| 160                 | %N1    | 60.1                   | 62.9 | 66.8  | 71.3  | 75.9  | 80.5  | 84.9  |
|                     | KIAS   | 217                    | 217  | 217   | 217   | 217   | 217   | 217   |
|                     | FF/ENG | 4320                   | 4270 | 4210  | 4190  | 4210  | 4260  | 4350  |

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

# GEAR DOWN

## Holding Flaps 1

| WEIGHT<br>(1000 KG) |        | PRESSURE ALTITUDE (FT) |      |       |       |       |
|---------------------|--------|------------------------|------|-------|-------|-------|
|                     |        | 1500                   | 5000 | 10000 | 15000 | 20000 |
| 360                 | %N1    | 75.9                   | 79.0 | 83.8  | 88.3  | 94.3  |
|                     | KIAS   | 244                    | 244  | 244   | 244   | 244   |
|                     | FF/ENG | 7660                   | 7700 | 7690  | 7810  | 8200  |
| 340                 | %N1    | 74.3                   | 77.4 | 82.1  | 86.8  | 91.8  |
|                     | KIAS   | 240                    | 240  | 240   | 240   | 240   |
|                     | FF/ENG | 7240                   | 7260 | 7250  | 7350  | 7630  |
| 320                 | %N1    | 72.5                   | 75.5 | 80.0  | 84.9  | 89.7  |
|                     | KIAS   | 233                    | 233  | 233   | 233   | 233   |
|                     | FF/ENG | 6770                   | 6780 | 6770  | 6830  | 7040  |
| 300                 | %N1    | 70.3                   | 73.4 | 77.8  | 82.9  | 87.6  |
|                     | KIAS   | 224                    | 224  | 224   | 224   | 224   |
|                     | FF/ENG | 6270                   | 6270 | 6270  | 6320  | 6450  |
| 280                 | %N1    | 68.3                   | 71.5 | 75.8  | 80.6  | 85.6  |
|                     | KIAS   | 218                    | 218  | 218   | 218   | 218   |
|                     | FF/ENG | 5840                   | 5840 | 5820  | 5870  | 5980  |
| 260                 | %N1    | 66.0                   | 69.1 | 73.5  | 78.1  | 83.3  |
|                     | KIAS   | 209                    | 209  | 209   | 209   | 209   |
|                     | FF/ENG | 5380                   | 5370 | 5340  | 5400  | 5460  |
| 240                 | %N1    | 64.1                   | 66.9 | 71.4  | 75.9  | 81.0  |
|                     | KIAS   | 203                    | 203  | 203   | 203   | 203   |
|                     | FF/ENG | 4980                   | 4960 | 4930  | 4970  | 5020  |
| 220                 | %N1    | 62.0                   | 64.7 | 69.0  | 73.6  | 78.4  |
|                     | KIAS   | 197                    | 197  | 197   | 197   | 197   |
|                     | FF/ENG | 4600                   | 4570 | 4530  | 4550  | 4610  |
| 200                 | %N1    | 60.5                   | 63.2 | 67.3  | 71.8  | 76.5  |
|                     | KIAS   | 197                    | 197  | 197   | 197   | 197   |
|                     | FF/ENG | 4350                   | 4310 | 4260  | 4270  | 4310  |
| 180                 | %N1    | 59.1                   | 61.8 | 65.8  | 70.3  | 74.9  |
|                     | KIAS   | 197                    | 197  | 197   | 197   | 197   |
|                     | FF/ENG | 4140                   | 4100 | 4040  | 4050  | 4070  |
| 160                 | %N1    | 57.9                   | 60.7 | 64.6  | 69.0  | 73.5  |
|                     | KIAS   | 197                    | 197  | 197   | 197   | 197   |
|                     | FF/ENG | 3970                   | 3920 | 3860  | 3860  | 3860  |

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

Intentionally  
Blank





Performance Inflight - QRH  
Gear Down, Engine INOP

Chapter PI-QRH  
Section 24

GEAR DOWN

ENGINE INOP

MAX CONTINUOUS THRUST

Driftdown Speed/Level Off Altitude

100 ft/min residual rate of climb

Includes APU fuel burn

| WEIGHT (1000 KG)       |              | OPTIMUM<br>DRIFTDOWN<br>SPEED<br>(KIAS) | LEVEL OFF PRESSURE ALTITUDE (FT) |            |            |
|------------------------|--------------|-----------------------------------------|----------------------------------|------------|------------|
| START<br>DRIFT<br>DOWN | LEVEL<br>OFF |                                         | ISA + 10°C<br>& BELOW            | ISA + 15°C | ISA + 20°C |
| 320                    | 307          | 254                                     | 5600                             | 4400       | 2200       |
| 300                    | 288          | 246                                     | 7700                             | 6800       | 5300       |
| 280                    | 269          | 238                                     | 9800                             | 9100       | 8100       |
| 260                    | 250          | 230                                     | 12100                            | 11400      | 10300      |
| 240                    | 230          | 223                                     | 14000                            | 13500      | 12400      |
| 220                    | 210          | 217                                     | 15900                            | 15400      | 14400      |
| 200                    | 191          | 216                                     | 17300                            | 16700      | 15700      |
| 180                    | 172          | 216                                     | 18500                            | 18100      | 16900      |
| 160                    | 153          | 216                                     | 19700                            | 19400      | 18200      |

Long Range Cruise Altitude Capability

100 ft/min residual rate of climb

| WEIGHT<br>(1000 KG) | PRESSURE ALTITUDE (FT) |            |            |
|---------------------|------------------------|------------|------------|
|                     | ISA + 10°C<br>& BELOW  | ISA + 15°C | ISA + 20°C |
| 340                 | 1800                   |            |            |
| 330                 | 3300                   | 1000       |            |
| 320                 | 4500                   | 2700       |            |
| 310                 | 5700                   | 4400       | 1900       |
| 300                 | 6800                   | 5700       | 3800       |
| 290                 | 7800                   | 7000       | 5300       |
| 280                 | 8800                   | 8100       | 6700       |
| 270                 | 9800                   | 9100       | 8100       |
| 260                 | 11100                  | 10400      | 9300       |
| 250                 | 12100                  | 11400      | 10300      |
| 240                 | 13100                  | 12500      | 11300      |
| 230                 | 14000                  | 13600      | 12400      |
| 220                 | 15100                  | 14600      | 13600      |
| 210                 | 15900                  | 15400      | 14400      |
| 200                 | 16700                  | 16100      | 15100      |
| 190                 | 17400                  | 16700      | 15800      |
| 180                 | 18000                  | 17500      | 16400      |
| 170                 | 18700                  | 18200      | 16900      |
| 160                 | 19300                  | 18900      | 17700      |

# GEAR DOWN

# ENGINE INOP

## MAX CONTINUOUS THRUST

### Long Range Cruise Control

| WEIGHT<br>(1000 KG) |        | PRESSURE ALTITUDE (1000 FT) |       |       |       |       |      |      |       |
|---------------------|--------|-----------------------------|-------|-------|-------|-------|------|------|-------|
|                     |        | 5                           | 7     | 9     | 11    | 13    | 15   | 17   | 19    |
| 300                 | %N1    | 94.3                        | 96.8  |       |       |       |      |      |       |
|                     | MACH   | .403                        | .418  |       |       |       |      |      |       |
|                     | KIAS   | 244                         | 244   |       |       |       |      |      |       |
|                     | FF/ENG | 12328                       | 12507 |       |       |       |      |      |       |
| 280                 | %N1    | 92.3                        | 94.1  | 96.8  |       |       |      |      |       |
|                     | MACH   | .393                        | .407  | .422  |       |       |      |      |       |
|                     | KIAS   | 238                         | 238   | 238   |       |       |      |      |       |
|                     | FF/ENG | 11514                       | 11566 | 11807 |       |       |      |      |       |
| 260                 | %N1    | 90.5                        | 91.6  | 93.6  | 96.4  |       |      |      |       |
|                     | MACH   | .385                        | .393  | .408  | .423  |       |      |      |       |
|                     | KIAS   | 233                         | 229   | 229   | 229   |       |      |      |       |
|                     | FF/ENG | 10870                       | 10626 | 10714 | 10945 |       |      |      |       |
| 240                 | %N1    | 88.9                        | 89.8  | 91.3  | 93.4  | 96.5  |      |      |       |
|                     | MACH   | .379                        | .385  | .397  | .412  | .428  |      |      |       |
|                     | KIAS   | 229                         | 225   | 223   | 223   | 223   |      |      |       |
|                     | FF/ENG | 10228                       | 9966  | 9915  | 10023 | 10245 |      |      |       |
| 220                 | %N1    | 86.6                        | 88.0  | 89.1  | 90.9  | 93.1  | 96.4 |      |       |
|                     | MACH   | .368                        | .377  | .387  | .401  | .417  | .433 |      |       |
|                     | KIAS   | 223                         | 220   | 217   | 217   | 217   | 217  |      |       |
|                     | FF/ENG | 9452                        | 9309  | 9167  | 9222  | 9323  | 9542 |      |       |
| 200                 | %N1    | 84.2                        | 86.0  | 87.8  | 89.5  | 91.4  | 94.0 | 98.1 |       |
|                     | MACH   | .358                        | .371  | .385  | .400  | .415  | .431 | .448 |       |
|                     | KIAS   | 217                         | 217   | 217   | 217   | 217   | 217  | 217  |       |
|                     | FF/ENG | 8693                        | 8698  | 8718  | 8773  | 8844  | 8956 | 9300 |       |
| 180                 | %N1    | 82.9                        | 84.7  | 86.7  | 88.4  | 90.2  | 92.3 | 95.5 | 100.2 |
|                     | MACH   | .358                        | .371  | .385  | .400  | .415  | .431 | .448 | .466  |
|                     | KIAS   | 217                         | 217   | 217   | 217   | 217   | 217  | 217  | 217   |
|                     | FF/ENG | 8330                        | 8328  | 8342  | 8399  | 8458  | 8533 | 8740 | 9239  |
| 160                 | %N1    | 81.7                        | 83.6  | 85.4  | 87.3  | 89.0  | 90.9 | 93.5 | 97.7  |
|                     | MACH   | .358                        | .371  | .385  | .400  | .415  | .431 | .448 | .466  |
|                     | KIAS   | 217                         | 217   | 217   | 217   | 217   | 217  | 217  | 217   |
|                     | FF/ENG | 8019                        | 8011  | 8010  | 8058  | 8115  | 8168 | 8310 | 8670  |

# GEAR DOWN

# ENGINE INOP

## MAX CONTINUOUS THRUST

### Long Range Cruise Diversion Fuel and Time

#### Ground to Air Miles Conversion

| AIR DISTANCE (NM)        |      |      |      |      | GROUND<br>DISTANCE<br>(NM) | AIR DISTANCE (NM)        |     |     |     |     |
|--------------------------|------|------|------|------|----------------------------|--------------------------|-----|-----|-----|-----|
| HEADWIND COMPONENT (KTS) |      |      |      |      |                            | TAILWIND COMPONENT (KTS) |     |     |     |     |
| 100                      | 80   | 60   | 40   | 20   |                            | 20                       | 40  | 60  | 80  | 100 |
| 165                      | 145  | 129  | 118  | 108  | 100                        | 95                       | 90  | 84  | 78  | 73  |
| 332                      | 295  | 263  | 238  | 218  | 200                        | 187                      | 175 | 165 | 155 | 147 |
| 500                      | 444  | 396  | 358  | 327  | 300                        | 280                      | 262 | 246 | 233 | 221 |
| 669                      | 593  | 528  | 477  | 436  | 400                        | 374                      | 350 | 329 | 310 | 294 |
| 837                      | 742  | 661  | 597  | 545  | 500                        | 467                      | 437 | 410 | 387 | 367 |
| 1007                     | 893  | 795  | 718  | 655  | 600                        | 560                      | 524 | 492 | 464 | 440 |
| 1177                     | 1043 | 928  | 838  | 764  | 700                        | 653                      | 611 | 574 | 541 | 513 |
| 1347                     | 1193 | 1061 | 958  | 873  | 800                        | 746                      | 698 | 655 | 618 | 586 |
| 1519                     | 1344 | 1195 | 1078 | 983  | 900                        | 839                      | 785 | 737 | 695 | 659 |
| 1691                     | 1496 | 1329 | 1198 | 1092 | 1000                       | 933                      | 873 | 819 | 772 | 731 |

### Reference Fuel and Time Required at Check Point

| AIR<br>DIST<br>(NM) | PRESSURE ALTITUDE (1000 FT) |                  |                   |                  |                   |                  |                   |                  |                   |                  |
|---------------------|-----------------------------|------------------|-------------------|------------------|-------------------|------------------|-------------------|------------------|-------------------|------------------|
|                     | 6                           |                  | 8                 |                  | 10                |                  | 12                |                  | 14                |                  |
|                     | FUEL<br>(1000 KG)           | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) |
| 100                 | 4.0                         | 0:27             | 3.8               | 0:26             | 3.5               | 0:26             | 3.4               | 0:25             | 3.3               | 0:25             |
| 200                 | 8.2                         | 0:51             | 7.8               | 0:50             | 7.5               | 0:49             | 7.3               | 0:48             | 7.2               | 0:47             |
| 300                 | 12.3                        | 1:15             | 11.8              | 1:14             | 11.4              | 1:12             | 11.1              | 1:10             | 11.1              | 1:09             |
| 400                 | 16.4                        | 1:40             | 15.8              | 1:38             | 15.3              | 1:36             | 14.9              | 1:33             | 14.9              | 1:30             |
| 500                 | 20.5                        | 2:04             | 19.7              | 2:02             | 19.1              | 1:59             | 18.7              | 1:56             | 18.7              | 1:53             |
| 600                 | 24.5                        | 2:29             | 23.6              | 2:27             | 22.9              | 2:23             | 22.5              | 2:19             | 22.4              | 2:15             |
| 700                 | 28.5                        | 2:53             | 27.5              | 2:51             | 26.7              | 2:46             | 26.1              | 2:42             | 26.0              | 2:37             |
| 800                 | 32.5                        | 3:18             | 31.3              | 3:16             | 30.4              | 3:10             | 29.8              | 3:05             | 29.6              | 2:59             |
| 900                 | 36.4                        | 3:43             | 35.1              | 3:40             | 34.1              | 3:34             | 33.4              | 3:28             | 33.2              | 3:22             |
| 1000                | 40.3                        | 4:08             | 38.8              | 4:05             | 37.8              | 3:58             | 37.0              | 3:51             | 36.7              | 3:44             |

### Fuel Required Adjustment (1000 KG)

| REFERENCE FUEL REQUIRED<br>(1000 KG) | WEIGHT AT CHECK POINT (1000 KG) |      |     |      |      |
|--------------------------------------|---------------------------------|------|-----|------|------|
|                                      | 150                             | 200  | 250 | 300  | 350  |
| 5                                    | -0.8                            | -0.5 | 0.0 | 1.6  | 2.6  |
| 10                                   | -1.8                            | -1.1 | 0.0 | 3.0  | 5.6  |
| 15                                   | -2.8                            | -1.6 | 0.0 | 4.4  | 8.6  |
| 20                                   | -3.7                            | -2.2 | 0.0 | 5.6  | 11.6 |
| 25                                   | -4.5                            | -2.7 | 0.0 | 6.8  | 14.4 |
| 30                                   | -5.4                            | -3.2 | 0.0 | 7.8  | 17.3 |
| 35                                   | -6.2                            | -3.7 | 0.0 | 8.7  | 20.0 |
| 40                                   | -7.0                            | -4.2 | 0.0 | 9.5  | 22.7 |
| 45                                   | -7.7                            | -4.7 | 0.0 | 10.2 | 25.3 |

Based on Long Range Cruise and VREF30+80 descent. Includes APU fuel burn.

**GEAR DOWN**  
**ENGINE INOP**

**MAX CONTINUOUS THRUST**

**Holding  
Flaps Up**

| WEIGHT<br>(1000 KG) |        | PRESSURE ALTITUDE (FT) |       |       |       |
|---------------------|--------|------------------------|-------|-------|-------|
|                     |        | 1500                   | 5000  | 10000 | 15000 |
| 340                 | %N1    | 95.5                   |       |       |       |
|                     | KIAS   | 260                    |       |       |       |
|                     | FF/ENG | 14970                  |       |       |       |
| 320                 | %N1    | 93.4                   | 97.2  |       |       |
|                     | KIAS   | 253                    | 253   |       |       |
|                     | FF/ENG | 13980                  | 14120 |       |       |
| 300                 | %N1    | 91.1                   | 94.3  |       |       |
|                     | KIAS   | 244                    | 244   |       |       |
|                     | FF/ENG | 12970                  | 12940 |       |       |
| 280                 | %N1    | 89.3                   | 92.3  | 98.8  |       |
|                     | KIAS   | 238                    | 238   | 238   |       |
|                     | FF/ENG | 12100                  | 12090 | 12660 |       |
| 260                 | %N1    | 86.8                   | 90.0  | 94.8  |       |
|                     | KIAS   | 229                    | 229   | 229   |       |
|                     | FF/ENG | 11100                  | 11180 | 11340 |       |
| 240                 | %N1    | 84.6                   | 88.0  | 92.2  |       |
|                     | KIAS   | 223                    | 223   | 223   |       |
|                     | FF/ENG | 10310                  | 10380 | 10460 |       |
| 220                 | %N1    | 82.3                   | 85.7  | 90.0  | 96.4  |
|                     | KIAS   | 217                    | 217   | 217   | 217   |
|                     | FF/ENG | 9540                   | 9590  | 9650  | 10020 |
| 200                 | %N1    | 80.8                   | 84.2  | 88.6  | 94.0  |
|                     | KIAS   | 217                    | 217   | 217   | 217   |
|                     | FF/ENG | 9080                   | 9130  | 9180  | 9400  |
| 180                 | %N1    | 79.6                   | 82.9  | 87.5  | 92.3  |
|                     | KIAS   | 217                    | 217   | 217   | 217   |
|                     | FF/ENG | 8700                   | 8750  | 8780  | 8960  |
| 160                 | %N1    | 78.6                   | 81.7  | 86.4  | 90.9  |
|                     | KIAS   | 217                    | 217   | 217   | 217   |
|                     | FF/ENG | 8380                   | 8420  | 8430  | 8580  |

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

**Performance Inflight - QRH****Chapter PI-QRH****Text****Section 25****Introduction**

This chapter contains information to supplement performance data from the Flight Management Computer. 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 Flight Manual, the Flight Manual shall always take precedence.

**General****Flight With Unreliable Airspeed / Turbulent Air Penetration**

Body 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 may also cause unreliable airspeed/Mach indications. Climb, cruise and descent information is based on the recommended turbulent air penetration speed schedule: 270 knots below 25,000 feet, 280 knots or 0.82 Mach whichever is lower at 25,000 feet and above; maintain a minimum speed of 15 knots above the minimum maneuvering speed when below 0.82 Mach. This schedule provides ample protection from stall and high speed buffet, while also providing protection from exceeding structural limits. The Climb, Cruise and Descent tables in this section may also be used for turbulent air penetration. The Flight with Unreliable Airspeed - FINAL APPROACH table includes a 10 knot margin for landing.

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

**Max Climb %N1**

This table shows Max Climb %N1 for a 310/.84 climb speed schedule, normal engine bleed for packs on and anti-ice off. Enter the table with airport pressure altitude and TAT and read %N1. %N1 adjustments are shown for anti-ice operation.

**Go-Around %N1**

To find Go-Around %N1 based on normal engine bleed for packs on and anti-ice off, enter the Go-Around %N1 table with airport pressure altitude and reported OAT or TAT and read %N1. %N1 adjustments are shown for engine bleeds for various conditions.

---

## VREF Speeds

This table contains flaps 30, 25 and 20 reference speeds for a given weight.

---

## Advisory Information

### Normal Configuration Landing Distance

Tables are provided as advisory information for normal configuration landing distance on dry runways and slippery runways with good, medium, and poor reported braking action. These values are actual landing distances and do not include the 1.67 regulatory factor. Therefore, they cannot be used to determine the dispatch required landing field length.

To use these tables, determine the reference landing distance for the selected braking configuration. Then adjust the reference distance for landing weight, altitude, wind, slope, temperature, approach speed, and the number of operative thrust reversers to obtain the actual landing distance.

When landing on slippery runways or runways contaminated with ice, snow, slush, or standing water, the reported braking action must be considered. If the surface is affected by water, snow, or ice and the braking action is reported as "good", conditions should not be expected to be as good as on clean, dry runways. The value "good" is comparative and is intended to mean that airplanes should not experience braking or directional control difficulties when landing. The performance level used to calculate the "good" data is consistent with wet runway testing done on early Boeing jets. The performance level used to calculate "poor" data reflects runways covered with wet ice.

Use of the autobrake system commands the airplane to a constant deceleration rate. In some conditions, such as a runway with "poor" braking action, the airplane may not be able to achieve these deceleration rates. In these cases, runway slope and inoperative reversers influence the stopping distance. Since it cannot be determined quickly when this becomes a factor, it is conservative to add the effects of slope and inoperative reversers when using the autobrake system.

### Non-normal Configuration Landing Distance

Advisory information is provided to support non-normal configurations that affect the landing performance of the airplane. Landing distances and adjustments are provided for dry runways and runways with good, medium, and poor reported braking action.

Enter the table with the applicable non-normal configuration and read the normal approach speed. The reference landing distance is a reference distance from 50 ft above the threshold to stop based on a reference landing weight and speed at sea level, zero wind, and zero slope. Subsequent columns provide adjustments for off-reference landing weight, altitude, wind, slope, and speed conditions. Each adjustment is independently added to the reference landing distance. Landing distance includes the effects of max manual braking and reverse thrust.

For an engine inoperative landing, check the rate of climb capability shown in Gear Down Landing Rate of Climb Available tables to ensure adequate climb performance.

## Recommended Brake Cooling Schedule

Advisory information is provided to assist in avoiding problems associated with hot brakes. For normal operation, most landings are at weights below the AFM quick turnaround limit weight.

Use of the recommended cooling schedule will help avoid brake overheat and fuse plug problems that could result from repeated landings at short time intervals or a rejected takeoff.

Enter the Recommended Brake Cooling Schedule table with the airplane weight and brakes on speed, adjusted for wind, at the appropriate temperature and altitude condition. Instructions for applying wind adjustments are included below the table. Linear interpolation may be used to obtain intermediate values. The resulting number is the reference brake energy per brake in millions of foot-pounds, and represents the amount of energy absorbed by each brake during a rejected takeoff.

To determine the energy per brake absorbed during landing, enter the appropriate Event Adjusted Brake Energy Table (No Reverse Thrust or 2 Engine Reverse) with the reference brake energy per brake and the type of braking used during landing (Max Manual, Max Auto, or Autobrake). The resulting number is the adjusted brake energy per brake and represents the energy absorbed in each brake during the landing. The recommended cooling time is found in the final table by entering with the adjusted brake energy per brake. Times are provided for ground cooling and inflight gear down cooling.

Brake Temperature Monitor System (BTMS) indications are also shown. If brake cooling is determined from the BTMS, the hottest brake indication 10 to 15 minutes after the airplane has come to a complete stop, or inflight with gear retracted, may be used to determine recommended cooling schedule by entering at the bottom of the chart. An EICAS advisory message, BRAKE TEMP, will appear when any brake registers 5.0 or higher on the EICAS indication and disappear as the hottest brake cools with an EICAS indication of 3.5. Note that even without an EICAS advisory message, brake cooling is recommended.

## Approach or Landing Climb Limited Weight

In the event an overweight landing is necessary and the fuel dump system is unavailable, approach or landing climb limits should be checked if a Flaps 25 or 30 landing is planned. Enter the table with airport OAT and pressure altitude to read approach or landing climb limited weight. Apply the noted adjustments as required. At weights exceeding those shown, plan a Flaps 20 landing.

The table "Approach or Landing Climb Limited Weight" presents the data which are the more limiting of Approach Climb Limit Weight and Landing Climb Limit Weight.

---

## 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 Mach number of .84 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 engine bleed for packs on or off and all anti-ice bleeds off. Enter the table with pressure altitude and IAS or Mach to read %N1.

It is desirable to maintain engine thrust level within the limits of the Max Cruise thrust rating. However, where thrust level in excess of Max Cruise rating is required, such as for meeting terrain clearance, ATC altitude assignments, or to attain maximum range capability, it is permissible to use the thrust needed up to the Max Continuous thrust rating. The Max Continuous thrust rating is intended primarily for emergency use at the discretion of the pilot and is the maximum thrust that may be used continuously.

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## 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/Cruise 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 correct 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 Diversion Fuel and Time table.

## Long Range Cruise Altitude Capability

Table show the maximum altitude that can be maintained at a given weight and air temperature (ISA deviation), based on LRC speed, Max Continuous thrust, and 100 ft/min residual rate of climb.

## Long Range Cruise Control

The table provides target %N1, engine inoperative Long Range Cruise Mach number, IAS and fuel flow for the airplane weight and pressure altitude. The fuel flow values in this table reflect single engine fuel burn.

## Long Range Cruise Diversion Fuel and Time

Tables are provided for crews to determine the fuel and time required to proceed to an alternate airfield with one engine inoperative. The data is based on single engine Long Range Cruise speed and .84/310/250 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 corrections table with the fuel required for the reference weight and the actual weight at checkpoint. Read fuel and time required for the actual weight.

---

## Holding

Single engine holding data is provided in the same format as the all engine holding data and is based on the same assumptions.

## Gear Down Landing Rate of Climb Available

Rate of climb data is provided as guidance information in the event an engine inoperative landing is planned. The tables show gear down rate of climb available for Flaps 20, Flaps 25 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 for all phases of flight. The data is based on engine bleeds for normal air conditioning.

Note: The Flight Management Computer System (FMCS) does not contain special provisions for operation with landing gear extended. As a result, the FMCS will generate inaccurate enroute speed schedules, display non-conservative predictions of fuel burn, estimated time of arrival (ETA), maximum altitude, and compute overly shallow descent path. To obtain accurate ETA predictions, gear down cruise speed and altitude should be entered on the CLB and CRZ pages. Gear down cruise speed should also be entered on the DES page and a STEP SIZE of zero should be entered on the PERF INIT or CRZ page. Use of VNAV during descent under these circumstances is not recommended.

Tables for gear down performance in this section are identical in format and used in the same manner as tables for the gear up configuration previously described.

**Performance Inflight - QRH****Chapter PI-QRH****Table of Contents****Section 30****777-300ER GE90-115BL KG M FAA TO1-10 TO2-20 PCC2****Pkg Model Identification ..... PI-QRH.ModID.30.1****General ..... PI-QRH.30.1**

Flight With Unreliable Airspeed /

Turbulent Air Penetration ..... PI-QRH.30.1

Max Climb %N1 ..... PI-QRH.30.4

Go-Around %N1 ..... PI-QRH.30.5

VREF ..... PI-QRH.30.6

**Advisory Information..... PI-QRH.31.1**

Normal Configuration Landing Distance ..... PI-QRH.31.1

Non-Normal Configuration Landing Distance ..... PI-QRH.31.4

ADIRU/GPS DISAGREE (Flaps 25) ..... PI-QRH.31.4

ADIRU/GPS DISAGREE (Flaps 30) ..... PI-QRH.31.5

AIR DATA SYS (Flaps 20) ..... PI-QRH.31.6

Airspeed Unreliable (Flaps 20) ..... PI-QRH.31.7

ANTISKID (Flaps 25)..... PI-QRH.31.8

ANTISKID (Flaps 30)..... PI-QRH.31.9

ENG SHUTDOWN L, R (Flaps 20) ..... PI-QRH.31.10

ENG SHUTDOWN L, R (Flaps 30) ..... PI-QRH.31.11

FLAP / SLAT CONTROL (Flaps 20) ..... PI-QRH.31.12

FLAPS DRIVE (Flaps  $\leq 5$ ) ..... PI-QRH.31.13FLAPS DRIVE ( $5 < \text{Flaps} < 20$ ) ..... PI-QRH.31.14FLAPS DRIVE (Flaps  $\geq 20$ ) ..... PI-QRH.31.15

FLAPS PRIMARY FAIL (Flaps 20) ..... PI-QRH.31.16

FLIGHT CONTROL MODE (Flaps 20)..... PI-QRH.31.17

FLIGHT CONTROLS (Flaps 20) ..... PI-QRH.31.18

HYD PRESS SYS C (Flaps 20) ..... PI-QRH.31.19

HYD PRESS SYS L (Flaps 25)..... PI-QRH.31.20

HYD PRESS SYS L (Flaps 30)..... PI-QRH.31.21



---

|                                               |              |
|-----------------------------------------------|--------------|
| HYD PRESS SYS L+C (Flaps 20) .....            | PI-QRH.31.22 |
| HYD PRESS SYS L+R (Flaps 20) .....            | PI-QRH.31.23 |
| HYD PRESS SYS R (Flaps 25).....               | PI-QRH.31.24 |
| HYD PRESS SYS R (Flaps 30).....               | PI-QRH.31.25 |
| HYD PRESS SYS R+C (Flaps 20) .....            | PI-QRH.31.26 |
| NAV AIR DATA SYS (Flaps 20).....              | PI-QRH.31.27 |
| PITCH DOWN AUTHORITY (Flaps 25).....          | PI-QRH.31.28 |
| PITCH DOWN AUTHORITY (Flaps 30).....          | PI-QRH.31.29 |
| PITCH UP AUTHORITY (Flaps $\leq$ 15) .....    | PI-QRH.31.30 |
| PITCH UP AUTHORITY (Flaps $\geq$ 20) .....    | PI-QRH.31.31 |
| PRI FLIGHT COMPUTERS (Flaps 20) .....         | PI-QRH.31.32 |
| SLATS DRIVE (Flaps 20).....                   | PI-QRH.31.33 |
| SPOILERS (Flaps 25) .....                     | PI-QRH.31.34 |
| SPOILERS (Flaps 30) .....                     | PI-QRH.31.35 |
| STABILIZER (Flaps 20) .....                   | PI-QRH.31.36 |
| Recommended Brake Cooling Schedule. ....      | PI-QRH.31.37 |
| Approach or Landing Climb Limited Weight..... | PI-QRH.31.39 |

**Engine Inoperative .....PI-QRH.32.1**

|                                                 |              |
|-------------------------------------------------|--------------|
| Initial Max Continuous %N1 .....                | PI-QRH.32.1  |
| Max Continuous %N1.....                         | PI-QRH.32.2  |
| Driftdown Speed/Level Off Altitude.....         | PI-QRH.32.5  |
| Driftdown/LRC Cruise Range Capability.....      | PI-QRH.32.6  |
| Long Range Cruise Altitude Capability .....     | PI-QRH.32.7  |
| Long Range Cruise Control .....                 | PI-QRH.32.8  |
| Long Range Cruise Diversion Fuel and Time.....  | PI-QRH.32.9  |
| Holding .....                                   | PI-QRH.32.10 |
| Gear Down Landing Rate of Climb Available ..... | PI-QRH.32.11 |

**Gear Down.....PI-QRH.33.1**

|                                               |             |
|-----------------------------------------------|-------------|
| 220 KIAS Max Climb %N1 .....                  | PI-QRH.33.1 |
| Long Range Cruise Altitude Capability .....   | PI-QRH.33.2 |
| Long Range Cruise Control .....               | PI-QRH.33.3 |
| Long Range Cruise Enroute Fuel and Time ..... | PI-QRH.33.4 |



777 Flight Crew Operations Manual

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|                                                 |                    |
|-------------------------------------------------|--------------------|
| Descent at VREF30+80 .....                      | PI-QRH.33.5        |
| Holding .....                                   | PI-QRH.33.6        |
| <b>Gear Down, Engine Inoperative .....</b>      | <b>PI-QRH.34.1</b> |
| Driftdown Speed/Level Off Altitude .....        | PI-QRH.34.1        |
| Long Range Cruise Altitude Capability .....     | PI-QRH.34.2        |
| Long Range Cruise Control .....                 | PI-QRH.34.3        |
| Long Range Cruise Diversion Fuel and Time ..... | PI-QRH.34.4        |
| Holding .....                                   | PI-QRH.34.5        |
| <b>Text .....</b>                               | <b>PI-QRH.35.1</b> |
| Introduction .....                              | PI-QRH.35.1        |
| General .....                                   | PI-QRH.35.1        |
| Advisory Information .....                      | PI-QRH.35.2        |
| Engine Inoperative .....                        | PI-QRH.35.4        |
| Gear Down .....                                 | PI-QRH.35.6        |



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**Performance Inflight - QRH**  
**Pkg Model Identification****Chapter PI-QRH**  
**Section 30****General**

The table below shows the airplanes that have been identified with the following performance package. Note, some airplanes may be identified with more than one performance package. This configuration table information reflects the Boeing delivered configuration updated for service bulletin incorporations in conformance with the policy stated in the introduction section of the FCOM. The performance data is prepared for the owner/operator named on the title page. The intent of this information is to assist flight crews and airlines in knowing which performance package is applicable to a given airplane. The performance package model identification information is based on Boeing's knowledge of the airline's fleet at a point in time approximately three months prior to the page date. Notice of Errata (NOE) will not be provided to airlines to identify airplanes that are moved between performance packages within this manual or airplanes added to the airline's fleet whose performance packages are already represented in this manual. These types of changes will be updated in the next block revision. Owners/operators are responsible for ensuring the operational documentation they are using is complete and matches the current configuration of their airplanes, and the accuracy and validity of all information furnished by the owner/operator or any other party. Owners/operators receiving active revision service are responsible to ensure that any modifications to the listed airplanes are properly reflected in this manual.

Airplane number is supplied by the operator. Registry number is supplied by the national regulatory agency. Serial and tabulation numbers are supplied by Boeing.

| <b>Airplane Number</b> | <b>Registry Number</b> | <b>Serial Number</b> | <b>Tabulation Number</b> |
|------------------------|------------------------|----------------------|--------------------------|
| 101                    | AP-BHV                 | 33778                | WD786                    |
| 102                    | AP-BHW                 | 33779                | WD787                    |
| 103                    | AP-BID                 | 33780                | WD788                    |

Intentionally  
Blank





## Performance Inflight - QRH

## Chapter PI-QRH

## General

## Section 30

**Flight With Unreliable Airspeed / Turbulent Air Penetration**

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

**Climb****Flaps Up, Set Max Climb Thrust**

| PRESSURE ALTITUDE (FT)<br>(SPEED) |                  | WEIGHT (1000 KG) |             |             |             |             |
|-----------------------------------|------------------|------------------|-------------|-------------|-------------|-------------|
|                                   |                  | 160              | 210         | 260         | 310         | 360         |
| 40000<br>(.82M)                   | <b>PITCH ATT</b> | <b>4.5</b>       | <b>4.0</b>  |             |             |             |
|                                   | V/S (FT/MIN)     | 2200             | 800         |             |             |             |
| 30000<br>(280 KIAS)               | <b>PITCH ATT</b> | <b>6.0</b>       | <b>5.0</b>  | <b>5.0</b>  | <b>4.5</b>  | <b>4.0</b>  |
|                                   | V/S (FT/MIN)     | 3300             | 2300        | 1600        | 1200        | 800         |
| 20000<br>(270 KIAS)               | <b>PITCH ATT</b> | <b>9.0</b>       | <b>8.0</b>  | <b>7.5</b>  | <b>7.5</b>  | <b>7.0</b>  |
|                                   | V/S (FT/MIN)     | 4700             | 3400        | 2500        | 1900        | 1300        |
| 10000<br>(270 KIAS)               | <b>PITCH ATT</b> | <b>13.0</b>      | <b>10.5</b> | <b>10.0</b> | <b>9.5</b>  | <b>9.0</b>  |
|                                   | V/S (FT/MIN)     | 6200             | 4500        | 3500        | 2700        | 2100        |
| SEA LEVEL<br>(270 KIAS)           | <b>PITCH ATT</b> | <b>16.5</b>      | <b>13.5</b> | <b>12.0</b> | <b>11.5</b> | <b>11.0</b> |
|                                   | V/S (FT/MIN)     | 7200             | 5300        | 4100        | 3300        | 2700        |

**Cruise****Flaps Up, Set Thrust for Level Flight**

| PRESSURE ALTITUDE (FT)<br>(SPEED) |                  | WEIGHT (1000 KG) |            |            |            |            |
|-----------------------------------|------------------|------------------|------------|------------|------------|------------|
|                                   |                  | 160              | 210        | 260        | 310        | 360        |
| 40000<br>(.82M)                   | <b>PITCH ATT</b> | <b>2.0</b>       | <b>3.0</b> |            |            |            |
|                                   | %N1              | 80.2             | 84.8       |            |            |            |
| 35000<br>(280 KIAS)               | <b>PITCH ATT</b> | <b>1.5</b>       | <b>2.0</b> | <b>2.5</b> | <b>3.5</b> |            |
|                                   | %N1              | 77.7             | 80.4       | 84.1       | 90.4       |            |
| 30000<br>(280 KIAS)               | <b>PITCH ATT</b> | <b>1.5</b>       | <b>2.0</b> | <b>3.0</b> | <b>3.0</b> | <b>3.0</b> |
|                                   | %N1              | 73.5             | 76.0       | 79.8       | 84.2       | 88.5       |
| 25000<br>(280 KIAS)               | <b>PITCH ATT</b> | <b>1.5</b>       | <b>2.5</b> | <b>3.0</b> | <b>3.5</b> | <b>3.5</b> |
|                                   | %N1              | 69.6             | 72.1       | 75.2       | 79.3       | 83.4       |
| 20000<br>(270 KIAS)               | <b>PITCH ATT</b> | <b>1.5</b>       | <b>2.5</b> | <b>3.5</b> | <b>4.0</b> | <b>4.0</b> |
|                                   | %N1              | 64.7             | 67.3       | 70.5       | 74.6       | 78.7       |
| 15000<br>(270 KIAS)               | <b>PITCH ATT</b> | <b>1.5</b>       | <b>2.5</b> | <b>3.5</b> | <b>4.5</b> | <b>4.5</b> |
|                                   | %N1              | 60.9             | 63.3       | 66.4       | 69.7       | 74.1       |

**Descent****Flaps Up, Set Idle Thrust**

| PRESSURE ALTITUDE (FT)<br>(SPEED) |                  | WEIGHT (1000 KG) |             |            |            |            |
|-----------------------------------|------------------|------------------|-------------|------------|------------|------------|
|                                   |                  | 160              | 210         | 260        | 310        | 360        |
| 40000<br>(.82M)                   | <b>PITCH ATT</b> | <b>-1.5</b>      | <b>-0.5</b> |            |            |            |
|                                   | V/S (FT/MIN)     | -2900            | -2600       |            |            |            |
| 30000<br>(280 KIAS)               | <b>PITCH ATT</b> | <b>-1.5</b>      | <b>-0.5</b> | <b>0.5</b> | <b>0.5</b> | <b>0.5</b> |
|                                   | V/S (FT/MIN)     | -2400            | -2000       | -1900      | -2100      | -2500      |
| 20000<br>(270 KIAS)               | <b>PITCH ATT</b> | <b>-1.5</b>      | <b>0.0</b>  | <b>1.0</b> | <b>2.0</b> | <b>1.5</b> |
|                                   | V/S (FT/MIN)     | -1900            | -1700       | -1600      | -1500      | -1600      |
| 10000<br>(270 KIAS)               | <b>PITCH ATT</b> | <b>-1.5</b>      | <b>0.0</b>  | <b>1.0</b> | <b>2.0</b> | <b>2.5</b> |
|                                   | V/S (FT/MIN)     | -1700            | -1500       | -1400      | -1400      | -1400      |
| SEA LEVEL<br>(270 KIAS)           | <b>PITCH ATT</b> | <b>-2.0</b>      | <b>-0.5</b> | <b>1.0</b> | <b>2.0</b> | <b>2.5</b> |
|                                   | V/S (FT/MIN)     | -1600            | -1300       | -1200      | -1200      | -1200      |

In shaded areas, data reflects the minimum speed limitation of 15 knots above minimum maneuvering speed.

**Flight With Unreliable Airspeed / Turbulent Air Penetration**

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

**Holding**

**Flaps Up, Set Thrust for Level Flight**

| PRESSURE ALTITUDE (FT) |                  | WEIGHT (1000 KG) |            |            |            |            |
|------------------------|------------------|------------------|------------|------------|------------|------------|
|                        |                  | 160              | 210        | 260        | 310        | 360        |
| 10000                  | <b>PITCH ATT</b> | <b>4.0</b>       | <b>5.0</b> | <b>5.5</b> | <b>5.5</b> | <b>5.5</b> |
|                        | %N1              | 50.4             | 55.8       | 60.8       | 65.5       | 69.5       |
|                        | KIAS             | 199              | 217        | 233        | 255        | 275        |
| 5000                   | <b>PITCH ATT</b> | <b>4.0</b>       | <b>5.0</b> | <b>5.5</b> | <b>5.5</b> | <b>5.5</b> |
|                        | %N1              | 46.7             | 52.3       | 56.9       | 61.3       | 65.4       |
|                        | KIAS             | 199              | 217        | 232        | 253        | 273        |

**Terminal Area (5000 FT)**

**Set Thrust for Level Flight**

| FLAP POSITION<br>(VREF + INCREMENT)  |                  | WEIGHT (1000 KG) |            |            |            |            |
|--------------------------------------|------------------|------------------|------------|------------|------------|------------|
|                                      |                  | 160              | 210        | 260        | 310        | 360        |
| FLAPS UP<br>GEAR UP<br>(VREF30+80)   | <b>PITCH ATT</b> | <b>4.5</b>       | <b>5.5</b> | <b>6.0</b> | <b>6.0</b> | <b>6.5</b> |
|                                      | %N1              | 46.9             | 52.6       | 57.4       | 61.9       | 66.2       |
|                                      | KIAS             | 201              | 217        | 232        | 248        | 264        |
| FLAPS 1<br>GEAR UP<br>(VREF30+60)    | <b>PITCH ATT</b> | <b>6.0</b>       | <b>7.0</b> | <b>7.5</b> | <b>7.5</b> | <b>8.0</b> |
|                                      | %N1              | 47.7             | 53.6       | 58.7       | 63.6       | 67.8       |
|                                      | KIAS             | 181              | 197        | 212        | 228        | 244        |
| FLAPS 5<br>GEAR UP<br>(VREF30+40)    | <b>PITCH ATT</b> | <b>5.5</b>       | <b>6.0</b> | <b>6.5</b> | <b>6.5</b> | <b>6.5</b> |
|                                      | %N1              | 48.3             | 54.3       | 59.8       | 64.5       | 68.9       |
|                                      | KIAS             | 161              | 177        | 192        | 208        | 224        |
| FLAPS 15<br>GEAR UP<br>(VREF30+20)   | <b>PITCH ATT</b> | <b>6.0</b>       | <b>6.5</b> | <b>7.0</b> | <b>7.0</b> | <b>7.0</b> |
|                                      | %N1              | 49.2             | 55.6       | 61.5       | 66.3       | 70.9       |
|                                      | KIAS             | 141              | 157        | 172        | 188        | 204        |
| FLAPS 20<br>GEAR DOWN<br>(VREF30+20) | <b>PITCH ATT</b> | <b>4.5</b>       | <b>5.0</b> | <b>5.5</b> | <b>5.5</b> | <b>5.5</b> |
|                                      | %N1              | 54.9             | 61.7       | 67.8       | 73.2       | 77.9       |
|                                      | KIAS             | 141              | 157        | 172        | 188        | 204        |

**Final Approach (1500 FT)**

**Gear Down, Set Thrust for 3° Glideslope**

| FLAP POSITION<br>(VREF + INCREMENT) |                  | WEIGHT (1000 KG) |            |            |            |            |
|-------------------------------------|------------------|------------------|------------|------------|------------|------------|
|                                     |                  | 160              | 210        | 260        | 310        | 360        |
| FLAPS 20<br>(VREF20+10)             | <b>PITCH ATT</b> | <b>1.0</b>       | <b>1.0</b> | <b>1.5</b> | <b>1.5</b> | <b>2.0</b> |
|                                     | %N1              | 37.7             | 42.4       | 46.8       | 50.6       | 53.7       |
|                                     | KIAS             | 144              | 164        | 181        | 196        | 208        |
| FLAPS 25<br>(VREF25+10)             | <b>PITCH ATT</b> | <b>1.5</b>       | <b>1.5</b> | <b>2.0</b> | <b>2.0</b> | <b>2.0</b> |
|                                     | %N1              | 47.6             | 53.0       | 57.5       | 61.6       | 64.5       |
|                                     | KIAS             | 135              | 154        | 170        | 184        | 195        |
| FLAPS 30<br>(VREF30+10)             | <b>PITCH ATT</b> | <b>1.0</b>       | <b>1.0</b> | <b>1.5</b> | <b>1.0</b> | <b>1.0</b> |
|                                     | %N1              | 52.5             | 57.7       | 62.6       | 68.2       | 73.3       |
|                                     | KIAS             | 131              | 147        | 162        | 178        | 194        |



**Flight With Unreliable Airspeed / Turbulent Air Penetration**

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

**Go-Around**

**Flaps 20, Gear Up, Set Go-Around Thrust**

| PRESSURE ALTITUDE (FT) |                  | WEIGHT (1000 KG) |             |             |             |             |
|------------------------|------------------|------------------|-------------|-------------|-------------|-------------|
|                        |                  | 160              | 210         | 260         | 310         | 360         |
| 10000                  | <b>PITCH ATT</b> | <b>20.5</b>      | <b>15.5</b> | <b>13.0</b> | <b>10.5</b> | <b>9.0</b>  |
|                        | V/S (FT/MIN)     | 4600             | 3500        | 2600        | 2100        | 1600        |
|                        | KIAS             | 139              | 157         | 172         | 189         | 204         |
| 5000                   | <b>PITCH ATT</b> | <b>26.0</b>      | <b>19.5</b> | <b>16.0</b> | <b>13.0</b> | <b>11.0</b> |
|                        | V/S (FT/MIN)     | 5700             | 4400        | 3400        | 2800        | 2300        |
|                        | KIAS             | 139              | 157         | 172         | 189         | 204         |
| SEA LEVEL              | <b>PITCH ATT</b> | <b>30.5</b>      | <b>23.0</b> | <b>18.5</b> | <b>15.5</b> | <b>13.0</b> |
|                        | V/S (FT/MIN)     | 6500             | 5100        | 4100        | 3400        | 2800        |
|                        | KIAS             | 141              | 157         | 172         | 188         | 204         |

**Max Climb %N1**

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

| TAT<br>(°C) | PRESSURE ALTITUDE (1000 FT) / SPEED (KIAS OR MACH) |      |      |      |      |      |       |       |       |       |
|-------------|----------------------------------------------------|------|------|------|------|------|-------|-------|-------|-------|
|             | 0                                                  | 5    | 10   | 15   | 20   | 25   | 30    | 35    | 40    | 43    |
|             | 310                                                | 310  | 310  | 310  | 310  | 310  | 310   | 0.84  | 0.84  | 0.84  |
| 60          | 88.3                                               | 88.1 | 90.3 | 91.0 | 93.1 | 96.7 | 99.6  | 101.7 | 101.8 | 101.3 |
| 50          | 90.6                                               | 90.4 | 90.2 | 89.6 | 91.7 | 95.3 | 98.0  | 100.1 | 100.2 | 99.7  |
| 40          | 92.5                                               | 92.4 | 92.4 | 92.2 | 90.5 | 93.8 | 96.5  | 98.6  | 98.7  | 98.2  |
| 30          | 91.6                                               | 94.1 | 94.2 | 94.0 | 93.1 | 94.2 | 95.2  | 97.0  | 97.1  | 96.6  |
| 20          | 90.1                                               | 92.5 | 95.1 | 95.8 | 95.9 | 95.9 | 96.9  | 95.9  | 95.5  | 95.0  |
| 15          | 89.3                                               | 91.7 | 94.3 | 96.9 | 96.9 | 96.9 | 97.8  | 96.6  | 95.8  | 95.4  |
| 10          | 88.6                                               | 90.9 | 93.5 | 96.1 | 98.4 | 98.1 | 98.8  | 97.2  | 96.5  | 96.0  |
| 5           | 87.8                                               | 90.1 | 92.7 | 95.2 | 98.1 | 99.6 | 100.1 | 98.1  | 97.2  | 96.8  |
| 0           | 87.0                                               | 89.3 | 91.8 | 94.4 | 97.3 | 99.9 | 101.5 | 99.3  | 98.1  | 97.6  |
| -5          | 86.2                                               | 88.5 | 91.0 | 93.5 | 96.4 | 99.0 | 101.9 | 100.5 | 99.5  | 98.8  |
| -10         | 85.4                                               | 87.7 | 90.1 | 92.6 | 95.5 | 98.1 | 100.9 | 101.3 | 100.5 | 100.0 |
| -15         | 84.6                                               | 86.8 | 89.3 | 91.7 | 94.5 | 97.1 | 100.0 | 101.0 | 100.9 | 100.5 |
| -20         | 83.7                                               | 86.0 | 88.4 | 90.8 | 93.6 | 96.2 | 99.0  | 100.1 | 99.9  | 99.5  |
| -25         | 82.9                                               | 85.1 | 87.5 | 89.9 | 92.7 | 95.2 | 98.0  | 99.1  | 98.9  | 98.5  |
| -30         | 82.1                                               | 84.3 | 86.7 | 89.0 | 91.8 | 94.3 | 97.0  | 98.1  | 97.9  | 97.5  |
| -35         | 81.2                                               | 83.4 | 85.8 | 88.1 | 90.8 | 93.3 | 96.0  | 97.0  | 96.9  | 96.5  |
| -40         | 80.4                                               | 82.5 | 84.9 | 87.2 | 89.8 | 92.3 | 95.0  | 96.0  | 95.9  | 95.5  |

**%N1 Adjustments for Engine Bleed**

| BLEED CONFIGURATION              | PRESSURE ALTITUDE (1000 FT) |      |      |      |      |      |      |      |      |      |
|----------------------------------|-----------------------------|------|------|------|------|------|------|------|------|------|
|                                  | 0                           | 5    | 10   | 15   | 20   | 25   | 30   | 35   | 40   | 43   |
| 2 PACKS ON - 1 BLEED SOURCE      | -0.4                        | -0.5 | -0.4 | -0.3 | -0.2 | -0.3 | -0.3 | -0.4 | -0.4 | -0.5 |
| 1 PACK ON - 1 OR 2 BLEED SOURCES | -0.4                        | -0.5 | -0.4 | -0.3 | -0.2 | -0.3 | -0.3 | -0.4 | -0.4 | -0.5 |
| ENGINE ANTI-ICE ON               | -0.3                        | -0.5 | -0.4 | -0.3 | -0.1 | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 |
| ENGINE & WING ANTI-ICE ON*       | -0.6                        | -0.8 | -0.7 | -0.5 | -0.2 | -0.3 | -0.3 | -0.4 | -0.4 | -0.4 |
| ENGINE & WING ANTI-ICE ON**      | -1.1                        | -0.9 | -0.9 | -0.6 | -0.3 | -0.4 | -0.5 | -0.5 | -0.6 | -0.6 |

\*Packs on or off with 2 bleed sources.

\*\*Packs off with 1 bleed source.

**Go-Around %N1****Based on engine bleed for packs on, engine anti-ice on or off, and wing anti-ice off**

| REPORTED OAT |     | TAT (°C) | AIRPORT PRESSURE ALTITUDE (1000 FT) |       |       |       |       |       |       |       |       |       |       |       |       |
|--------------|-----|----------|-------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| °C           | °F  |          | -2                                  | -1    | 0     | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    |
| 66           | 150 | 70       | 93.7                                | 93.8  | 94.1  | 93.9  | 93.8  | 93.7  | 93.6  | 93.4  | 93.3  | 92.6  | 91.5  | 90.5  | 89.6  |
| 56           | 133 | 60       | 96.5                                | 96.6  | 96.9  | 96.7  | 96.6  | 96.5  | 96.4  | 96.2  | 96.1  | 95.4  | 94.3  | 93.4  | 92.5  |
| 51           | 124 | 55       | 97.8                                | 98.0  | 98.3  | 98.1  | 97.9  | 97.9  | 97.7  | 97.6  | 97.4  | 96.7  | 95.7  | 94.7  | 93.9  |
| 46           | 115 | 50       | 99.1                                | 99.3  | 99.6  | 99.4  | 99.3  | 99.2  | 99.1  | 98.9  | 98.7  | 98.0  | 97.0  | 96.1  | 95.2  |
| 41           | 106 | 45       | 100.2                               | 100.7 | 101.1 | 101.0 | 100.9 | 100.7 | 100.5 | 100.4 | 100.0 | 99.3  | 98.3  | 97.3  | 96.5  |
| 36           | 97  | 40       | 101.5                               | 102.4 | 103.2 | 103.2 | 102.8 | 102.6 | 102.3 | 102.0 | 101.4 | 100.5 | 99.5  | 98.6  | 97.8  |
| 31           | 88  | 35       | 101.2                               | 103.9 | 105.8 | 105.4 | 105.1 | 104.7 | 104.3 | 103.8 | 102.7 | 101.7 | 100.6 | 99.7  | 98.9  |
| 26           | 79  | 30       | 100.4                               | 103.1 | 105.9 | 106.8 | 107.3 | 106.8 | 106.6 | 106.4 | 105.0 | 103.4 | 101.9 | 100.8 | 100.0 |
| 21           | 70  | 25       | 99.5                                | 102.2 | 105.0 | 105.9 | 106.5 | 107.0 | 107.4 | 107.4 | 106.8 | 105.7 | 104.0 | 102.3 | 101.3 |
| 16           | 61  | 20       | 98.7                                | 101.4 | 104.1 | 105.0 | 105.6 | 106.1 | 106.5 | 107.0 | 106.8 | 106.3 | 105.2 | 104.2 | 103.3 |
| 11           | 53  | 15       | 97.9                                | 100.5 | 103.2 | 104.1 | 104.7 | 105.2 | 105.6 | 106.1 | 105.9 | 105.5 | 104.9 | 104.4 | 104.0 |
| 7            | 44  | 10       | 97.0                                | 99.6  | 102.3 | 103.2 | 103.8 | 104.3 | 104.7 | 105.1 | 105.0 | 104.6 | 104.0 | 103.5 | 103.4 |
| 2            | 35  | 5        | 96.1                                | 98.7  | 101.4 | 102.3 | 102.9 | 103.4 | 103.8 | 104.2 | 104.1 | 103.7 | 103.1 | 102.6 | 102.5 |
| -3           | 26  | 0        | 95.3                                | 97.8  | 100.5 | 101.4 | 102.0 | 102.4 | 102.8 | 103.3 | 103.1 | 102.7 | 102.2 | 101.7 | 101.6 |
| -13          | 8   | -10      | 93.5                                | 96.0  | 98.6  | 99.5  | 100.1 | 100.5 | 100.9 | 101.4 | 101.2 | 100.8 | 100.3 | 99.8  | 99.7  |
| -23          | -10 | -20      | 91.7                                | 94.2  | 96.7  | 97.6  | 98.2  | 98.6  | 99.0  | 99.4  | 99.3  | 98.9  | 98.3  | 97.9  | 97.8  |
| -33          | -27 | -30      | 89.9                                | 92.3  | 94.8  | 95.6  | 96.2  | 96.6  | 97.0  | 97.4  | 97.3  | 96.9  | 96.4  | 95.9  | 95.8  |
| -43          | -45 | -40      | 88.0                                | 90.4  | 92.8  | 93.6  | 94.2  | 94.6  | 95.0  | 95.4  | 95.3  | 94.9  | 94.4  | 93.9  | 93.9  |
| -53          | -63 | -50      | 86.1                                | 88.4  | 90.8  | 91.6  | 92.2  | 92.6  | 93.0  | 93.3  | 93.2  | 92.9  | 92.3  | 91.9  | 91.8  |

**%N1 Adjustments for Engine Bleed**

| BLEED<br>CONFIGURATION | AIRPORT PRESSURE ALTITUDE (1000 FT) |      |      |      |      |      |      |      |      |      |      |      |      |
|------------------------|-------------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
|                        | -2                                  | -1   | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   |
| PACKS OFF              | 0.2                                 | 0.2  | 0.3  | 0.4  | 0.4  | 0.4  | 0.4  | 0.4  | 0.4  | 0.3  | 0.3  | 0.3  | 0.3  |
| 1 PACK ON              | -0.2                                | -0.2 | -0.3 | -0.4 | -0.4 | -0.4 | -0.4 | -0.4 | -0.4 | -0.3 | -0.3 | -0.3 | -0.3 |
| WING ANTI-ICE ON       | -0.2                                | -0.3 | -0.4 | -0.5 | -0.4 | -0.4 | -0.4 | -0.4 | -0.4 | -0.4 | -0.4 | -0.4 | -0.4 |

## VREF

| WEIGHT<br>(1000 KG) | VREF (KIAS) |     |     |
|---------------------|-------------|-----|-----|
|                     | FLAPS       |     |     |
|                     | 30          | 25  | 20  |
| 360                 | 184         | 186 | 199 |
| 340                 | 180         | 183 | 196 |
| 320                 | 173         | 177 | 190 |
| 300                 | 164         | 172 | 184 |
| 280                 | 158         | 166 | 178 |
| 260                 | 152         | 160 | 172 |
| 240                 | 146         | 154 | 165 |
| 220                 | 140         | 148 | 158 |
| 200                 | 134         | 141 | 151 |
| 180                 | 126         | 133 | 143 |
| 160                 | 119         | 125 | 134 |



# Performance Inflight - QRH

## Advisory Information

# Chapter PI-QRH

## Section 31

### ADVISORY INFORMATION

#### Normal Configuration Landing Distance

#### Flaps 30

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                                   |                                         |                           |                        |                         |                                 |                          |           |
|--------------------------|--------------------------------------|---------------------------------------------------|-----------------------------------------|---------------------------|------------------------|-------------------------|---------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WEIGHT<br>ADJ                                     | ALT<br>ADJ                              | WIND<br>ADJ PER<br>10 KTS | SLOPE<br>ADJ<br>PER 1% | TEMP<br>ADJ<br>PER 10°C | APP<br>SPD<br>ADJ               | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000 KG<br>LANDING<br>WT           | PER<br>5000 KG<br>ABOVE/<br>BELOW<br>250000<br>KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | HEAD/<br>TAIL<br>WIND     | DOWN/<br>UP<br>HILL    | ABOVE/<br>BELOW<br>ISA  | PER<br>5 KTS<br>ABOVE<br>VREF30 | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |      |         |    |           |         |         |     |     |     |
|---------------|------|---------|----|-----------|---------|---------|-----|-----|-----|
| MAX MANUAL    | 980  | +25/-10 | 20 | -40/+130  | +10/-10 | +20/-20 | 35  | 20  | 50  |
| AUTOBRAKE MAX | 1330 | +25/-20 | 30 | -55/+190  | +0/0    | +35/-35 | 65  | 0   | 0   |
| AUTOBRAKE 4   | 1740 | +35/-25 | 45 | -80/+270  | +0/0    | +45/-50 | 95  | 0   | 0   |
| AUTOBRAKE 3   | 2060 | +40/-35 | 60 | -100/+335 | +0/-10  | +60/-60 | 105 | 0   | 0   |
| AUTOBRAKE 2   | 2285 | +45/-40 | 70 | -115/+385 | +30/-50 | +65/-65 | 85  | 65  | 65  |
| AUTOBRAKE 1   | 2485 | +55/-45 | 85 | -130/+450 | +75/-80 | +70/-70 | 85  | 255 | 320 |

#### Good Reported Braking Action

|               |      |         |    |           |         |         |     |     |     |
|---------------|------|---------|----|-----------|---------|---------|-----|-----|-----|
| MAX MANUAL    | 1390 | +25/-20 | 35 | -65/+230  | +35/-30 | +35/-35 | 50  | 90  | 215 |
| AUTOBRAKE MAX | 1445 | +25/-20 | 40 | -65/+235  | +30/-25 | +35/-35 | 60  | 95  | 225 |
| AUTOBRAKE 4   | 1745 | +35/-25 | 45 | -80/+275  | +10/-5  | +50/-50 | 95  | 5   | 40  |
| AUTOBRAKE 3   | 2060 | +40/-35 | 60 | -100/+335 | +5/-10  | +60/-60 | 105 | 0   | 0   |
| AUTOBRAKE 2   | 2285 | +45/-40 | 70 | -115/+385 | +30/-50 | +65/-65 | 85  | 65  | 65  |
| AUTOBRAKE 1   | 2485 | +55/-45 | 85 | -130/+450 | +75/-80 | +70/-70 | 85  | 255 | 320 |

#### Medium Reported Braking Action

|               |      |         |    |           |         |         |     |     |     |
|---------------|------|---------|----|-----------|---------|---------|-----|-----|-----|
| MAX MANUAL    | 1865 | +35/-30 | 60 | -100/+365 | +80/-65 | +50/-50 | 65  | 245 | 625 |
| AUTOBRAKE MAX | 1865 | +40/-30 | 60 | -100/+365 | +85/-65 | +50/-50 | 70  | 240 | 620 |
| AUTOBRAKE 4   | 1930 | +40/-30 | 60 | -105/+375 | +65/-40 | +50/-55 | 95  | 225 | 615 |
| AUTOBRAKE 3   | 2150 | +45/-35 | 60 | -110/+400 | +40/-35 | +60/-60 | 105 | 105 | 420 |
| AUTOBRAKE 2   | 2335 | +45/-40 | 70 | -120/+430 | +60/-70 | +65/-65 | 85  | 120 | 325 |
| AUTOBRAKE 1   | 2495 | +55/-45 | 85 | -130/+460 | +95/-85 | +70/-70 | 85  | 275 | 430 |

#### Poor Reported Braking Action

|               |      |         |    |           |           |         |     |     |      |
|---------------|------|---------|----|-----------|-----------|---------|-----|-----|------|
| MAX MANUAL    | 2365 | +50/-45 | 80 | -145/+560 | +175/-120 | +65/-65 | 75  | 505 | 1485 |
| AUTOBRAKE MAX | 2370 | +50/-45 | 80 | -145/+560 | +180/-125 | +65/-65 | 75  | 505 | 1485 |
| AUTOBRAKE 4   | 2370 | +55/-45 | 80 | -145/+560 | +180/-115 | +65/-65 | 85  | 505 | 1485 |
| AUTOBRAKE 3   | 2450 | +55/-45 | 80 | -150/+570 | +150/-100 | +70/-70 | 105 | 455 | 1440 |
| AUTOBRAKE 2   | 2555 | +55/-45 | 85 | -155/+580 | +155/-120 | +70/-70 | 85  | 405 | 1350 |
| AUTOBRAKE 1   | 2650 | +55/-50 | 90 | -160/+600 | +175/-130 | +75/-75 | 85  | 475 | 1295 |

Reference distance is for sea level, standard day, no wind or slope, VREF30, 2 engine reverse thrust, and auto speedbrakes.

For Max Manual braking and manual speedbrakes, increase reference landing distance by 60 m.

For autobrake and manual speedbrakes, increase reference landing distance by 50 m.

Actual (unfactored) distances are shown.

Includes distance from 50 ft above threshold (305 meters of air distance).

## ADVISORY INFORMATION

### Normal Configuration Landing Distance

#### Flaps 25

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                                   |                                         |                           |                        |                         |                                 |                          |           |
|--------------------------|--------------------------------------|---------------------------------------------------|-----------------------------------------|---------------------------|------------------------|-------------------------|---------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WEIGHT<br>ADJ                                     | ALT<br>ADJ                              | WIND<br>ADJ PER<br>10 KTS | SLOPE<br>ADJ<br>PER 1% | TEMP<br>ADJ<br>PER 10°C | APP<br>SPD<br>ADJ               | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000 KG<br>LANDING<br>WT           | PER<br>5000 KG<br>ABOVE/<br>BELOW<br>250000<br>KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | HEAD/<br>TAIL<br>WIND     | DOWN/<br>UP<br>HILL    | ABOVE/<br>BELOW<br>ISA  | PER<br>5 KTS<br>ABOVE<br>VREF25 | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |      |         |    |           |         |         |     |     |     |
|---------------|------|---------|----|-----------|---------|---------|-----|-----|-----|
| MAX MANUAL    | 1030 | +25/-15 | 25 | -40/+135  | +15/-10 | +25/-25 | 35  | 25  | 55  |
| AUTOBRAKE MAX | 1430 | +20/-20 | 35 | -60/+195  | +0/0    | +35/-35 | 70  | 0   | 0   |
| AUTOBRAKE 4   | 1880 | +25/-30 | 50 | -85/+280  | +0/0    | +50/-50 | 100 | 0   | 0   |
| AUTOBRAKE 3   | 2235 | +35/-40 | 65 | -105/+350 | +0/-20  | +65/-65 | 105 | 5   | 5   |
| AUTOBRAKE 2   | 2460 | +40/-45 | 80 | -120/+400 | +35/-60 | +70/-70 | 90  | 100 | 100 |
| AUTOBRAKE 1   | 2665 | +50/-50 | 90 | -135/+465 | +85/-85 | +75/-80 | 90  | 305 | 395 |

#### Good Reported Braking Action

|               |      |         |    |           |         |         |     |     |     |
|---------------|------|---------|----|-----------|---------|---------|-----|-----|-----|
| MAX MANUAL    | 1470 | +20/-20 | 40 | -65/+235  | +35/-30 | +35/-35 | 55  | 100 | 235 |
| AUTOBRAKE MAX | 1530 | +20/-25 | 40 | -70/+240  | +30/-20 | +40/-40 | 70  | 105 | 250 |
| AUTOBRAKE 4   | 1890 | +25/-30 | 50 | -85/+290  | +10/-5  | +50/-55 | 100 | 5   | 40  |
| AUTOBRAKE 3   | 2235 | +35/-40 | 65 | -105/+350 | +5/-20  | +65/-65 | 105 | 5   | 5   |
| AUTOBRAKE 2   | 2460 | +40/-45 | 80 | -120/+400 | +35/-60 | +70/-70 | 90  | 100 | 100 |
| AUTOBRAKE 1   | 2665 | +50/-50 | 90 | -135/+465 | +85/-85 | +75/-80 | 90  | 305 | 395 |

#### Medium Reported Braking Action

|               |      |         |    |           |          |         |     |     |     |
|---------------|------|---------|----|-----------|----------|---------|-----|-----|-----|
| MAX MANUAL    | 1980 | +35/-35 | 65 | -105/+375 | +85/-70  | +55/-55 | 65  | 270 | 695 |
| AUTOBRAKE MAX | 1980 | +35/-35 | 65 | -105/+375 | +85/-65  | +55/-55 | 75  | 270 | 695 |
| AUTOBRAKE 4   | 2075 | +35/-35 | 65 | -105/+385 | +60/-40  | +55/-55 | 100 | 225 | 665 |
| AUTOBRAKE 3   | 2330 | +35/-40 | 70 | -115/+415 | +40/-45  | +65/-65 | 105 | 110 | 445 |
| AUTOBRAKE 2   | 2505 | +40/-45 | 80 | -125/+445 | +70/-75  | +70/-70 | 90  | 155 | 375 |
| AUTOBRAKE 1   | 2675 | +50/-50 | 90 | -135/+480 | +105/-90 | +80/-80 | 90  | 325 | 510 |

#### Poor Reported Braking Action

|               |      |         |     |           |           |         |     |     |      |
|---------------|------|---------|-----|-----------|-----------|---------|-----|-----|------|
| MAX MANUAL    | 2515 | +50/-45 | 90  | -150/+575 | +185/-130 | +70/-70 | 80  | 555 | 1655 |
| AUTOBRAKE MAX | 2520 | +50/-45 | 90  | -150/+575 | +190/-130 | +70/-70 | 80  | 560 | 1655 |
| AUTOBRAKE 4   | 2520 | +50/-45 | 90  | -150/+575 | +185/-120 | +70/-70 | 85  | 560 | 1660 |
| AUTOBRAKE 3   | 2630 | +50/-50 | 90  | -155/+585 | +155/-110 | +75/-75 | 105 | 480 | 1585 |
| AUTOBRAKE 2   | 2730 | +50/-50 | 95  | -160/+600 | +170/-125 | +75/-75 | 85  | 460 | 1500 |
| AUTOBRAKE 1   | 2835 | +55/-55 | 100 | -165/+615 | +185/-135 | +80/-80 | 90  | 535 | 1455 |

Reference distance is for sea level, standard day, no wind or slope, VREF25, 2 engine 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 60 m.

Includes distance from 50 ft above threshold (305 meters of unfactored air distance).



## ADVISORY INFORMATION

### Normal Configuration Landing Distance

#### Flaps 20

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                                   |                                         |                           |                        |                         |                                 |                          |           |
|--------------------------|--------------------------------------|---------------------------------------------------|-----------------------------------------|---------------------------|------------------------|-------------------------|---------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WEIGHT<br>ADJ                                     | ALT<br>ADJ                              | WIND<br>ADJ PER<br>10 KTS | SLOPE<br>ADJ<br>PER 1% | TEMP<br>ADJ<br>PER 10°C | APP<br>SPD<br>ADJ               | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000 KG<br>LANDING<br>WT           | PER<br>5000 KG<br>ABOVE/<br>BELOW<br>250000<br>KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | HEAD/<br>TAIL<br>WIND     | DOWN/<br>UP<br>HILL    | ABOVE/<br>BELOW<br>ISA  | PER<br>5 KTS<br>ABOVE<br>VREF20 | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |      |         |     |           |          |         |     |     |     |
|---------------|------|---------|-----|-----------|----------|---------|-----|-----|-----|
| MAX MANUAL    | 1120 | +30/-15 | 25  | -40/+140  | +15/-15  | +25/-25 | 40  | 30  | 65  |
| AUTOBRAKE MAX | 1585 | +20/-25 | 40  | -60/+210  | +0/0     | +40/-40 | 75  | 0   | 0   |
| AUTOBRAKE 4   | 2100 | +30/-35 | 60  | -90/+300  | +0/0     | +60/-60 | 105 | 0   | 0   |
| AUTOBRAKE 3   | 2500 | +40/-45 | 75  | -110/+370 | +5/-25   | +75/-75 | 115 | 10  | 10  |
| AUTOBRAKE 2   | 2750 | +45/-50 | 90  | -125/+425 | +45/-65  | +80/-80 | 95  | 130 | 130 |
| AUTOBRAKE 1   | 2975 | +55/-60 | 105 | -145/+490 | +95/-100 | +90/-90 | 95  | 370 | 485 |

#### Good Reported Braking Action

|               |      |         |     |           |          |         |     |     |     |
|---------------|------|---------|-----|-----------|----------|---------|-----|-----|-----|
| MAX MANUAL    | 1615 | +25/-25 | 45  | -70/+245  | +40/-35  | +40/-40 | 55  | 120 | 285 |
| AUTOBRAKE MAX | 1685 | +25/-25 | 45  | -75/+255  | +35/-20  | +45/-45 | 75  | 120 | 295 |
| AUTOBRAKE 4   | 2105 | +30/-35 | 60  | -90/+305  | +10/0    | +60/-60 | 105 | 5   | 45  |
| AUTOBRAKE 3   | 2500 | +40/-45 | 75  | -110/+370 | +5/-25   | +75/-75 | 115 | 10  | 10  |
| AUTOBRAKE 2   | 2750 | +45/-50 | 90  | -125/+425 | +45/-65  | +80/-80 | 95  | 130 | 130 |
| AUTOBRAKE 1   | 2975 | +55/-60 | 105 | -145/+490 | +95/-100 | +90/-90 | 95  | 370 | 485 |

#### Medium Reported Braking Action

|               |      |         |     |           |           |         |     |     |     |
|---------------|------|---------|-----|-----------|-----------|---------|-----|-----|-----|
| MAX MANUAL    | 2190 | +40/-40 | 70  | -110/+395 | +95/-75   | +60/-60 | 70  | 320 | 835 |
| AUTOBRAKE MAX | 2185 | +40/-40 | 70  | -110/+395 | +95/-70   | +60/-60 | 80  | 315 | 830 |
| AUTOBRAKE 4   | 2300 | +40/-40 | 70  | -115/+405 | +65/-45   | +65/-65 | 105 | 255 | 785 |
| AUTOBRAKE 3   | 2590 | +40/-45 | 80  | -125/+440 | +50/-50   | +75/-75 | 110 | 130 | 530 |
| AUTOBRAKE 2   | 2795 | +50/-50 | 90  | -135/+470 | +75/-80   | +80/-80 | 95  | 195 | 455 |
| AUTOBRAKE 1   | 2985 | +55/-60 | 105 | -145/+505 | +115/-105 | +90/-90 | 95  | 395 | 615 |

#### Poor Reported Braking Action

|               |      |         |     |           |           |         |     |     |      |
|---------------|------|---------|-----|-----------|-----------|---------|-----|-----|------|
| MAX MANUAL    | 2780 | +55/-55 | 100 | -160/+600 | +200/-140 | +75/-75 | 80  | 655 | 1975 |
| AUTOBRAKE MAX | 2785 | +55/-55 | 100 | -160/+600 | +205/-145 | +80/-80 | 85  | 655 | 1975 |
| AUTOBRAKE 4   | 2785 | +55/-55 | 100 | -160/+600 | +205/-130 | +80/-80 | 95  | 655 | 1980 |
| AUTOBRAKE 3   | 2915 | +55/-55 | 100 | -165/+610 | +165/-120 | +85/-85 | 110 | 555 | 1885 |
| AUTOBRAKE 2   | 3030 | +55/-60 | 105 | -170/+625 | +180/-140 | +85/-85 | 95  | 540 | 1790 |
| AUTOBRAKE 1   | 3145 | +60/-60 | 110 | -175/+645 | +200/-150 | +90/-90 | 95  | 630 | 1735 |

Reference distance is for sea level, standard day, no wind or slope, VREF20, 2 engine 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 60 m.

Actual (unfactored) distances are shown.

Includes distance from 50 ft above threshold (305 meters of air distance).



777 Flight Crew Operations Manual

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

ADIRU/GPS DISAGREE (Flaps 25)

VREF25

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                       |                                         |                                        |                               |                                   |                               |                          |
|--------------------------|--------------------------------------|---------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|
|                          | REF<br>DIST                          | WT<br>ADJ                             | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV<br>NO<br>REV  |

Dry Runway

|               |                       |        |    |         |        |        |    |    |     |
|---------------|-----------------------|--------|----|---------|--------|--------|----|----|-----|
| MAX MANUAL    | 1275                  | 40/-20 | 35 | -55/190 | 25/-20 | 30/-30 | 45 | 60 | 135 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |         |        |        |    |    |     |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |         |        |        |    |    |     |

Good Reported Braking Action

|               |                       |        |    |         |        |        |    |     |     |
|---------------|-----------------------|--------|----|---------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1780                  | 30/-30 | 55 | -90/315 | 65/-50 | 45/-45 | 60 | 195 | 480 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |         |        |        |    |     |     |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |         |        |        |    |     |     |

Medium Reported Braking Action

|               |                       |        |    |          |         |        |    |     |      |
|---------------|-----------------------|--------|----|----------|---------|--------|----|-----|------|
| MAX MANUAL    | 2255                  | 40/-40 | 75 | -125/470 | 130/-95 | 60/-60 | 75 | 400 | 1110 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |          |         |        |    |     |      |
| AUTOBRAKE 3   | Autobrake Inoperative |        |    |          |         |        |    |     |      |

Poor Reported Braking Action

|               |                       |        |     |          |          |        |    |     |      |
|---------------|-----------------------|--------|-----|----------|----------|--------|----|-----|------|
| MAX MANUAL    | 2890                  | 60/-55 | 105 | -190/760 | 335/-185 | 80/-80 | 85 | 860 | 2965 |
| 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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### ADIRU/GPS DISAGREE (Flaps 30)

#### VREF30

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |                       |        |    |         |        |        |    |    |     |
|---------------|-----------------------|--------|----|---------|--------|--------|----|----|-----|
| MAX MANUAL    | 1210                  | 40/-15 | 30 | -55/185 | 25/-20 | 30/-30 | 45 | 55 | 120 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |         |        |        |    |    |     |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |         |        |        |    |    |     |

#### Good Reported Braking Action

|               |                       |        |    |         |        |        |    |     |     |
|---------------|-----------------------|--------|----|---------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1680                  | 30/-25 | 50 | -85/310 | 60/-50 | 45/-45 | 60 | 175 | 430 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |         |        |        |    |     |     |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |         |        |        |    |     |     |

#### Medium Reported Braking Action

|               |                       |        |    |          |         |        |    |     |     |
|---------------|-----------------------|--------|----|----------|---------|--------|----|-----|-----|
| MAX MANUAL    | 2125                  | 45/-35 | 70 | -125/460 | 120/-90 | 55/-55 | 70 | 365 | 995 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |          |         |        |    |     |     |
| AUTOBRAKE 3   | Autobrake Inoperative |        |    |          |         |        |    |     |     |

#### Poor Reported Braking Action

|               |                       |        |     |          |          |        |    |     |      |
|---------------|-----------------------|--------|-----|----------|----------|--------|----|-----|------|
| MAX MANUAL    | 2720                  | 60/-50 | 100 | -185/740 | 325/-175 | 75/-75 | 80 | 785 | 2670 |
| 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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**AIR DATA SYS (Flaps 20)**

**VREF20**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |      |        |    |          |        |        |     |    |    |
|---------------|------|--------|----|----------|--------|--------|-----|----|----|
| MAX MANUAL    | 1295 | 30/-15 | 30 | -45/160  | 20/-15 | 30/-30 | 50  | 40 | 90 |
| AUTOBRAKE MAX | 1585 | 20/-25 | 40 | -60/210  | 0/0    | 40/-40 | 75  | 0  | 0  |
| AUTOBRAKE 2   | 2855 | 45/-50 | 90 | -130/435 | 15/-40 | 85/-85 | 130 | 30 | 30 |

**Good Reported Braking Action**

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1835 | 30/-30 | 55 | -80/270  | 50/-45 | 45/-45 | 70  | 155 | 380 |
| AUTOBRAKE MAX | 1820 | 30/-30 | 55 | -80/270  | 50/-40 | 50/-50 | 75  | 155 | 375 |
| AUTOBRAKE 2   | 2855 | 45/-50 | 90 | -130/435 | 15/-40 | 85/-85 | 130 | 30  | 30  |

**Medium Reported Braking Action**

|               |      |        |    |          |         |        |     |     |      |
|---------------|------|--------|----|----------|---------|--------|-----|-----|------|
| MAX MANUAL    | 2450 | 45/-45 | 80 | -120/425 | 110/-90 | 65/-65 | 90  | 400 | 1095 |
| AUTOBRAKE MAX | 2440 | 45/-45 | 85 | -120/425 | 120/-95 | 65/-65 | 90  | 400 | 1090 |
| AUTOBRAKE 3   | 2645 | 45/-45 | 80 | -125/445 | 65/-40  | 75/-75 | 130 | 220 | 910  |

**Poor Reported Braking Action**

|               |      |        |     |          |          |        |     |     |      |
|---------------|------|--------|-----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 3075 | 60/-60 | 115 | -170/635 | 230/-160 | 85/-85 | 100 | 805 | 2575 |
| AUTOBRAKE MAX | 3080 | 60/-60 | 115 | -170/635 | 240/-170 | 85/-85 | 100 | 805 | 2580 |
| AUTOBRAKE 3   | 3110 | 60/-60 | 110 | -170/635 | 225/-145 | 90/-90 | 115 | 775 | 2550 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### Airspeed Unreliable (Flaps 20)

#### VREF20

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |      |        |     |          |        |        |     |    |     |
|---------------|------|--------|-----|----------|--------|--------|-----|----|-----|
| MAX MANUAL    | 1400 | 30/-20 | 35  | -50/165  | 20/-20 | 35/-35 | N/A | 45 | 105 |
| AUTOBRAKE MAX | 1730 | 25/-25 | 45  | -65/220  | 0/0    | 45/-45 | N/A | 0  | 0   |
| AUTOBRAKE 2   | 3110 | 50/-55 | 100 | -135/455 | 35/-55 | 95/-95 | N/A | 80 | 80  |

#### Good Reported Braking Action

|               |      |        |     |          |        |        |     |     |     |
|---------------|------|--------|-----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1980 | 30/-30 | 60  | -80/280  | 55/-45 | 50/-50 | N/A | 180 | 430 |
| AUTOBRAKE MAX | 1970 | 30/-30 | 60  | -80/280  | 50/-45 | 55/-55 | N/A | 175 | 430 |
| AUTOBRAKE 2   | 3110 | 50/-55 | 100 | -135/455 | 35/-55 | 95/-95 | N/A | 80  | 80  |

#### Medium Reported Braking Action

|               |      |        |    |          |          |        |     |     |      |
|---------------|------|--------|----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2625 | 45/-45 | 90 | -125/435 | 120/-95  | 70/-70 | N/A | 440 | 1200 |
| AUTOBRAKE MAX | 2615 | 45/-45 | 90 | -125/435 | 125/-100 | 75/-75 | N/A | 440 | 1195 |
| AUTOBRAKE 3   | 2900 | 45/-50 | 90 | -135/465 | 65/-50   | 85/-85 | N/A | 205 | 945  |

#### Poor Reported Braking Action

|               |      |        |     |          |          |        |     |     |      |
|---------------|------|--------|-----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 3275 | 65/-65 | 120 | -175/650 | 240/-170 | 90/-90 | N/A | 860 | 2740 |
| AUTOBRAKE MAX | 3280 | 65/-65 | 125 | -175/650 | 250/-175 | 95/-95 | N/A | 860 | 2745 |
| AUTOBRAKE 3   | 3345 | 60/-60 | 120 | -175/655 | 225/-150 | 95/-95 | N/A | 795 | 2680 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**ANTISKID (Flaps 25)**

**VREF25**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |                       |        |    |          |        |        |    |     |     |
|---------------|-----------------------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1980                  | 35/-35 | 65 | -105/375 | 85/-70 | 55/-55 | 65 | 270 | 695 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |          |        |        |    |     |     |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |          |        |        |    |     |     |

**Good Reported Braking Action**

|               |                       |        |    |          |        |        |    |     |     |
|---------------|-----------------------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1980                  | 35/-35 | 65 | -105/375 | 85/-70 | 55/-55 | 65 | 270 | 695 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |          |        |        |    |     |     |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |          |        |        |    |     |     |

**Medium Reported Braking Action**

|               |                       |        |    |          |          |        |    |     |      |
|---------------|-----------------------|--------|----|----------|----------|--------|----|-----|------|
| MAX MANUAL    | 2515                  | 50/-45 | 90 | -150/575 | 185/-130 | 70/-70 | 75 | 555 | 1655 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |          |          |        |    |     |      |
| AUTOBRAKE 3   | Autobrake Inoperative |        |    |          |          |        |    |     |      |

**Poor Reported Braking Action**

|               |                       |        |     |           |           |        |    |      |      |
|---------------|-----------------------|--------|-----|-----------|-----------|--------|----|------|------|
| MAX MANUAL    | 3340                  | 70/-70 | 125 | -245/1055 | 1065/-280 | 90/-90 | 85 | 1460 | 2765 |
| 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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### ANTISKID (Flaps 30)

#### VREF30

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV<br>NO<br>REV  |

#### Dry Runway

|               |                       |        |    |          |        |        |    |     |     |
|---------------|-----------------------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1865                  | 35/-30 | 60 | -100/365 | 80/-65 | 50/-50 | 65 | 245 | 625 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |          |        |        |    |     |     |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |          |        |        |    |     |     |

#### Good Reported Braking Action

|               |                       |        |    |          |        |        |    |     |     |
|---------------|-----------------------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1865                  | 35/-30 | 60 | -100/365 | 80/-65 | 50/-50 | 65 | 245 | 625 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |          |        |        |    |     |     |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |          |        |        |    |     |     |

#### Medium Reported Braking Action

|               |                       |        |    |          |          |        |    |     |      |
|---------------|-----------------------|--------|----|----------|----------|--------|----|-----|------|
| MAX MANUAL    | 2365                  | 50/-45 | 80 | -145/560 | 175/-120 | 65/-65 | 75 | 505 | 1485 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |          |          |        |    |     |      |
| AUTOBRAKE 3   | Autobrake Inoperative |        |    |          |          |        |    |     |      |

#### Poor Reported Braking Action

|               |                       |        |     |           |           |        |    |      |      |
|---------------|-----------------------|--------|-----|-----------|-----------|--------|----|------|------|
| MAX MANUAL    | 3145                  | 75/-65 | 115 | -240/1035 | 1030/-265 | 85/-85 | 85 | 1350 | 2955 |
| 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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**ENG SHUTDOWN L, R (Flaps 20)**

**VREF20**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |      |        |    |          |        |        |     |   |    |
|---------------|------|--------|----|----------|--------|--------|-----|---|----|
| MAX MANUAL    | 1135 | 35/-15 | 25 | -45/145  | 15/-15 | 25/-25 | 40  | 0 | 35 |
| AUTOBRAKE MAX | 1585 | 25/-25 | 40 | -60/210  | 0/0    | 40/-40 | 75  | 0 | 0  |
| AUTOBRAKE 2   | 2860 | 45/-50 | 85 | -130/435 | 10/-35 | 85/-85 | 130 | 0 | 0  |

**Good Reported Braking Action**

|               |      |        |    |          |        |        |     |   |     |
|---------------|------|--------|----|----------|--------|--------|-----|---|-----|
| MAX MANUAL    | 1700 | 25/-25 | 50 | -75/260  | 50/-40 | 45/-45 | 60  | 0 | 155 |
| AUTOBRAKE MAX | 1775 | 25/-30 | 50 | -80/270  | 45/-40 | 45/-45 | 70  | 0 | 165 |
| AUTOBRAKE 2   | 2860 | 45/-50 | 85 | -130/435 | 10/-35 | 85/-85 | 130 | 0 | 0   |

**Medium Reported Braking Action**

|               |      |        |    |          |          |        |     |   |     |
|---------------|------|--------|----|----------|----------|--------|-----|---|-----|
| MAX MANUAL    | 2425 | 40/-45 | 75 | -125/440 | 130/-100 | 70/-70 | 80  | 0 | 475 |
| AUTOBRAKE MAX | 2430 | 40/-45 | 80 | -125/440 | 125/-95  | 70/-70 | 90  | 0 | 470 |
| AUTOBRAKE 3   | 2680 | 45/-45 | 85 | -130/465 | 85/-60   | 80/-80 | 120 | 0 | 340 |

**Poor Reported Braking Action**

|               |      |        |     |          |          |          |     |   |      |
|---------------|------|--------|-----|----------|----------|----------|-----|---|------|
| MAX MANUAL    | 3265 | 60/-60 | 115 | -190/700 | 310/-205 | 95/-95   | 100 | 0 | 1150 |
| AUTOBRAKE MAX | 3265 | 60/-65 | 115 | -190/700 | 315/-210 | 95/-95   | 100 | 0 | 1150 |
| AUTOBRAKE 3   | 3310 | 65/-65 | 115 | -190/700 | 305/-190 | 100/-100 | 115 | 0 | 1165 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.



## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### ENG SHUTDOWN L, R (Flaps 30)

#### VREF30

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |      |        |    |          |        |        |     |   |    |
|---------------|------|--------|----|----------|--------|--------|-----|---|----|
| MAX MANUAL    | 990  | 25/-15 | 20 | -40/135  | 15/-10 | 20/-20 | 40  | 0 | 25 |
| AUTOBRAKE MAX | 1330 | 25/-20 | 30 | -55/190  | 0/0    | 35/-35 | 65  | 0 | 0  |
| AUTOBRAKE 2   | 2335 | 45/-40 | 65 | -115/390 | 10/-20 | 70/-70 | 120 | 0 | 0  |

#### Good Reported Braking Action

|               |      |        |    |          |        |        |     |   |     |
|---------------|------|--------|----|----------|--------|--------|-----|---|-----|
| MAX MANUAL    | 1450 | 25/-20 | 40 | -70/240  | 40/-35 | 35/-35 | 55  | 0 | 115 |
| AUTOBRAKE MAX | 1515 | 30/-25 | 40 | -70/245  | 35/-30 | 40/-40 | 65  | 0 | 120 |
| AUTOBRAKE 2   | 2335 | 45/-40 | 65 | -115/390 | 10/-20 | 70/-70 | 120 | 0 | 0   |

#### Medium Reported Braking Action

|               |      |        |    |          |         |        |     |   |     |
|---------------|------|--------|----|----------|---------|--------|-----|---|-----|
| MAX MANUAL    | 2035 | 40/-35 | 60 | -110/405 | 110/-85 | 55/-55 | 75  | 0 | 350 |
| AUTOBRAKE MAX | 2040 | 40/-35 | 65 | -110/405 | 110/-80 | 55/-55 | 85  | 0 | 345 |
| AUTOBRAKE 3   | 2220 | 45/-35 | 65 | -120/425 | 75/-55  | 65/-65 | 105 | 0 | 265 |

#### Poor Reported Braking Action

|               |      |        |    |          |          |        |    |   |     |
|---------------|------|--------|----|----------|----------|--------|----|---|-----|
| MAX MANUAL    | 2720 | 60/-50 | 90 | -170/645 | 265/-170 | 80/-80 | 90 | 0 | 840 |
| AUTOBRAKE MAX | 2725 | 60/-50 | 90 | -170/645 | 265/-175 | 80/-80 | 90 | 0 | 845 |
| AUTOBRAKE 3   | 2760 | 60/-50 | 95 | -170/645 | 260/-165 | 80/-80 | 95 | 0 | 855 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**FLAP / SLAT CONTROL (Flaps 20)**

**VREF20**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |      |        |    |          |        |        |    |     |     |
|---------------|------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1120 | 30/-15 | 25 | -40/140  | 15/-15 | 25/-25 | 40 | 30  | 65  |
| AUTOBRAKE MAX | 1585 | 20/-25 | 40 | -60/210  | 0/0    | 40/-40 | 75 | 0   | 0   |
| AUTOBRAKE 2   | 2750 | 45/-50 | 90 | -125/425 | 45/-65 | 80/-80 | 95 | 130 | 130 |

**Good Reported Braking Action**

|               |      |        |    |          |        |        |    |     |     |
|---------------|------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1615 | 25/-25 | 45 | -70/245  | 40/-35 | 40/-40 | 55 | 120 | 285 |
| AUTOBRAKE MAX | 1685 | 25/-25 | 45 | -75/255  | 35/-20 | 45/-45 | 75 | 120 | 295 |
| AUTOBRAKE 2   | 2750 | 45/-50 | 90 | -125/425 | 45/-65 | 80/-80 | 95 | 130 | 130 |

**Medium Reported Braking Action**

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 2190 | 40/-40 | 70 | -110/395 | 95/-75 | 60/-60 | 70  | 320 | 835 |
| AUTOBRAKE MAX | 2185 | 40/-40 | 70 | -110/395 | 95/-70 | 60/-60 | 75  | 315 | 830 |
| AUTOBRAKE 3   | 2590 | 40/-45 | 80 | -125/440 | 50/-50 | 75/-75 | 110 | 130 | 530 |

**Poor Reported Braking Action**

|               |      |        |     |          |          |        |     |     |      |
|---------------|------|--------|-----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2780 | 55/-55 | 100 | -160/600 | 200/-140 | 75/-75 | 80  | 655 | 1975 |
| AUTOBRAKE MAX | 2785 | 55/-55 | 100 | -160/600 | 205/-145 | 80/-80 | 80  | 655 | 1975 |
| AUTOBRAKE 3   | 2915 | 55/-55 | 100 | -165/610 | 165/-120 | 85/-85 | 110 | 555 | 1885 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### FLAPS DRIVE (Flaps ≤ 5)

#### VREF30 + 40

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                             |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|-----------------------------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ    |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV<br><br>NO<br>REV |

#### Dry Runway

|               |      |        |     |          |        |          |     |     |     |
|---------------|------|--------|-----|----------|--------|----------|-----|-----|-----|
| MAX MANUAL    | 1260 | 50/-15 | 40  | -45/190  | 15/-15 | 35/-30   | 50  | 45  | 115 |
| AUTOBRAKE MAX | 1905 | 30/-25 | 50  | -70/230  | 0/0    | 50/-50   | 80  | 0   | 0   |
| AUTOBRAKE 2   | 3290 | 65/-60 | 115 | -140/465 | 60/-80 | 100/-100 | 110 | 270 | 270 |

#### Good Reported Braking Action

|               |      |        |     |          |        |          |     |     |     |
|---------------|------|--------|-----|----------|--------|----------|-----|-----|-----|
| MAX MANUAL    | 1815 | 30/-25 | 55  | -75/260  | 40/-35 | 50/-50   | 55  | 160 | 390 |
| AUTOBRAKE MAX | 1975 | 30/-25 | 55  | -80/270  | 20/-15 | 55/-55   | 80  | 95  | 330 |
| AUTOBRAKE 2   | 3290 | 65/-60 | 115 | -140/465 | 60/-80 | 100/-100 | 110 | 270 | 270 |

#### Medium Reported Braking Action

|               |      |        |     |          |         |        |     |     |      |
|---------------|------|--------|-----|----------|---------|--------|-----|-----|------|
| MAX MANUAL    | 2495 | 45/-40 | 85  | -115/415 | 100/-80 | 70/-70 | 70  | 435 | 1200 |
| AUTOBRAKE MAX | 2485 | 45/-40 | 85  | -115/415 | 100/-75 | 70/-70 | 80  | 430 | 1190 |
| AUTOBRAKE 3   | 3105 | 55/-50 | 100 | -135/475 | 55/-60  | 90/-90 | 115 | 175 | 710  |

#### Poor Reported Braking Action

|               |      |        |     |          |          |          |     |     |      |
|---------------|------|--------|-----|----------|----------|----------|-----|-----|------|
| MAX MANUAL    | 3200 | 65/-60 | 120 | -170/625 | 215/-150 | 90/-90   | 85  | 895 | 2980 |
| AUTOBRAKE MAX | 3195 | 65/-60 | 120 | -170/625 | 220/-155 | 90/-90   | 85  | 895 | 2975 |
| AUTOBRAKE 3   | 3405 | 70/-60 | 120 | -175/645 | 185/-125 | 100/-100 | 115 | 705 | 2790 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

FLAPS DRIVE (5 < Flaps < 20)

VREF30 + 20

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

Dry Runway

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1130 | 40/-15 | 25 | -40/140  | 15/-15 | 25/-25 | 40  | 30  | 70  |
| AUTOBRAKE MAX | 1600 | 25/-20 | 40 | -65/210  | 0/0    | 40/-40 | 75  | 0   | 0   |
| AUTOBRAKE 2   | 2810 | 55/-50 | 90 | -130/430 | 40/-55 | 85/-85 | 110 | 110 | 110 |

Good Reported Braking Action

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1635 | 30/-25 | 45 | -70/250  | 40/-35 | 40/-40 | 55  | 135 | 320 |
| AUTOBRAKE MAX | 1690 | 30/-25 | 50 | -75/255  | 35/-20 | 45/-45 | 70  | 130 | 325 |
| AUTOBRAKE 2   | 2810 | 55/-50 | 90 | -130/430 | 40/-55 | 85/-85 | 110 | 110 | 110 |

Medium Reported Braking Action

|               |      |        |    |          |         |        |     |     |     |
|---------------|------|--------|----|----------|---------|--------|-----|-----|-----|
| MAX MANUAL    | 2230 | 45/-35 | 75 | -110/400 | 95/-80  | 60/-60 | 75  | 355 | 960 |
| AUTOBRAKE MAX | 2225 | 45/-35 | 75 | -110/400 | 100/-80 | 60/-60 | 75  | 355 | 955 |
| AUTOBRAKE 3   | 2625 | 50/-40 | 80 | -125/440 | 45/-40  | 75/-75 | 120 | 130 | 635 |

Poor Reported Braking Action

|               |      |        |     |          |          |        |     |     |      |
|---------------|------|--------|-----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2850 | 60/-50 | 105 | -160/605 | 205/-145 | 80/-80 | 85  | 735 | 2335 |
| AUTOBRAKE MAX | 2850 | 60/-50 | 105 | -160/605 | 210/-145 | 80/-80 | 85  | 735 | 2340 |
| AUTOBRAKE 3   | 2950 | 60/-50 | 100 | -165/615 | 180/-110 | 85/-85 | 115 | 640 | 2245 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### FLAPS DRIVE (Flaps ≥ 20)

#### VREF20

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |      |        |    |          |        |        |    |     |     |
|---------------|------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1120 | 30/-15 | 25 | -40/140  | 15/-15 | 25/-25 | 40 | 30  | 65  |
| AUTOBRAKE MAX | 1585 | 20/-25 | 40 | -60/210  | 0/0    | 40/-40 | 75 | 0   | 0   |
| AUTOBRAKE 2   | 2750 | 45/-50 | 90 | -125/425 | 45/-65 | 80/-80 | 95 | 130 | 130 |

#### Good Reported Braking Action

|               |      |        |    |          |        |        |    |     |     |
|---------------|------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1615 | 25/-25 | 45 | -70/245  | 40/-35 | 40/-40 | 55 | 120 | 285 |
| AUTOBRAKE MAX | 1675 | 25/-25 | 45 | -75/250  | 35/-20 | 45/-45 | 75 | 120 | 295 |
| AUTOBRAKE 2   | 2750 | 45/-50 | 90 | -125/425 | 45/-65 | 80/-80 | 95 | 130 | 130 |

#### Medium Reported Braking Action

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 2190 | 40/-40 | 70 | -110/395 | 95/-75 | 60/-60 | 70  | 320 | 835 |
| AUTOBRAKE MAX | 2185 | 40/-40 | 70 | -110/395 | 95/-70 | 60/-60 | 75  | 315 | 830 |
| AUTOBRAKE 3   | 2585 | 40/-45 | 80 | -125/440 | 50/-50 | 75/-75 | 110 | 130 | 530 |

#### Poor Reported Braking Action

|               |      |        |     |          |          |        |     |     |      |
|---------------|------|--------|-----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2780 | 55/-55 | 100 | -160/600 | 200/-140 | 75/-75 | 80  | 655 | 1975 |
| AUTOBRAKE MAX | 2785 | 55/-55 | 100 | -160/600 | 205/-145 | 80/-80 | 80  | 655 | 1975 |
| AUTOBRAKE 3   | 2915 | 55/-55 | 100 | -165/610 | 165/-120 | 85/-85 | 110 | 555 | 1885 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.



ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

FLAPS PRIMARY FAIL (Flaps 20)

VREF20

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

Dry Runway

|               |      |        |    |          |        |        |     |    |    |
|---------------|------|--------|----|----------|--------|--------|-----|----|----|
| MAX MANUAL    | 1280 | 30/-15 | 30 | -45/155  | 15/-15 | 30/-30 | 50  | 40 | 85 |
| AUTOBRAKE MAX | 1585 | 20/-25 | 40 | -60/210  | 0/0    | 40/-40 | 75  | 0  | 0  |
| AUTOBRAKE 2   | 2835 | 45/-50 | 90 | -130/435 | 25/-45 | 85/-85 | 120 | 50 | 50 |

Good Reported Braking Action

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1805 | 25/-30 | 50 | -75/265  | 45/-40 | 45/-45 | 70  | 150 | 355 |
| AUTOBRAKE MAX | 1795 | 30/-30 | 50 | -75/265  | 45/-40 | 45/-45 | 75  | 150 | 355 |
| AUTOBRAKE 2   | 2835 | 45/-50 | 90 | -130/435 | 25/-45 | 85/-85 | 120 | 50  | 50  |

Medium Reported Braking Action

|               |      |        |    |          |         |        |     |     |      |
|---------------|------|--------|----|----------|---------|--------|-----|-----|------|
| MAX MANUAL    | 2400 | 40/-40 | 80 | -120/420 | 105/-85 | 65/-65 | 85  | 380 | 1020 |
| AUTOBRAKE MAX | 2390 | 40/-40 | 80 | -115/415 | 115/-90 | 65/-65 | 85  | 375 | 1010 |
| AUTOBRAKE 3   | 2635 | 40/-45 | 80 | -125/445 | 60/-45  | 75/-75 | 125 | 180 | 800  |

Poor Reported Braking Action

|               |      |        |     |          |          |        |     |     |      |
|---------------|------|--------|-----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 3005 | 60/-60 | 110 | -165/625 | 225/-155 | 85/-85 | 95  | 755 | 2370 |
| AUTOBRAKE MAX | 3010 | 60/-60 | 110 | -170/625 | 230/-160 | 85/-85 | 95  | 755 | 2375 |
| AUTOBRAKE 3   | 3055 | 60/-55 | 110 | -170/630 | 215/-135 | 85/-85 | 115 | 710 | 2330 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### FLIGHT CONTROL MODE (Flaps 20)

#### VREF20

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |      |        |    |          |        |        |     |    |    |
|---------------|------|--------|----|----------|--------|--------|-----|----|----|
| MAX MANUAL    | 1295 | 30/-15 | 30 | -45/160  | 20/-15 | 30/-30 | 50  | 40 | 90 |
| AUTOBRAKE MAX | 1585 | 20/-25 | 40 | -60/210  | 0/0    | 40/-40 | 75  | 0  | 0  |
| AUTOBRAKE 2   | 2855 | 45/-50 | 90 | -130/435 | 15/-40 | 85/-85 | 130 | 30 | 30 |

#### Good Reported Braking Action

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1835 | 30/-30 | 55 | -80/270  | 50/-45 | 45/-45 | 70  | 155 | 380 |
| AUTOBRAKE MAX | 1820 | 30/-30 | 55 | -80/270  | 50/-40 | 50/-50 | 75  | 155 | 375 |
| AUTOBRAKE 2   | 2855 | 45/-50 | 90 | -130/435 | 15/-40 | 85/-85 | 130 | 30  | 30  |

#### Medium Reported Braking Action

|               |      |        |    |          |         |        |     |     |      |
|---------------|------|--------|----|----------|---------|--------|-----|-----|------|
| MAX MANUAL    | 2450 | 45/-45 | 80 | -120/425 | 110/-90 | 65/-65 | 90  | 400 | 1095 |
| AUTOBRAKE MAX | 2440 | 45/-45 | 85 | -120/425 | 120/-95 | 65/-65 | 90  | 400 | 1090 |
| AUTOBRAKE 3   | 2645 | 45/-45 | 80 | -125/445 | 65/-40  | 75/-75 | 130 | 220 | 910  |

#### Poor Reported Braking Action

|               |      |        |     |          |          |        |     |     |      |
|---------------|------|--------|-----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 3075 | 60/-60 | 115 | -170/635 | 230/-160 | 85/-85 | 100 | 805 | 2575 |
| AUTOBRAKE MAX | 3080 | 60/-60 | 115 | -170/635 | 240/-170 | 85/-85 | 100 | 805 | 2580 |
| AUTOBRAKE 3   | 3110 | 60/-60 | 110 | -170/635 | 225/-145 | 90/-90 | 115 | 775 | 2550 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**FLIGHT CONTROLS (Flaps 20)**

**VREF30 + 20**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |      |        |    |          |        |        |     |    |     |
|---------------|------|--------|----|----------|--------|--------|-----|----|-----|
| MAX MANUAL    | 1345 | 30/-15 | 35 | -50/165  | 25/-20 | 35/-35 | 65  | 60 | 130 |
| AUTOBRAKE MAX | 1600 | 25/-20 | 40 | -65/210  | 0/0    | 40/-40 | 75  | 0  | 10  |
| AUTOBRAKE 2   | 2905 | 55/-50 | 90 | -130/440 | 10/-35 | 85/-85 | 135 | 20 | 20  |

**Good Reported Braking Action**

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1930 | 35/-30 | 60 | -80/280  | 60/-50 | 50/-50 | 85  | 210 | 520 |
| AUTOBRAKE MAX | 1915 | 35/-30 | 60 | -80/280  | 65/-55 | 50/-50 | 85  | 205 | 505 |
| AUTOBRAKE 2   | 2905 | 55/-50 | 90 | -130/440 | 10/-35 | 85/-85 | 135 | 20  | 20  |

**Medium Reported Braking Action**

|               |      |        |    |          |          |        |     |     |      |
|---------------|------|--------|----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2570 | 50/-45 | 90 | -125/440 | 130/-105 | 70/-70 | 100 | 495 | 1405 |
| AUTOBRAKE MAX | 2565 | 50/-45 | 90 | -125/440 | 135/-105 | 70/-70 | 100 | 495 | 1400 |
| AUTOBRAKE 3   | 2685 | 50/-40 | 85 | -130/450 | 95/-45   | 80/-80 | 125 | 370 | 1275 |

**Poor Reported Braking Action**

|               |      |        |     |          |          |        |     |     |      |
|---------------|------|--------|-----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 3205 | 70/-60 | 125 | -175/650 | 255/-180 | 90/-90 | 110 | 945 | 3160 |
| AUTOBRAKE MAX | 3210 | 70/-60 | 125 | -175/650 | 260/-180 | 90/-90 | 110 | 945 | 3160 |
| AUTOBRAKE 3   | 3220 | 70/-60 | 125 | -175/650 | 255/-160 | 90/-90 | 120 | 935 | 3150 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.



## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### HYD PRESS SYS C (Flaps 20)

#### VREF20

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |      |        |    |          |        |        |     |    |    |
|---------------|------|--------|----|----------|--------|--------|-----|----|----|
| MAX MANUAL    | 1280 | 30/-15 | 30 | -45/155  | 15/-15 | 30/-30 | 50  | 40 | 85 |
| AUTOBRAKE MAX | 1585 | 20/-25 | 40 | -60/210  | 0/0    | 40/-40 | 75  | 0  | 0  |
| AUTOBRAKE 2   | 2835 | 45/-50 | 90 | -130/435 | 25/-45 | 85/-85 | 120 | 50 | 50 |

#### Good Reported Braking Action

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1805 | 25/-30 | 50 | -75/265  | 45/-40 | 45/-45 | 70  | 150 | 355 |
| AUTOBRAKE MAX | 1795 | 30/-30 | 50 | -75/265  | 45/-40 | 45/-45 | 75  | 150 | 355 |
| AUTOBRAKE 2   | 2835 | 45/-50 | 90 | -130/435 | 25/-45 | 85/-85 | 120 | 50  | 50  |

#### Medium Reported Braking Action

|               |      |        |    |          |         |        |     |     |      |
|---------------|------|--------|----|----------|---------|--------|-----|-----|------|
| MAX MANUAL    | 2400 | 40/-40 | 80 | -120/420 | 105/-85 | 65/-65 | 85  | 380 | 1020 |
| AUTOBRAKE MAX | 2390 | 40/-40 | 80 | -115/415 | 115/-90 | 65/-65 | 85  | 375 | 1010 |
| AUTOBRAKE 3   | 2635 | 40/-45 | 80 | -125/445 | 60/-45  | 75/-75 | 125 | 180 | 800  |

#### Poor Reported Braking Action

|               |      |        |     |          |          |        |     |     |      |
|---------------|------|--------|-----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 3005 | 60/-60 | 110 | -165/625 | 225/-155 | 85/-85 | 95  | 755 | 2370 |
| AUTOBRAKE MAX | 3010 | 60/-60 | 110 | -170/625 | 230/-160 | 85/-85 | 95  | 755 | 2375 |
| AUTOBRAKE 3   | 3055 | 60/-55 | 110 | -170/630 | 215/-135 | 85/-85 | 115 | 710 | 2330 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**HYD PRESS SYS L (Flaps 25)**

**VREF25**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |      |        |    |          |        |        |     |   |    |
|---------------|------|--------|----|----------|--------|--------|-----|---|----|
| MAX MANUAL    | 1115 | 25/-15 | 25 | -45/145  | 15/-15 | 25/-25 | 45  | 0 | 35 |
| AUTOBRAKE MAX | 1430 | 20/-20 | 35 | -60/195  | 0/0    | 35/-35 | 70  | 0 | 0  |
| AUTOBRAKE 2   | 2565 | 40/-45 | 75 | -120/410 | 0/0    | 75/-75 | 145 | 0 | 0  |

**Good Reported Braking Action**

|               |      |        |    |          |        |        |     |   |     |
|---------------|------|--------|----|----------|--------|--------|-----|---|-----|
| MAX MANUAL    | 1675 | 25/-25 | 45 | -80/270  | 55/-45 | 45/-45 | 70  | 0 | 165 |
| AUTOBRAKE MAX | 1710 | 25/-25 | 50 | -80/270  | 50/-40 | 45/-45 | 75  | 0 | 170 |
| AUTOBRAKE 2   | 2565 | 40/-45 | 75 | -120/410 | 0/0    | 75/-75 | 145 | 0 | 0   |

**Medium Reported Braking Action**

|               |      |        |    |          |          |        |     |   |     |
|---------------|------|--------|----|----------|----------|--------|-----|---|-----|
| MAX MANUAL    | 2410 | 40/-40 | 75 | -130/460 | 145/-110 | 70/-70 | 90  | 0 | 520 |
| AUTOBRAKE MAX | 2405 | 40/-40 | 80 | -130/460 | 145/-115 | 70/-70 | 90  | 0 | 520 |
| AUTOBRAKE 3   | 2485 | 40/-40 | 80 | -130/465 | 120/-65  | 70/-70 | 120 | 0 | 500 |

**Poor Reported Braking Action**

|               |      |        |     |          |          |        |     |   |      |
|---------------|------|--------|-----|----------|----------|--------|-----|---|------|
| MAX MANUAL    | 3295 | 60/-60 | 115 | -205/765 | 380/-230 | 95/-95 | 105 | 0 | 1330 |
| AUTOBRAKE MAX | 3305 | 60/-60 | 115 | -205/765 | 385/-235 | 95/-95 | 105 | 0 | 1330 |
| AUTOBRAKE 3   | 3305 | 60/-60 | 115 | -205/765 | 385/-225 | 95/-95 | 115 | 0 | 1330 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### HYD PRESS SYS L (Flaps 30)

#### VREF30

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                             |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|-----------------------------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ    |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV<br><br>NO<br>REV |

#### Dry Runway

|               |      |        |    |          |        |        |     |   |    |
|---------------|------|--------|----|----------|--------|--------|-----|---|----|
| MAX MANUAL    | 1060 | 25/-15 | 25 | -40/145  | 15/-15 | 25/-25 | 45  | 0 | 30 |
| AUTOBRAKE MAX | 1330 | 25/-20 | 30 | -55/190  | 0/0    | 35/-35 | 65  | 0 | 0  |
| AUTOBRAKE 2   | 2355 | 50/-40 | 70 | -115/395 | 0/0    | 70/-70 | 135 | 0 | 0  |

#### Good Reported Braking Action

|               |      |        |    |          |        |        |     |   |     |
|---------------|------|--------|----|----------|--------|--------|-----|---|-----|
| MAX MANUAL    | 1580 | 30/-25 | 45 | -75/260  | 50/-45 | 40/-40 | 70  | 0 | 150 |
| AUTOBRAKE MAX | 1610 | 30/-25 | 45 | -75/265  | 45/-40 | 40/-40 | 75  | 0 | 155 |
| AUTOBRAKE 2   | 2355 | 50/-40 | 70 | -115/395 | 0/0    | 70/-70 | 135 | 0 | 0   |

#### Medium Reported Braking Action

|               |      |        |    |          |          |        |     |   |     |
|---------------|------|--------|----|----------|----------|--------|-----|---|-----|
| MAX MANUAL    | 2270 | 45/-35 | 70 | -125/450 | 140/-105 | 65/-65 | 90  | 0 | 470 |
| AUTOBRAKE MAX | 2270 | 45/-40 | 70 | -125/450 | 140/-110 | 65/-65 | 90  | 0 | 470 |
| AUTOBRAKE 3   | 2315 | 50/-40 | 75 | -125/450 | 130/-70  | 65/-65 | 115 | 0 | 475 |

#### Poor Reported Braking Action

|               |      |        |     |          |          |        |     |   |      |
|---------------|------|--------|-----|----------|----------|--------|-----|---|------|
| MAX MANUAL    | 3110 | 65/-55 | 110 | -195/750 | 365/-220 | 90/-90 | 105 | 0 | 1215 |
| AUTOBRAKE MAX | 3120 | 65/-55 | 110 | -200/750 | 370/-225 | 90/-90 | 105 | 0 | 1220 |
| AUTOBRAKE 3   | 3120 | 65/-55 | 110 | -200/750 | 370/-220 | 90/-90 | 110 | 0 | 1220 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

HYD PRESS SYS L+C (Flaps 20)

VREF30 + 20

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

Dry Runway

|               |      |        |    |          |        |        |     |   |    |
|---------------|------|--------|----|----------|--------|--------|-----|---|----|
| MAX MANUAL    | 1410 | 35/-15 | 35 | -50/175  | 25/-20 | 35/-35 | 65  | 0 | 60 |
| AUTOBRAKE MAX | 1600 | 25/-20 | 40 | -65/210  | 0/0    | 40/-40 | 75  | 0 | 0  |
| AUTOBRAKE 2   | 2920 | 55/-45 | 85 | -130/440 | 0/0    | 90/-90 | 155 | 0 | 0  |

Good Reported Braking Action

|               |      |        |    |          |        |        |     |   |     |
|---------------|------|--------|----|----------|--------|--------|-----|---|-----|
| MAX MANUAL    | 2100 | 35/-30 | 60 | -90/310  | 75/-60 | 55/-55 | 90  | 0 | 260 |
| AUTOBRAKE MAX | 2060 | 35/-30 | 60 | -90/305  | 80/-60 | 55/-55 | 95  | 0 | 250 |
| AUTOBRAKE 2   | 2920 | 55/-45 | 85 | -130/440 | 0/0    | 90/-90 | 155 | 0 | 0   |

Medium Reported Braking Action

|               |      |        |     |          |          |        |     |   |     |
|---------------|------|--------|-----|----------|----------|--------|-----|---|-----|
| MAX MANUAL    | 2980 | 55/-50 | 100 | -145/515 | 190/-145 | 85/-85 | 115 | 0 | 780 |
| AUTOBRAKE MAX | 2965 | 55/-50 | 100 | -145/515 | 200/-150 | 85/-85 | 115 | 0 | 775 |
| AUTOBRAKE 3   | 2975 | 60/-50 | 100 | -145/515 | 195/-130 | 85/-85 | 120 | 0 | 780 |

Poor Reported Braking Action

|               |      |        |     |          |          |          |     |   |      |
|---------------|------|--------|-----|----------|----------|----------|-----|---|------|
| MAX MANUAL    | 4020 | 80/-70 | 145 | -230/840 | 475/-290 | 120/-120 | 135 | 0 | 1940 |
| AUTOBRAKE MAX | 4030 | 85/-70 | 150 | -230/840 | 485/-300 | 120/-120 | 135 | 0 | 1940 |
| AUTOBRAKE 3   | 4030 | 85/-70 | 150 | -230/840 | 485/-300 | 120/-120 | 135 | 0 | 1940 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### HYD PRESS SYS L+R (Flaps 20)

#### VREF30 + 20

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV<br>NO<br>REV  |

#### Dry Runway

|               |                       |        |    |         |        |        |    |   |   |
|---------------|-----------------------|--------|----|---------|--------|--------|----|---|---|
| MAX MANUAL    | 1530                  | 35/-20 | 40 | -60/205 | 35/-30 | 40/-40 | 70 | 0 | 0 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |         |        |        |    |   |   |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |         |        |        |    |   |   |

#### Good Reported Braking Action

|               |                       |        |    |          |          |        |     |   |   |
|---------------|-----------------------|--------|----|----------|----------|--------|-----|---|---|
| MAX MANUAL    | 2525                  | 40/-35 | 75 | -115/395 | 135/-105 | 75/-75 | 110 | 0 | 0 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |          |          |        |     |   |   |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |          |          |        |     |   |   |

#### Medium Reported Braking Action

|               |                       |        |     |          |          |          |     |   |   |
|---------------|-----------------------|--------|-----|----------|----------|----------|-----|---|---|
| MAX MANUAL    | 4060                  | 65/-55 | 125 | -215/745 | 465/-305 | 125/-125 | 155 | 0 | 0 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |     |          |          |          |     |   |   |
| AUTOBRAKE 3   | Autobrake Inoperative |        |     |          |          |          |     |   |   |

#### Poor Reported Braking Action

|               |                       |         |     |           |           |          |     |   |   |
|---------------|-----------------------|---------|-----|-----------|-----------|----------|-----|---|---|
| MAX MANUAL    | 6470                  | 100/-75 | 210 | -400/1480 | 2270/-800 | 210/-210 | 190 | 0 | 0 |
| 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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**HYD PRESS SYS R (Flaps 25)**

**VREF25**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |                       |        |    |         |        |        |    |   |    |
|---------------|-----------------------|--------|----|---------|--------|--------|----|---|----|
| MAX MANUAL    | 1230                  | 20/-15 | 30 | -50/170 | 20/-20 | 30/-30 | 50 | 0 | 55 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |         |        |        |    |   |    |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |         |        |        |    |   |    |

**Good Reported Braking Action**

|               |                       |        |    |         |        |        |    |   |     |
|---------------|-----------------------|--------|----|---------|--------|--------|----|---|-----|
| MAX MANUAL    | 1835                  | 25/-30 | 55 | -90/310 | 70/-55 | 50/-50 | 75 | 0 | 225 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |         |        |        |    |   |     |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |         |        |        |    |   |     |

**Medium Reported Braking Action**

|               |                       |        |    |          |          |        |    |   |     |
|---------------|-----------------------|--------|----|----------|----------|--------|----|---|-----|
| MAX MANUAL    | 2595                  | 45/-45 | 85 | -145/520 | 180/-130 | 75/-75 | 95 | 0 | 650 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |          |          |        |    |   |     |
| AUTOBRAKE 3   | Autobrake Inoperative |        |    |          |          |        |    |   |     |

**Poor Reported Braking Action**

|               |                       |        |     |          |          |          |     |   |      |
|---------------|-----------------------|--------|-----|----------|----------|----------|-----|---|------|
| MAX MANUAL    | 3485                  | 65/-65 | 125 | -225/860 | 485/-265 | 100/-100 | 110 | 0 | 1590 |
| 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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### HYD PRESS SYS R (Flaps 30)

#### VREF30

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |                       |        |    |         |        |        |    |   |    |
|---------------|-----------------------|--------|----|---------|--------|--------|----|---|----|
| MAX MANUAL    | 1160                  | 20/-15 | 30 | -50/165 | 20/-20 | 25/-25 | 50 | 0 | 45 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |         |        |        |    |   |    |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |         |        |        |    |   |    |

#### Good Reported Braking Action

|               |                       |        |    |         |        |        |    |   |     |
|---------------|-----------------------|--------|----|---------|--------|--------|----|---|-----|
| MAX MANUAL    | 1715                  | 30/-25 | 50 | -85/295 | 65/-55 | 45/-45 | 70 | 0 | 195 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |         |        |        |    |   |     |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |         |        |        |    |   |     |

#### Medium Reported Braking Action

|               |                       |        |    |          |          |        |    |   |     |
|---------------|-----------------------|--------|----|----------|----------|--------|----|---|-----|
| MAX MANUAL    | 2400                  | 50/-40 | 75 | -135/500 | 165/-120 | 70/-70 | 90 | 0 | 560 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |          |          |        |    |   |     |
| AUTOBRAKE 3   | Autobrake Inoperative |        |    |          |          |        |    |   |     |

#### Poor Reported Braking Action

|               |                       |        |     |          |          |        |     |   |      |
|---------------|-----------------------|--------|-----|----------|----------|--------|-----|---|------|
| MAX MANUAL    | 3210                  | 65/-55 | 115 | -215/830 | 450/-245 | 95/-95 | 100 | 0 | 1360 |
| 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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**HYD PRESS SYS R+C (Flaps 20)**

**VREF30 + 20**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |                       |        |    |         |        |        |    |   |     |
|---------------|-----------------------|--------|----|---------|--------|--------|----|---|-----|
| MAX MANUAL    | 1740                  | 30/-25 | 45 | -70/235 | 45/-40 | 45/-45 | 80 | 0 | 135 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |         |        |        |    |   |     |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |         |        |        |    |   |     |

**Good Reported Braking Action**

|               |                       |        |    |          |          |        |     |   |     |
|---------------|-----------------------|--------|----|----------|----------|--------|-----|---|-----|
| MAX MANUAL    | 2560                  | 45/-40 | 80 | -120/405 | 125/-100 | 70/-70 | 110 | 0 | 490 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |          |          |        |     |   |     |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |          |          |        |     |   |     |

**Medium Reported Braking Action**

|               |                       |        |     |          |          |          |     |   |      |
|---------------|-----------------------|--------|-----|----------|----------|----------|-----|---|------|
| MAX MANUAL    | 3540                  | 70/-60 | 125 | -185/670 | 310/-215 | 105/-105 | 130 | 0 | 1310 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |     |          |          |          |     |   |      |
| AUTOBRAKE 3   | Autobrake Inoperative |        |     |          |          |          |     |   |      |

**Poor Reported Braking Action**

|               |                       |        |     |           |          |          |     |   |      |
|---------------|-----------------------|--------|-----|-----------|----------|----------|-----|---|------|
| MAX MANUAL    | 4640                  | 95/-85 | 175 | -285/1090 | 860/-405 | 140/-140 | 145 | 0 | 3065 |
| 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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.



## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### NAV AIR DATA SYS (Flaps 20)

#### VREF20

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |      |        |    |          |        |        |     |    |    |
|---------------|------|--------|----|----------|--------|--------|-----|----|----|
| MAX MANUAL    | 1295 | 30/-15 | 30 | -45/160  | 20/-15 | 30/-30 | 50  | 40 | 90 |
| AUTOBRAKE MAX | 1585 | 20/-25 | 40 | -60/210  | 0/0    | 40/-40 | 75  | 0  | 0  |
| AUTOBRAKE 2   | 2855 | 45/-50 | 90 | -130/435 | 15/-40 | 85/-85 | 130 | 30 | 30 |

#### Good Reported Braking Action

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1835 | 30/-30 | 55 | -80/270  | 50/-45 | 45/-45 | 70  | 155 | 380 |
| AUTOBRAKE MAX | 1820 | 30/-30 | 55 | -80/270  | 50/-40 | 50/-50 | 75  | 155 | 375 |
| AUTOBRAKE 2   | 2855 | 45/-50 | 90 | -130/435 | 15/-40 | 85/-85 | 130 | 30  | 30  |

#### Medium Reported Braking Action

|               |      |        |    |          |         |        |     |     |      |
|---------------|------|--------|----|----------|---------|--------|-----|-----|------|
| MAX MANUAL    | 2450 | 45/-45 | 80 | -120/425 | 110/-90 | 65/-65 | 90  | 400 | 1095 |
| AUTOBRAKE MAX | 2440 | 45/-45 | 85 | -120/425 | 120/-95 | 65/-65 | 90  | 400 | 1090 |
| AUTOBRAKE 3   | 2645 | 45/-45 | 80 | -125/445 | 65/-40  | 75/-75 | 130 | 220 | 910  |

#### Poor Reported Braking Action

|               |      |        |     |          |          |        |     |     |      |
|---------------|------|--------|-----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 3075 | 60/-60 | 115 | -170/635 | 230/-160 | 85/-85 | 100 | 805 | 2575 |
| AUTOBRAKE MAX | 3080 | 60/-60 | 115 | -170/635 | 240/-170 | 85/-85 | 100 | 805 | 2580 |
| AUTOBRAKE 3   | 3110 | 60/-60 | 110 | -170/635 | 225/-145 | 90/-90 | 115 | 775 | 2550 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**PITCH DOWN AUTHORITY (Flaps 25)**

**VREF25**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |      |        |    |          |        |        |     |    |    |
|---------------|------|--------|----|----------|--------|--------|-----|----|----|
| MAX MANUAL    | 1195 | 25/-15 | 25 | -45/150  | 15/-15 | 25/-25 | 45  | 20 | 40 |
| AUTOBRAKE MAX | 1430 | 20/-20 | 35 | -60/195  | 0/0    | 35/-35 | 70  | 0  | 0  |
| AUTOBRAKE 2   | 2520 | 40/-45 | 75 | -120/405 | 20/-40 | 70/-75 | 110 | 45 | 45 |

**Good Reported Braking Action**

|               |      |        |    |          |        |        |     |    |     |
|---------------|------|--------|----|----------|--------|--------|-----|----|-----|
| MAX MANUAL    | 1635 | 20/-25 | 45 | -70/250  | 40/-35 | 40/-40 | 60  | 90 | 215 |
| AUTOBRAKE MAX | 1630 | 20/-25 | 45 | -70/250  | 45/-35 | 40/-40 | 65  | 90 | 210 |
| AUTOBRAKE 2   | 2520 | 40/-45 | 75 | -120/405 | 25/-40 | 70/-75 | 110 | 45 | 45  |

**Medium Reported Braking Action**

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 2150 | 35/-35 | 65 | -110/395 | 90/-70 | 55/-55 | 75  | 255 | 655 |
| AUTOBRAKE MAX | 2150 | 35/-35 | 65 | -110/395 | 95/-75 | 55/-55 | 75  | 255 | 655 |
| AUTOBRAKE 3   | 2385 | 35/-40 | 70 | -120/420 | 55/-40 | 65/-65 | 120 | 110 | 440 |

**Poor Reported Braking Action**

|               |      |        |    |          |          |        |     |     |      |
|---------------|------|--------|----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2685 | 50/-50 | 90 | -155/590 | 190/-130 | 70/-70 | 85  | 540 | 1600 |
| AUTOBRAKE MAX | 2700 | 50/-50 | 90 | -155/590 | 195/-140 | 70/-70 | 85  | 540 | 1600 |
| AUTOBRAKE 3   | 2760 | 50/-45 | 90 | -160/595 | 175/-115 | 75/-75 | 105 | 480 | 1545 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### PITCH DOWN AUTHORITY (Flaps 30)

#### VREF30

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |      |        |    |          |        |        |     |    |    |
|---------------|------|--------|----|----------|--------|--------|-----|----|----|
| MAX MANUAL    | 1135 | 25/-15 | 25 | -45/145  | 15/-15 | 25/-25 | 45  | 15 | 35 |
| AUTOBRAKE MAX | 1330 | 25/-20 | 30 | -55/190  | 5/0    | 35/-35 | 70  | 0  | 0  |
| AUTOBRAKE 2   | 2335 | 45/-40 | 70 | -115/390 | 10/-30 | 65/-65 | 110 | 20 | 20 |

#### Good Reported Braking Action

|               |      |        |    |          |        |        |     |    |     |
|---------------|------|--------|----|----------|--------|--------|-----|----|-----|
| MAX MANUAL    | 1545 | 25/-20 | 40 | -70/245  | 35/-35 | 35/-35 | 60  | 80 | 190 |
| AUTOBRAKE MAX | 1540 | 25/-20 | 40 | -70/245  | 40/-35 | 35/-35 | 65  | 80 | 185 |
| AUTOBRAKE 2   | 2335 | 45/-40 | 70 | -115/390 | 15/-30 | 65/-65 | 110 | 20 | 20  |

#### Medium Reported Braking Action

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 2025 | 35/-30 | 60 | -105/385 | 85/-70 | 50/-50 | 70  | 230 | 585 |
| AUTOBRAKE MAX | 2025 | 40/-30 | 60 | -105/385 | 90/-70 | 50/-50 | 75  | 225 | 580 |
| AUTOBRAKE 3   | 2205 | 40/-35 | 65 | -115/405 | 60/-40 | 60/-60 | 115 | 105 | 415 |

#### Poor Reported Braking Action

|               |      |        |    |          |          |        |     |     |      |
|---------------|------|--------|----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2525 | 50/-45 | 85 | -150/575 | 180/-125 | 65/-65 | 80  | 485 | 1430 |
| AUTOBRAKE MAX | 2535 | 50/-45 | 85 | -150/575 | 190/-130 | 65/-65 | 80  | 490 | 1430 |
| AUTOBRAKE 3   | 2570 | 50/-45 | 85 | -155/580 | 175/-110 | 70/-70 | 105 | 455 | 1400 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**PITCH UP AUTHORITY (Flaps ≤ 15)**

**VREF30 + 40**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |      |        |     |          |        |        |    |     |     |
|---------------|------|--------|-----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1275 | 45/-15 | 30  | -45/150  | 15/-15 | 30/-30 | 40 | 40  | 90  |
| AUTOBRAKE MAX | 1840 | 30/-25 | 50  | -70/225  | 0/0    | 50/-50 | 80 | 0   | 0   |
| AUTOBRAKE 2   | 3130 | 60/-55 | 105 | -135/450 | 70/-80 | 90/-90 | 95 | 280 | 285 |

**Good Reported Braking Action**

|               |      |        |     |          |        |        |    |     |     |
|---------------|------|--------|-----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1850 | 30/-25 | 55  | -75/260  | 45/-40 | 50/-50 | 55 | 160 | 380 |
| AUTOBRAKE MAX | 1930 | 30/-25 | 55  | -80/270  | 25/-20 | 50/-55 | 80 | 115 | 340 |
| AUTOBRAKE 2   | 3130 | 60/-55 | 105 | -135/450 | 70/-80 | 90/-90 | 95 | 280 | 285 |

**Medium Reported Braking Action**

|               |      |        |    |          |         |        |     |     |      |
|---------------|------|--------|----|----------|---------|--------|-----|-----|------|
| MAX MANUAL    | 2495 | 45/-40 | 85 | -115/415 | 100/-85 | 70/-70 | 70  | 400 | 1075 |
| AUTOBRAKE MAX | 2450 | 45/-40 | 80 | -115/410 | 100/-75 | 70/-70 | 75  | 390 | 1050 |
| AUTOBRAKE 3   | 2985 | 55/-50 | 95 | -135/470 | 65/-70  | 85/-85 | 100 | 195 | 650  |

**Poor Reported Braking Action**

|               |      |        |     |          |          |        |     |     |      |
|---------------|------|--------|-----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 3150 | 65/-55 | 115 | -165/625 | 210/-150 | 90/-90 | 85  | 800 | 2495 |
| AUTOBRAKE MAX | 3090 | 65/-55 | 115 | -165/620 | 215/-150 | 85/-90 | 80  | 780 | 2450 |
| AUTOBRAKE 3   | 3300 | 65/-60 | 115 | -170/640 | 180/-140 | 95/-95 | 100 | 630 | 2300 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### PITCH UP AUTHORITY (Flaps ≥ 20)

#### VREF30 + 20

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV<br>NO<br>REV  |

#### Dry Runway

|               |      |        |    |          |        |        |    |     |     |
|---------------|------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1140 | 35/-15 | 25 | -40/145  | 15/-15 | 25/-25 | 40 | 30  | 70  |
| AUTOBRAKE MAX | 1600 | 25/-20 | 40 | -65/210  | 0/0    | 40/-40 | 75 | 0   | 0   |
| AUTOBRAKE 2   | 2760 | 55/-50 | 90 | -125/425 | 50/-65 | 80/-80 | 95 | 150 | 150 |

#### Good Reported Braking Action

|               |      |        |    |          |        |        |    |     |     |
|---------------|------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1635 | 30/-25 | 45 | -70/250  | 40/-35 | 40/-40 | 55 | 125 | 295 |
| AUTOBRAKE MAX | 1705 | 30/-25 | 50 | -75/255  | 35/-20 | 45/-45 | 75 | 125 | 305 |
| AUTOBRAKE 2   | 2760 | 55/-50 | 90 | -125/425 | 50/-65 | 80/-80 | 95 | 150 | 150 |

#### Medium Reported Braking Action

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 2205 | 45/-35 | 70 | -110/395 | 95/-75 | 60/-60 | 70  | 325 | 845 |
| AUTOBRAKE MAX | 2205 | 45/-35 | 70 | -110/395 | 95/-70 | 60/-60 | 80  | 320 | 840 |
| AUTOBRAKE 3   | 2615 | 50/-45 | 80 | -125/440 | 50/-55 | 75/-75 | 105 | 140 | 535 |

#### Poor Reported Braking Action

|               |      |        |     |          |          |        |     |     |      |
|---------------|------|--------|-----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2795 | 60/-50 | 100 | -160/600 | 200/-140 | 80/-80 | 80  | 655 | 1970 |
| AUTOBRAKE MAX | 2800 | 60/-50 | 100 | -160/600 | 205/-145 | 80/-80 | 80  | 655 | 1975 |
| AUTOBRAKE 3   | 2940 | 60/-50 | 100 | -165/615 | 170/-125 | 85/-85 | 105 | 550 | 1880 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**PRI FLIGHT COMPUTERS (Flaps 20)**

**VREF20**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |      |        |    |          |        |        |     |    |    |
|---------------|------|--------|----|----------|--------|--------|-----|----|----|
| MAX MANUAL    | 1295 | 30/-15 | 30 | -45/160  | 20/-15 | 30/-30 | 50  | 40 | 90 |
| AUTOBRAKE MAX | 1585 | 20/-25 | 40 | -60/210  | 0/0    | 40/-40 | 75  | 0  | 0  |
| AUTOBRAKE 2   | 2855 | 45/-50 | 90 | -130/435 | 15/-40 | 85/-85 | 130 | 30 | 30 |

**Good Reported Braking Action**

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1835 | 30/-30 | 55 | -80/270  | 50/-45 | 45/-45 | 70  | 155 | 380 |
| AUTOBRAKE MAX | 1820 | 30/-30 | 55 | -80/270  | 50/-40 | 50/-50 | 75  | 155 | 375 |
| AUTOBRAKE 2   | 2855 | 45/-50 | 90 | -130/435 | 15/-40 | 85/-85 | 130 | 30  | 30  |

**Medium Reported Braking Action**

|               |      |        |    |          |         |        |     |     |      |
|---------------|------|--------|----|----------|---------|--------|-----|-----|------|
| MAX MANUAL    | 2450 | 45/-45 | 80 | -120/425 | 110/-90 | 65/-65 | 90  | 400 | 1095 |
| AUTOBRAKE MAX | 2440 | 45/-45 | 85 | -120/425 | 120/-95 | 65/-65 | 90  | 400 | 1090 |
| AUTOBRAKE 3   | 2645 | 45/-45 | 80 | -125/445 | 65/-40  | 75/-75 | 130 | 220 | 910  |

**Poor Reported Braking Action**

|               |      |        |     |          |          |        |     |     |      |
|---------------|------|--------|-----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 3075 | 60/-60 | 115 | -170/635 | 230/-160 | 85/-85 | 100 | 805 | 2575 |
| AUTOBRAKE MAX | 3080 | 60/-60 | 115 | -170/635 | 240/-170 | 85/-85 | 100 | 805 | 2580 |
| AUTOBRAKE 3   | 3110 | 60/-60 | 110 | -170/635 | 225/-145 | 90/-90 | 115 | 775 | 2550 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### SLATS DRIVE (Flaps 20)

#### VREF30 + 30

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |      |        |     |          |        |        |    |     |     |
|---------------|------|--------|-----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1220 | 40/-15 | 30  | -45/150  | 15/-15 | 30/-30 | 40 | 35  | 80  |
| AUTOBRAKE MAX | 1750 | 30/-25 | 45  | -65/220  | 0/0    | 45/-45 | 80 | 0   | 0   |
| AUTOBRAKE 2   | 2975 | 55/-50 | 100 | -130/440 | 65/-75 | 90/-90 | 95 | 225 | 225 |

#### Good Reported Braking Action

|               |      |        |     |          |        |        |    |     |     |
|---------------|------|--------|-----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1760 | 30/-25 | 50  | -75/260  | 45/-40 | 45/-45 | 60 | 140 | 330 |
| AUTOBRAKE MAX | 1855 | 30/-25 | 50  | -75/265  | 30/-20 | 50/-50 | 80 | 130 | 330 |
| AUTOBRAKE 2   | 2975 | 55/-50 | 100 | -130/440 | 65/-75 | 90/-90 | 95 | 225 | 225 |

#### Medium Reported Braking Action

|               |      |        |    |          |         |        |     |     |     |
|---------------|------|--------|----|----------|---------|--------|-----|-----|-----|
| MAX MANUAL    | 2370 | 45/-40 | 80 | -115/410 | 100/-80 | 65/-65 | 70  | 355 | 935 |
| AUTOBRAKE MAX | 2380 | 45/-40 | 80 | -115/410 | 100/-75 | 65/-65 | 80  | 355 | 930 |
| AUTOBRAKE 3   | 2850 | 50/-45 | 90 | -130/460 | 65/-70  | 80/-80 | 100 | 175 | 590 |

#### Poor Reported Braking Action

|               |      |        |     |          |          |        |    |     |      |
|---------------|------|--------|-----|----------|----------|--------|----|-----|------|
| MAX MANUAL    | 2990 | 60/-55 | 110 | -165/615 | 210/-150 | 85/-85 | 80 | 710 | 2145 |
| AUTOBRAKE MAX | 2995 | 60/-55 | 110 | -165/615 | 215/-150 | 85/-85 | 85 | 710 | 2145 |
| AUTOBRAKE 3   | 3175 | 65/-55 | 110 | -170/630 | 180/-140 | 90/-90 | 95 | 580 | 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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.



777 Flight Crew Operations Manual

ADVISORY INFORMATION

Non-Normal Configuration Landing Distance

SPOILERS (Flaps 25)

VREF25

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

Dry Runway

|               |      |        |    |          |        |        |     |    |    |
|---------------|------|--------|----|----------|--------|--------|-----|----|----|
| MAX MANUAL    | 1070 | 25/-15 | 25 | -40/140  | 15/-15 | 25/-25 | 40  | 30 | 60 |
| AUTOBRAKE MAX | 1430 | 20/-20 | 35 | -60/195  | 0/0    | 35/-35 | 70  | 0  | 0  |
| AUTOBRAKE 2   | 2505 | 40/-45 | 80 | -120/405 | 25/-50 | 70/-70 | 100 | 65 | 65 |

Good Reported Braking Action

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1530 | 25/-25 | 45 | -70/240  | 40/-35 | 40/-40 | 60  | 115 | 270 |
| AUTOBRAKE MAX | 1570 | 25/-25 | 45 | -70/245  | 35/-30 | 40/-40 | 65  | 120 | 285 |
| AUTOBRAKE 2   | 2505 | 40/-45 | 80 | -120/405 | 25/-50 | 70/-70 | 100 | 65  | 65  |

Medium Reported Braking Action

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 2055 | 35/-35 | 65 | -105/385 | 90/-75 | 55/-55 | 75  | 300 | 790 |
| AUTOBRAKE MAX | 2055 | 35/-35 | 65 | -105/385 | 95/-75 | 55/-55 | 75  | 300 | 785 |
| AUTOBRAKE 3   | 2335 | 35/-40 | 70 | -120/420 | 45/-35 | 65/-65 | 115 | 130 | 575 |

Poor Reported Braking Action

|               |      |        |    |          |          |        |     |     |      |
|---------------|------|--------|----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2605 | 50/-50 | 95 | -155/585 | 195/-135 | 70/-70 | 85  | 610 | 1855 |
| AUTOBRAKE MAX | 2610 | 50/-50 | 95 | -155/585 | 200/-140 | 70/-70 | 85  | 615 | 1855 |
| AUTOBRAKE 3   | 2665 | 50/-50 | 90 | -155/590 | 180/-105 | 75/-75 | 115 | 565 | 1815 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.



## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### SPOILERS (Flaps 30)

#### VREF30

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |      |        |    |          |        |        |     |    |    |
|---------------|------|--------|----|----------|--------|--------|-----|----|----|
| MAX MANUAL    | 1020 | 25/-15 | 25 | -40/135  | 15/-10 | 20/-20 | 40  | 25 | 55 |
| AUTOBRAKE MAX | 1330 | 20/-20 | 30 | -55/190  | 0/0    | 35/-35 | 65  | 0  | 0  |
| AUTOBRAKE 2   | 2320 | 45/-40 | 70 | -115/390 | 20/-45 | 65/-65 | 100 | 40 | 40 |

#### Good Reported Braking Action

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1445 | 25/-20 | 40 | -65/235  | 40/-35 | 35/-35 | 55  | 105 | 245 |
| AUTOBRAKE MAX | 1480 | 25/-25 | 40 | -70/240  | 35/-30 | 35/-35 | 65  | 105 | 250 |
| AUTOBRAKE 2   | 2320 | 45/-40 | 70 | -115/390 | 20/-45 | 65/-65 | 100 | 40  | 40  |

#### Medium Reported Braking Action

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1935 | 40/-35 | 60 | -105/375 | 90/-70 | 50/-50 | 70  | 270 | 705 |
| AUTOBRAKE MAX | 1935 | 40/-35 | 60 | -105/375 | 90/-75 | 50/-50 | 70  | 270 | 700 |
| AUTOBRAKE 3   | 2160 | 40/-35 | 65 | -115/405 | 45/-30 | 60/-60 | 115 | 130 | 540 |

#### Poor Reported Braking Action

|               |      |        |    |          |          |        |     |     |      |
|---------------|------|--------|----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2445 | 55/-45 | 85 | -150/570 | 190/-130 | 65/-65 | 80  | 555 | 1655 |
| AUTOBRAKE MAX | 2450 | 55/-45 | 85 | -150/570 | 190/-130 | 65/-65 | 80  | 555 | 1655 |
| AUTOBRAKE 3   | 2485 | 55/-45 | 85 | -150/575 | 175/-100 | 70/-70 | 110 | 530 | 1635 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**STABILIZER (Flaps 20)**

**VREF30 + 20**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |      |        |    |          |        |        |    |     |     |
|---------------|------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1140 | 35/-15 | 25 | -40/145  | 15/-15 | 25/-25 | 40 | 30  | 70  |
| AUTOBRAKE MAX | 1600 | 25/-20 | 40 | -65/210  | 0/0    | 40/-40 | 75 | 0   | 0   |
| AUTOBRAKE 2   | 2760 | 55/-50 | 90 | -125/425 | 50/-65 | 80/-80 | 95 | 150 | 150 |

**Good Reported Braking Action**

|               |      |        |    |          |        |        |    |     |     |
|---------------|------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1635 | 30/-25 | 45 | -70/250  | 40/-35 | 40/-40 | 55 | 125 | 295 |
| AUTOBRAKE MAX | 1705 | 30/-25 | 50 | -75/255  | 35/-20 | 45/-45 | 75 | 125 | 305 |
| AUTOBRAKE 2   | 2760 | 55/-50 | 90 | -125/425 | 50/-65 | 80/-80 | 95 | 150 | 150 |

**Medium Reported Braking Action**

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 2205 | 45/-35 | 70 | -110/395 | 95/-75 | 60/-60 | 70  | 325 | 845 |
| AUTOBRAKE MAX | 2205 | 45/-35 | 70 | -110/395 | 95/-70 | 60/-60 | 80  | 320 | 840 |
| AUTOBRAKE 3   | 2615 | 50/-45 | 80 | -125/440 | 50/-55 | 75/-75 | 105 | 140 | 535 |

**Poor Reported Braking Action**

|               |      |        |     |          |          |        |     |     |      |
|---------------|------|--------|-----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2795 | 60/-50 | 100 | -160/600 | 200/-140 | 80/-80 | 80  | 655 | 1970 |
| AUTOBRAKE MAX | 2800 | 60/-50 | 100 | -160/600 | 205/-145 | 80/-80 | 80  | 655 | 1975 |
| AUTOBRAKE 3   | 2940 | 60/-50 | 100 | -165/615 | 170/-125 | 85/-85 | 105 | 550 | 1880 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.



ADVISORY INFORMATION

Recommended Brake Cooling Schedule  
Reference Brake Energy (Millions of Foot Pounds)

|                     |             | BRAKES ON SPEED (KIAS)      |      |      |      |      |      |      |      |      |      |      |      |      |       |       |       |       |       |
|---------------------|-------------|-----------------------------|------|------|------|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|
|                     |             | 80                          |      |      | 100  |      |      | 120  |      |      | 140  |      |      | 160  |       |       | 180   |       |       |
| WEIGHT<br>(1000 KG) | OAT<br>(°C) | PRESSURE ALTITUDE (1000 FT) |      |      |      |      |      |      |      |      |      |      |      |      |       |       |       |       |       |
|                     |             | 0                           | 4    | 8    | 0    | 4    | 8    | 0    | 4    | 8    | 0    | 4    | 8    | 0    | 4     | 8     | 0     | 4     | 8     |
| 360                 | 0           | 22.1                        | 24.1 | 26.5 | 32.9 | 36.3 | 40.3 | 46.1 | 51.3 | 57.3 | 60.4 | 67.5 | 75.8 | 75.7 | 84.9  | 95.4  | 91.6  | 102.6 | 115.1 |
|                     | 10          | 22.7                        | 24.8 | 27.2 | 33.9 | 37.4 | 41.5 | 47.5 | 52.9 | 59.1 | 62.3 | 69.7 | 78.2 | 78.1 | 87.6  | 98.4  | 94.4  | 105.7 | 118.4 |
|                     | 15          | 23.2                        | 25.3 | 27.8 | 34.5 | 38.1 | 42.3 | 48.4 | 53.9 | 60.2 | 63.4 | 70.9 | 79.6 | 79.5 | 89.1  | 100.0 | 96.0  | 107.5 | 120.3 |
|                     | 20          | 23.6                        | 25.7 | 28.2 | 35.1 | 38.8 | 43.0 | 49.3 | 54.8 | 61.2 | 64.5 | 72.1 | 80.9 | 80.8 | 90.6  | 101.7 | 97.6  | 109.2 | 122.2 |
|                     | 30          | 24.1                        | 26.3 | 28.9 | 36.0 | 39.8 | 44.1 | 50.5 | 56.3 | 62.9 | 66.3 | 74.1 | 83.2 | 83.1 | 93.1  | 104.4 | 100.3 | 112.1 | 125.4 |
| 40                  | 24.3        | 26.5                        | 29.2 | 36.4 | 40.3 | 44.7 | 51.3 | 57.2 | 64.0 | 67.4 | 75.5 | 84.8 | 84.7 | 94.9 | 106.5 | 102.3 | 114.3 | 127.7 |       |
| 340                 | 0           | 21.2                        | 23.1 | 25.3 | 31.4 | 34.7 | 38.4 | 43.9 | 48.8 | 54.5 | 57.5 | 64.2 | 72.0 | 72.1 | 80.8  | 90.8  | 87.3  | 97.9  | 109.9 |
|                     | 10          | 21.7                        | 23.7 | 26.0 | 32.4 | 35.7 | 39.5 | 45.3 | 50.4 | 56.2 | 59.3 | 66.3 | 74.3 | 74.4 | 83.4  | 93.7  | 90.0  | 100.9 | 113.1 |
|                     | 15          | 22.1                        | 24.1 | 26.5 | 33.0 | 36.3 | 40.3 | 46.1 | 51.3 | 57.3 | 60.4 | 67.5 | 75.7 | 75.7 | 84.8  | 95.3  | 91.6  | 102.6 | 115.0 |
|                     | 20          | 22.5                        | 24.6 | 26.9 | 33.6 | 37.0 | 41.0 | 46.9 | 52.2 | 58.3 | 61.4 | 68.6 | 77.0 | 77.0 | 86.3  | 96.8  | 93.1  | 104.2 | 116.8 |
|                     | 30          | 23.1                        | 25.1 | 27.6 | 34.4 | 37.9 | 42.0 | 48.2 | 53.6 | 59.8 | 63.1 | 70.5 | 79.1 | 79.1 | 88.7  | 99.5  | 95.7  | 107.1 | 119.9 |
| 40                  | 23.2        | 25.3                        | 27.8 | 34.8 | 38.4 | 42.6 | 48.9 | 54.4 | 60.8 | 64.2 | 71.8 | 80.6 | 80.6 | 90.4 | 101.5 | 97.6  | 109.2 | 122.2 |       |
| 320                 | 0           | 20.2                        | 22.0 | 24.1 | 30.0 | 33.0 | 36.5 | 41.8 | 46.4 | 51.7 | 54.6 | 60.9 | 68.3 | 68.4 | 76.7  | 86.1  | 82.9  | 93.0  | 104.4 |
|                     | 10          | 20.8                        | 22.6 | 24.8 | 30.8 | 33.9 | 37.6 | 43.1 | 47.8 | 53.3 | 56.3 | 62.9 | 70.4 | 70.6 | 79.1  | 88.9  | 85.5  | 95.9  | 107.6 |
|                     | 15          | 21.2                        | 23.0 | 25.2 | 31.4 | 34.6 | 38.3 | 43.8 | 48.7 | 54.3 | 57.3 | 64.0 | 71.7 | 71.9 | 80.5  | 90.4  | 87.0  | 97.5  | 109.4 |
|                     | 20          | 21.5                        | 23.4 | 25.7 | 32.0 | 35.2 | 38.9 | 44.6 | 49.5 | 55.3 | 58.3 | 65.1 | 72.9 | 73.1 | 81.9  | 91.9  | 88.5  | 99.1  | 111.1 |
|                     | 30          | 22.0                        | 24.0 | 26.3 | 32.7 | 36.1 | 39.9 | 45.8 | 50.9 | 56.7 | 59.9 | 66.9 | 74.9 | 75.1 | 84.1  | 94.4  | 90.9  | 101.8 | 114.1 |
| 40                  | 22.1        | 24.1                        | 26.5 | 33.1 | 36.5 | 40.4 | 46.4 | 51.6 | 57.7 | 60.9 | 68.1 | 76.3 | 76.5 | 85.8 | 96.3  | 92.7  | 103.9 | 116.3 |       |
| 300                 | 0           | 19.3                        | 20.9 | 22.9 | 28.5 | 31.3 | 34.6 | 39.6 | 43.9 | 48.9 | 51.6 | 57.6 | 64.5 | 64.7 | 72.5  | 81.4  | 78.4  | 88.0  | 98.8  |
|                     | 10          | 19.8                        | 21.5 | 23.5 | 29.3 | 32.2 | 35.6 | 40.8 | 45.3 | 50.4 | 53.2 | 59.4 | 66.5 | 66.8 | 74.8  | 84.0  | 80.9  | 90.7  | 101.9 |
|                     | 15          | 20.2                        | 21.9 | 24.0 | 29.8 | 32.8 | 36.3 | 41.6 | 46.1 | 51.4 | 54.2 | 60.5 | 67.7 | 68.0 | 76.1  | 85.4  | 82.3  | 92.3  | 103.6 |
|                     | 20          | 20.5                        | 22.3 | 24.4 | 30.4 | 33.4 | 36.9 | 42.3 | 46.9 | 52.3 | 55.1 | 61.5 | 68.9 | 69.1 | 77.4  | 86.9  | 83.7  | 93.8  | 105.3 |
|                     | 30          | 21.0                        | 22.8 | 25.0 | 31.1 | 34.2 | 37.8 | 43.4 | 48.1 | 53.6 | 56.6 | 63.2 | 70.8 | 71.0 | 79.5  | 89.3  | 86.1  | 96.4  | 108.1 |
| 40                  | 21.1        | 22.9                        | 25.1 | 31.4 | 34.6 | 38.3 | 44.0 | 48.8 | 54.5 | 57.5 | 64.3 | 72.1 | 72.3 | 81.1 | 91.0  | 87.7  | 98.3  | 110.3 |       |
| 260                 | 0           | 17.4                        | 18.9 | 20.6 | 25.5 | 28.0 | 30.8 | 35.3 | 39.0 | 43.3 | 45.7 | 50.8 | 56.8 | 57.1 | 63.8  | 71.6  | 69.2  | 77.5  | 87.1  |
|                     | 10          | 17.9                        | 19.4 | 21.2 | 26.3 | 28.8 | 31.7 | 36.3 | 40.1 | 44.6 | 47.1 | 52.4 | 58.6 | 58.9 | 65.8  | 73.8  | 71.4  | 80.0  | 89.8  |
|                     | 15          | 18.2                        | 19.8 | 21.6 | 26.7 | 29.3 | 32.3 | 37.0 | 40.9 | 45.4 | 48.0 | 53.4 | 59.6 | 60.0 | 67.0  | 75.2  | 72.6  | 81.4  | 91.4  |
|                     | 20          | 18.6                        | 20.1 | 21.9 | 27.2 | 29.8 | 32.9 | 37.6 | 41.6 | 46.2 | 48.8 | 54.3 | 60.7 | 61.0 | 68.2  | 76.4  | 73.9  | 82.7  | 92.9  |
|                     | 30          | 19.0                        | 20.6 | 22.4 | 27.9 | 30.5 | 33.7 | 38.6 | 42.7 | 47.4 | 50.1 | 55.7 | 62.3 | 62.7 | 70.1  | 78.6  | 75.9  | 85.0  | 95.4  |
| 40                  | 19.0        | 20.7                        | 22.6 | 28.1 | 30.8 | 34.0 | 39.0 | 43.2 | 48.1 | 50.8 | 56.6 | 63.4 | 63.7 | 71.3 | 80.0  | 77.3  | 86.7  | 97.3  |       |
| 220                 | 0           | 15.7                        | 16.9 | 18.4 | 22.6 | 24.7 | 27.1 | 30.9 | 34.0 | 37.6 | 39.7 | 44.0 | 49.0 | 49.3 | 54.9  | 61.4  | 59.4  | 66.5  | 74.6  |
|                     | 10          | 16.1                        | 17.4 | 18.9 | 23.2 | 25.4 | 27.9 | 31.8 | 35.0 | 38.8 | 40.9 | 45.3 | 50.5 | 50.8 | 56.6  | 63.4  | 61.3  | 68.6  | 77.0  |
|                     | 15          | 16.4                        | 17.7 | 19.2 | 23.7 | 25.8 | 28.4 | 32.4 | 35.6 | 39.5 | 41.6 | 46.2 | 51.4 | 51.7 | 57.6  | 64.5  | 62.4  | 69.8  | 78.3  |
|                     | 20          | 16.7                        | 18.0 | 19.6 | 24.1 | 26.3 | 28.9 | 32.9 | 36.3 | 40.2 | 42.3 | 47.0 | 52.3 | 52.6 | 58.6  | 65.6  | 63.5  | 71.0  | 79.7  |
|                     | 30          | 17.0                        | 18.4 | 20.0 | 24.6 | 26.9 | 29.6 | 33.7 | 37.2 | 41.2 | 43.4 | 48.2 | 53.7 | 54.0 | 60.2  | 67.4  | 65.2  | 73.0  | 81.9  |
| 40                  | 17.1        | 18.4                        | 20.1 | 24.8 | 27.1 | 29.9 | 34.1 | 37.6 | 41.7 | 44.0 | 48.9 | 54.6 | 54.9 | 61.2 | 68.6  | 66.4  | 74.3  | 83.4  |       |
| 180                 | 0           | 13.9                        | 15.0 | 16.2 | 19.7 | 21.4 | 23.4 | 26.5 | 29.0 | 32.0 | 33.6 | 37.0 | 41.1 | 41.2 | 45.7  | 50.9  | 49.3  | 54.9  | 61.5  |
|                     | 10          | 14.3                        | 15.4 | 16.6 | 20.2 | 22.0 | 24.1 | 27.2 | 29.9 | 32.9 | 34.5 | 38.1 | 42.3 | 42.4 | 47.1  | 52.5  | 50.8  | 56.7  | 63.4  |
|                     | 15          | 14.6                        | 15.7 | 16.9 | 20.6 | 22.4 | 24.5 | 27.7 | 30.4 | 33.6 | 35.2 | 38.8 | 43.1 | 43.2 | 48.0  | 53.5  | 51.8  | 57.7  | 64.5  |
|                     | 20          | 14.8                        | 15.9 | 17.2 | 21.0 | 22.8 | 25.0 | 28.2 | 30.9 | 34.1 | 35.8 | 39.5 | 43.9 | 44.0 | 48.8  | 54.4  | 52.7  | 58.7  | 65.7  |
|                     | 30          | 15.1                        | 16.3 | 17.6 | 21.5 | 23.3 | 25.5 | 28.9 | 31.7 | 35.0 | 36.7 | 40.5 | 45.0 | 45.1 | 50.1  | 55.9  | 54.1  | 60.3  | 67.5  |
| 40                  | 15.1        | 16.3                        | 17.7 | 21.6 | 23.5 | 25.7 | 29.1 | 32.0 | 35.4 | 37.1 | 41.1 | 45.6 | 45.7 | 50.9 | 56.8  | 54.9  | 61.3  | 68.7  |       |

To correct for wind, enter table with the brakes on speed minus one half the headwind or plus 1.5 times the tailwind.

If ground speed is used for brakes on speed, ignore wind and enter table with sea level, 15°C.

**ADVISORY INFORMATION**

**Recommended Brake Cooling Schedule**  
**Event Adjusted Brake Energy (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   | 100  | 110  | 120   |
| LANDING | RTO MAX MAN | 10                                                         | 20   | 30   | 40   | 50   | 60   | 70   | 80   | 90   | 100  | 110  | 120   |
|         | MAX MAN     | 4.4                                                        | 14.1 | 23.7 | 33.2 | 42.6 | 51.9 | 61.2 | 70.5 | 79.9 | 89.3 | 98.9 | 108.7 |
|         | MAX AUTO    | 4.4                                                        | 13.1 | 21.7 | 30.2 | 38.7 | 47.3 | 56.0 | 65.0 | 74.3 | 83.9 | 94.0 | 104.6 |
|         | AUTOBRAKE 4 | 4.3                                                        | 12.5 | 20.4 | 28.1 | 35.7 | 43.4 | 51.2 | 59.3 | 67.7 | 76.6 | 86.1 | 96.4  |
|         | AUTOBRAKE 3 | 4.2                                                        | 11.9 | 19.2 | 26.3 | 33.3 | 40.3 | 47.4 | 54.8 | 62.6 | 70.8 | 79.7 | 89.3  |
|         | AUTOBRAKE 2 | 4.1                                                        | 11.2 | 17.9 | 24.4 | 30.8 | 37.2 | 43.7 | 50.5 | 57.6 | 65.1 | 73.2 | 81.9  |
|         | AUTOBRAKE 1 | 4.0                                                        | 10.3 | 16.3 | 22.1 | 27.8 | 33.4 | 39.1 | 45.1 | 51.3 | 58.0 | 65.1 | 72.9  |

**2 Engine Reverse Thrust**

|             |             | REFERENCE BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS) |      |      |      |      |      |      |      |      |      |      |      |
|-------------|-------------|------------------------------------------------------------|------|------|------|------|------|------|------|------|------|------|------|
| EVENT       |             | 10                                                         | 20   | 30   | 40   | 50   | 60   | 70   | 80   | 90   | 100  | 110  | 120  |
| RTO MAX MAN |             | 10                                                         | 20   | 30   | 40   | 50   | 60   | 70   | 80   | 90   | 100  | 110  | 120  |
| LANDING     | MAX MAN     | 3.3                                                        | 12.0 | 21.0 | 30.0 | 38.9 | 47.5 | 56.1 | 64.5 | 72.8 | 81.0 | 89.2 | 97.5 |
|             | MAX AUTO    | 2.0                                                        | 8.7  | 15.5 | 22.3 | 29.3 | 36.4 | 43.8 | 51.5 | 59.6 | 68.3 | 77.5 | 87.4 |
|             | AUTOBRAKE 4 | 1.4                                                        | 5.6  | 10.4 | 15.6 | 20.9 | 26.4 | 32.2 | 38.3 | 44.8 | 51.9 | 59.6 | 68.0 |
|             | AUTOBRAKE 3 | 0.9                                                        | 3.2  | 6.4  | 10.3 | 14.3 | 18.5 | 23.0 | 27.9 | 33.2 | 39.0 | 45.4 | 52.4 |
|             | AUTOBRAKE 2 | 0.3                                                        | 1.8  | 4.0  | 6.5  | 9.3  | 12.3 | 15.6 | 19.2 | 23.3 | 27.9 | 33.0 | 38.7 |
|             | AUTOBRAKE 1 | 0.2                                                        | 1.2  | 2.6  | 4.3  | 6.1  | 8.1  | 10.3 | 12.8 | 15.6 | 18.8 | 22.3 | 26.4 |

**Cooling Time (Minutes)**

|           |            | EVENT ADJUSTED BRAKE ENERGY (MILLIONS OF FOOT POUNDS) |     |     |     |     |     |     |            |             |                        |
|-----------|------------|-------------------------------------------------------|-----|-----|-----|-----|-----|-----|------------|-------------|------------------------|
|           |            | 16 & BELOW                                            | 17  | 18  | 20  | 24  | 28  | 32  | 35         | 36 TO 44    | 45 & ABOVE             |
| GEAR DOWN | NO SPECIAL | PROCEDURE<br>REQUIRED                                 | 1   | 2   | 3   | 4   | 6   | 7   | 7          | CAUTION     | FUSE PLUG<br>MELT ZONE |
| INFLIGHT  |            |                                                       |     |     |     |     |     |     |            |             |                        |
| GROUND    |            |                                                       | 11  | 18  | 26  | 42  | 55  | 66  | 73         |             |                        |
| BTMS      | UP TO 2.4  | 2.4                                                   | 2.6 | 2.9 | 3.4 | 4.0 | 4.5 | 4.9 | 5.0 TO 6.3 | 6.3 & ABOVE |                        |

Observe maximum quick turnaround limit.

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

Add 1.0 million foot pounds for each taxi mile.

For one brake deactivated, increase brake energy by 10 percent.

For two brakes deactivated, increase brake energy by 20 percent.

When in caution zone, wheel fuse plugs may melt. Delay takeoff and inspect after one hour. If overheat occurs after takeoff, extend gear soon for at least 8 minutes.

When in fuse plug melt zone, clear runway immediately. Unless required, do not set parking brake. Do not 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 EICAS may be used 10 to 15 minutes after airplane has come to a complete stop, or inflight with gear retracted, to determine recommended cooling schedule. (When inflight with gear extended, the BTMS indications may vary between individual brakes, due to airstream effects.)

## ADVISORY INFORMATION

## Approach or Landing Climb Limited Weight

Valid for approach with flaps 20 and landing with flaps 30

| AIRPORT OAT |     | APPROACH OR LANDING CLIMB LIMITED WEIGHT (1000 KG) |       |       |       |       |       |
|-------------|-----|----------------------------------------------------|-------|-------|-------|-------|-------|
|             |     | AIRPORT PRESSURE ALTITUDE (FT)                     |       |       |       |       |       |
| °C          | °F  | -2000                                              | 0     | 2000  | 4000  | 6000  | 8000  |
| 54          | 129 | 304.9                                              | 284.8 |       |       |       |       |
| 52          | 126 | 313.0                                              | 291.7 |       |       |       |       |
| 50          | 122 | 321.0                                              | 299.0 | 274.7 |       |       |       |
| 48          | 118 | 329.1                                              | 307.4 | 281.2 |       |       |       |
| 46          | 115 | 337.3                                              | 315.9 | 288.2 | 265.3 |       |       |
| 44          | 111 | 345.2                                              | 323.9 | 295.9 | 272.2 |       |       |
| 42          | 108 | 352.5                                              | 332.1 | 304.6 | 278.8 | 255.6 |       |
| 40          | 104 | 359.7                                              | 340.5 | 312.9 | 285.6 | 261.5 |       |
| 38          | 100 | 366.9                                              | 349.0 | 320.7 | 292.2 | 267.2 | 237.5 |
| 36          | 97  | 373.4                                              | 356.3 | 327.9 | 298.5 | 272.1 | 242.3 |
| 34          | 93  | 378.7                                              | 363.3 | 335.4 | 304.7 | 276.5 | 247.0 |
| 32          | 90  | 378.7                                              | 370.4 | 341.7 | 310.6 | 280.5 | 251.3 |
| 30          | 86  | 378.7                                              | 376.6 | 347.1 | 317.1 | 284.8 | 255.1 |
| 28          | 82  | 378.7                                              | 376.7 | 351.7 | 322.0 | 289.4 | 258.9 |
| 26          | 79  | 378.7                                              | 376.8 | 357.1 | 325.9 | 294.0 | 262.5 |
| 24          | 75  | 378.7                                              | 376.9 | 357.2 | 329.0 | 298.9 | 266.5 |
| 22          | 72  | 378.7                                              | 377.0 | 357.3 | 332.2 | 302.2 | 270.7 |
| 20          | 68  | 378.7                                              | 377.1 | 357.3 | 332.3 | 304.3 | 274.3 |
| 18          | 64  | 378.7                                              | 377.2 | 357.4 | 332.4 | 306.4 | 276.8 |
| 16          | 61  | 378.7                                              | 377.3 | 357.5 | 332.4 | 306.4 | 278.6 |
| 14          | 57  | 378.7                                              | 377.3 | 357.6 | 332.5 | 306.5 | 280.1 |
| 12          | 54  | 378.7                                              | 377.4 | 357.7 | 332.6 | 306.5 | 280.2 |
| 10          | 50  | 378.7                                              | 377.4 | 357.7 | 332.7 | 306.6 | 280.3 |
| 8           | 46  | 378.7                                              | 377.5 | 357.8 | 332.7 | 306.6 | 280.3 |
| 6           | 43  | 378.7                                              | 377.5 | 357.8 | 332.8 | 306.6 | 280.2 |
| 4           | 40  | 378.7                                              | 377.5 | 354.6 | 320.5 | 293.0 | 258.9 |
| 2           | 36  | 378.7                                              | 377.6 | 354.6 | 320.5 | 293.0 | 258.9 |
| 0           | 32  | 378.7                                              | 377.6 | 354.7 | 320.6 | 293.0 | 259.0 |
| -40         | -40 | 378.7                                              | 377.7 | 354.6 | 320.6 | 293.0 | 259.0 |

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

With engine bleed for packs off, increase weight by 1350 kg.

With engine and wing anti-ice on, decrease weight by 2200 kg.

When operating in icing conditions during any part of the flight with forecast landing temperature below 10°C, decrease weight by 21950 kg.

**ADVISORY INFORMATION**

**Approach or Landing Climb Limited Weight**

**Valid for approach with flaps 20 and landing with flaps 25**

| AIRPORT OAT |     | APPROACH OR LANDING CLIMB LIMITED WEIGHT (1000 KG) |       |       |       |       |       |
|-------------|-----|----------------------------------------------------|-------|-------|-------|-------|-------|
|             |     | AIRPORT PRESSURE ALTITUDE (FT)                     |       |       |       |       |       |
| °C          | °F  | -2000                                              | 0     | 2000  | 4000  | 6000  | 8000  |
| 54          | 129 | 308.4                                              | 289.3 |       |       |       |       |
| 52          | 126 | 315.6                                              | 296.4 |       |       |       |       |
| 50          | 122 | 323.1                                              | 303.4 | 279.2 |       |       |       |
| 48          | 118 | 330.8                                              | 310.6 | 285.8 |       |       |       |
| 46          | 115 | 338.7                                              | 318.2 | 292.8 | 269.5 |       |       |
| 44          | 111 | 346.3                                              | 325.7 | 300.4 | 276.4 |       |       |
| 42          | 108 | 353.7                                              | 333.6 | 308.1 | 283.2 | 259.8 |       |
| 40          | 104 | 360.8                                              | 341.6 | 315.5 | 290.1 | 265.8 |       |
| 38          | 100 | 368.1                                              | 350.1 | 322.9 | 297.3 | 271.8 | 241.8 |
| 36          | 97  | 374.8                                              | 357.4 | 329.8 | 303.3 | 277.2 | 246.6 |
| 34          | 93  | 378.7                                              | 364.4 | 337.1 | 309.0 | 281.6 | 251.3 |
| 32          | 90  | 378.7                                              | 371.7 | 343.0 | 314.0 | 285.9 | 256.0 |
| 30          | 86  | 378.7                                              | 377.9 | 348.2 | 319.8 | 290.2 | 259.9 |
| 28          | 82  | 378.7                                              | 378.0 | 352.9 | 324.4 | 295.0 | 263.8 |
| 26          | 79  | 378.7                                              | 378.2 | 358.5 | 328.1 | 299.6 | 267.5 |
| 24          | 75  | 378.7                                              | 378.3 | 358.5 | 331.1 | 304.0 | 271.5 |
| 22          | 72  | 378.7                                              | 378.4 | 358.6 | 334.1 | 307.0 | 275.9 |
| 20          | 68  | 378.7                                              | 378.5 | 358.7 | 334.2 | 308.7 | 279.6 |
| 18          | 64  | 378.7                                              | 378.5 | 358.8 | 334.3 | 310.5 | 282.2 |
| 16          | 61  | 378.7                                              | 378.6 | 358.8 | 334.4 | 310.5 | 284.1 |
| 14          | 57  | 378.7                                              | 378.7 | 358.9 | 334.4 | 310.6 | 285.7 |
| 12          | 54  | 378.7                                              | 378.7 | 359.0 | 334.5 | 310.7 | 285.7 |
| 10          | 50  | 378.7                                              | 378.7 | 359.1 | 334.6 | 310.7 | 285.8 |
| 8           | 46  | 378.7                                              | 378.7 | 359.1 | 334.7 | 310.7 | 285.8 |
| 6           | 43  | 378.7                                              | 378.7 | 359.2 | 334.7 | 310.8 | 285.8 |
| 4           | 40  | 378.7                                              | 378.7 | 359.2 | 334.8 | 310.8 | 280.7 |
| 2           | 36  | 378.7                                              | 378.7 | 359.3 | 334.8 | 310.8 | 280.7 |
| 0           | 32  | 378.7                                              | 378.7 | 359.3 | 334.8 | 310.9 | 280.7 |
| -40         | -40 | 378.7                                              | 378.7 | 359.4 | 334.9 | 311.0 | 280.9 |

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

With engine bleed for packs off, increase weight by 1450 kg.

With engine and wing anti-ice on, decrease weight by 1800 kg.

When operating in icing conditions during any part of the flight with forecast landing temperature below 10°C, decrease weight by 22250 kg.



Performance Inflight - QRH

Chapter PI-QRH

Engine Inoperative

Section 32

ENGINE INOP

Initial Max Continuous %N1

Based on .84M, engine bleed for one pack on and anti-ice off

| TAT<br>(°C) | PRESSURE ALTITUDE (1000 FT) |       |       |       |       |       |       |       |       |
|-------------|-----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
|             | 27                          | 29    | 31    | 33    | 35    | 37    | 39    | 41    | 43    |
| 20          | 97.4                        | 97.0  | 96.7  | 96.3  | 95.9  | 95.9  | 95.6  | 95.3  | 95.0  |
| 15          | 98.2                        | 97.8  | 97.3  | 97.0  | 96.6  | 96.3  | 96.0  | 95.7  | 95.4  |
| 10          | 99.2                        | 98.9  | 98.3  | 97.7  | 97.2  | 97.0  | 96.6  | 96.3  | 96.0  |
| 5           | 100.2                       | 100.1 | 99.7  | 98.8  | 98.1  | 97.8  | 97.4  | 97.1  | 96.8  |
| 0           | 99.3                        | 100.9 | 101.0 | 99.9  | 99.3  | 98.8  | 98.3  | 97.9  | 97.6  |
| -5          | 98.4                        | 99.9  | 101.2 | 101.3 | 100.5 | 100.2 | 99.7  | 99.3  | 98.8  |
| -10         | 97.4                        | 99.0  | 100.3 | 101.6 | 101.3 | 101.3 | 100.7 | 100.3 | 100.0 |
| -15         | 96.5                        | 98.1  | 99.3  | 100.6 | 101.0 | 102.0 | 101.1 | 100.8 | 100.5 |
| -20         | 95.6                        | 97.1  | 98.3  | 99.6  | 100.1 | 101.0 | 100.1 | 99.8  | 99.5  |
| -25         | 94.6                        | 96.1  | 97.4  | 98.6  | 99.1  | 100.0 | 99.1  | 98.8  | 98.5  |
| -30         | 93.7                        | 95.2  | 96.4  | 97.6  | 98.1  | 99.0  | 98.1  | 97.8  | 97.5  |
| -35         | 92.7                        | 94.2  | 95.4  | 96.6  | 97.0  | 97.9  | 97.1  | 96.8  | 96.5  |
| -40         | 91.7                        | 93.2  | 94.4  | 95.6  | 96.0  | 96.9  | 96.1  | 95.8  | 95.5  |

**ENGINE INOP**

**Max Continuous %N1**

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

**37000 FT to 27000 FT Pressure Altitudes**

| 37000 FT PRESS ALT |      |      |      |       |       |       |       |       |       |       |       |       | TAT (°C) |
|--------------------|------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|
| KLAS               | M    | -50  | -45  | -40   | -35   | -30   | -25   | -20   | -15   | -10   | -5    | 0     | 5        |
| 280                | 0.86 | 94.3 | 95.4 | 96.4  | 97.4  | 98.4  | 99.5  | 100.5 | 101.4 | 101.2 | 100.2 | 98.9  | 97.7     |
| 240                | 0.74 | 96.1 | 97.2 | 98.3  | 99.3  | 100.4 | 101.4 | 102.1 | 101.9 | 100.9 | 99.5  | 98.1  | 97.1     |
| 200                | 0.63 | 95.7 | 96.7 | 97.8  | 98.8  | 99.9  | 100.8 | 101.4 | 100.9 | 100.0 | 98.5  | 97.0  | 96.3     |
| 35000 FT PRESS ALT |      |      |      |       |       |       |       |       |       |       |       |       | TAT (°C) |
| KLAS               | M    | -50  | -45  | -40   | -35   | -30   | -25   | -20   | -15   | -10   | -5    | 0     | 5        |
| 280                | 0.82 | 94.6 | 95.6 | 96.6  | 97.7  | 98.7  | 99.7  | 100.7 | 101.7 | 101.4 | 100.4 | 99.2  | 98.1     |
| 240                | 0.71 | 95.1 | 96.2 | 97.2  | 98.3  | 99.3  | 100.3 | 101.3 | 101.8 | 100.9 | 99.8  | 98.3  | 97.2     |
| 200                | 0.60 | 94.8 | 95.8 | 96.9  | 97.9  | 98.9  | 99.9  | 100.9 | 101.0 | 100.2 | 98.8  | 97.1  | 96.1     |
| 33000 FT PRESS ALT |      |      |      |       |       |       |       |       |       |       |       |       | TAT (°C) |
| KLAS               | M    | -50  | -45  | -40   | -35   | -30   | -25   | -20   | -15   | -10   | -5    | 0     | 5        |
| 320                | 0.89 | 91.4 | 92.4 | 93.4  | 94.4  | 95.4  | 96.4  | 97.4  | 98.3  | 99.3  | 100.2 | 99.8  | 98.8     |
| 280                | 0.79 | 95.0 | 96.0 | 97.1  | 98.1  | 99.2  | 100.2 | 101.2 | 102.2 | 102.4 | 101.0 | 100.0 | 98.7     |
| 240                | 0.68 | 95.6 | 96.7 | 97.8  | 98.8  | 99.8  | 100.9 | 101.9 | 102.4 | 101.8 | 100.2 | 98.9  | 97.5     |
| 200                | 0.58 | 95.9 | 97.0 | 98.0  | 99.1  | 100.1 | 101.1 | 101.6 | 101.6 | 101.0 | 99.3  | 97.9  | 96.4     |
| 31000 FT PRESS ALT |      |      |      |       |       |       |       |       |       |       |       |       | TAT (°C) |
| KLAS               | M    | -45  | -40  | -35   | -30   | -25   | -20   | -15   | -10   | -5    | 0     | 5     | 10       |
| 320                | 0.85 | 92.7 | 93.8 | 94.8  | 95.7  | 96.7  | 97.7  | 98.7  | 99.6  | 100.5 | 100.8 | 99.7  | 98.4     |
| 280                | 0.76 | 96.3 | 97.4 | 98.4  | 99.5  | 100.5 | 101.5 | 102.5 | 103.5 | 102.0 | 100.6 | 99.1  | 98.0     |
| 240                | 0.66 | 97.4 | 98.4 | 99.5  | 100.5 | 101.5 | 102.6 | 103.3 | 103.0 | 101.0 | 99.5  | 98.1  | 96.9     |
| 200                | 0.55 | 97.6 | 98.7 | 99.7  | 100.8 | 101.8 | 102.6 | 102.8 | 102.0 | 100.7 | 98.7  | 97.2  | 96.1     |
| 29000 FT PRESS ALT |      |      |      |       |       |       |       |       |       |       |       |       | TAT (°C) |
| KLAS               | M    | -40  | -35  | -30   | -25   | -20   | -15   | -10   | -5    | 0     | 5     | 10    | 15       |
| 320                | 0.82 | 93.8 | 94.8 | 95.8  | 96.8  | 97.8  | 98.7  | 99.7  | 100.6 | 101.6 | 100.1 | 98.9  | 97.8     |
| 280                | 0.73 | 96.6 | 97.6 | 98.6  | 99.6  | 100.6 | 101.6 | 102.6 | 102.5 | 101.0 | 99.5  | 98.1  | 97.1     |
| 240                | 0.63 | 98.1 | 99.2 | 100.2 | 101.3 | 102.3 | 103.3 | 103.1 | 101.6 | 99.8  | 98.4  | 97.1  | 96.0     |
| 200                | 0.53 | 98.6 | 99.7 | 100.7 | 101.7 | 102.7 | 103.2 | 102.7 | 101.2 | 99.4  | 97.7  | 96.3  | 96.2     |
| 27000 FT PRESS ALT |      |      |      |       |       |       |       |       |       |       |       |       | TAT (°C) |
| KLAS               | M    | -40  | -35  | -30   | -25   | -20   | -15   | -10   | -5    | 0     | 5     | 10    | 15       |
| 360                | 0.88 | 90.2 | 91.2 | 92.1  | 93.0  | 94.0  | 94.9  | 95.8  | 96.7  | 97.6  | 98.5  | 99.2  | 98.1     |
| 320                | 0.79 | 93.4 | 94.4 | 95.3  | 96.3  | 97.3  | 98.2  | 99.2  | 100.1 | 101.1 | 100.6 | 99.2  | 98.1     |
| 280                | 0.70 | 95.4 | 96.4 | 97.4  | 98.4  | 99.4  | 100.4 | 101.3 | 102.3 | 101.3 | 99.7  | 98.2  | 97.1     |
| 240                | 0.60 | 97.2 | 98.2 | 99.2  | 100.3 | 101.3 | 102.3 | 103.0 | 102.0 | 99.9  | 98.5  | 97.2  | 96.2     |
| 200                | 0.51 | 98.4 | 99.4 | 100.4 | 101.5 | 102.5 | 103.2 | 102.7 | 101.8 | 99.9  | 98.1  | 96.5  | 95.6     |

**%N1 Adjustments for Engine Bleed**

| BLEED CONFIGURATION     | PRESSURE ALTITUDE (1000 FT) |      |      |      |      |      |
|-------------------------|-----------------------------|------|------|------|------|------|
|                         | 37                          | 35   | 33   | 31   | 29   | 27   |
| ENGINE A/T ON           | -0.2                        | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 |
| WING A/T ON - PACKS ON  | -0.4                        | -0.4 | -0.4 | -0.3 | -0.3 | -0.3 |
| WING A/T ON - PACKS OFF | -0.6                        | -0.5 | -0.5 | -0.5 | -0.5 | -0.4 |



# ENGINE INOP

## Max Continuous %N1

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

### 25000 FT to 18000 FT Pressure Altitudes

| 25000 FT PRESS ALT |      |      |       |       |       |       |       |       |       |       |       | TAT (°C) |       |  |  |
|--------------------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|-------|--|--|
| KIAS               | M    | -35  | -30   | -25   | -20   | -15   | -10   | -5    | 0     | 5     | 10    | 15       | 20    |  |  |
| 360                | 0.85 | 91.2 | 92.2  | 93.1  | 94.1  | 95.0  | 95.9  | 96.8  | 97.7  | 98.6  | 99.5  | 98.9     | 98.1  |  |  |
| 320                | 0.76 | 93.9 | 94.8  | 95.8  | 96.8  | 97.7  | 98.7  | 99.6  | 100.5 | 101.1 | 99.6  | 98.5     | 97.6  |  |  |
| 280                | 0.67 | 95.5 | 96.5  | 97.5  | 98.5  | 99.4  | 100.4 | 101.3 | 101.5 | 100.4 | 98.8  | 97.5     | 96.7  |  |  |
| 240                | 0.58 | 97.4 | 98.5  | 99.5  | 100.5 | 101.5 | 102.4 | 102.3 | 100.9 | 99.3  | 97.8  | 96.7     | 95.9  |  |  |
| 200                | 0.49 | 99.3 | 100.3 | 101.4 | 102.4 | 103.4 | 103.1 | 102.0 | 100.6 | 98.5  | 97.1  | 96.1     | 95.9  |  |  |
| 24000 FT PRESS ALT |      |      |       |       |       |       |       |       |       |       |       | TAT (°C) |       |  |  |
| KIAS               | M    | -35  | -30   | -25   | -20   | -15   | -10   | -5    | 0     | 5     | 10    | 15       | 20    |  |  |
| 360                | 0.83 | 91.3 | 92.3  | 93.2  | 94.2  | 95.1  | 96.0  | 96.9  | 97.8  | 98.7  | 99.6  | 99.4     | 98.4  |  |  |
| 320                | 0.75 | 93.6 | 94.6  | 95.6  | 96.5  | 97.5  | 98.4  | 99.4  | 100.3 | 101.2 | 100.0 | 98.8     | 97.8  |  |  |
| 280                | 0.66 | 95.4 | 96.4  | 97.4  | 98.3  | 99.3  | 100.3 | 101.2 | 101.8 | 100.7 | 99.1  | 97.8     | 96.9  |  |  |
| 240                | 0.57 | 97.3 | 98.3  | 99.3  | 100.3 | 101.3 | 102.2 | 102.6 | 101.4 | 99.8  | 98.3  | 97.1     | 96.2  |  |  |
| 200                | 0.48 | 98.8 | 99.9  | 100.9 | 101.9 | 102.9 | 103.4 | 102.3 | 101.0 | 98.9  | 97.4  | 96.3     | 95.6  |  |  |
| 22000 FT PRESS ALT |      |      |       |       |       |       |       |       |       |       |       | TAT (°C) |       |  |  |
| KIAS               | M    | -30  | -25   | -20   | -15   | -10   | -5    | 0     | 5     | 10    | 15    | 20       | 25    |  |  |
| 360                | 0.80 | 92.1 | 93.0  | 94.0  | 94.9  | 95.8  | 96.7  | 97.6  | 98.5  | 99.4  | 100.0 | 99.0     | 98.3  |  |  |
| 320                | 0.72 | 94.3 | 95.3  | 96.3  | 97.2  | 98.1  | 99.1  | 100.0 | 100.9 | 100.7 | 99.3  | 98.2     | 97.5  |  |  |
| 280                | 0.63 | 96.1 | 97.1  | 98.1  | 99.0  | 100.0 | 100.9 | 101.9 | 101.3 | 99.8  | 98.4  | 97.3     | 96.6  |  |  |
| 240                | 0.55 | 97.7 | 98.7  | 99.7  | 100.7 | 101.7 | 102.7 | 102.3 | 100.9 | 99.3  | 97.7  | 96.8     | 96.1  |  |  |
| 200                | 0.46 | 99.5 | 100.5 | 101.5 | 102.5 | 103.5 | 103.0 | 101.5 | 99.9  | 97.9  | 96.8  | 95.9     | 95.8  |  |  |
| 20000 FT PRESS ALT |      |      |       |       |       |       |       |       |       |       |       | TAT (°C) |       |  |  |
| KIAS               | M    | -30  | -25   | -20   | -15   | -10   | -5    | 0     | 5     | 10    | 15    | 20       | 25    |  |  |
| 360                | 0.77 | 93.7 | 94.6  | 95.6  | 96.5  | 97.4  | 98.4  | 99.3  | 100.2 | 101.1 | 102.0 | 101.3    | 100.1 |  |  |
| 320                | 0.69 | 95.9 | 96.9  | 97.8  | 98.8  | 99.7  | 100.7 | 101.6 | 102.6 | 103.5 | 101.8 | 100.4    | 99.1  |  |  |
| 280                | 0.61 | 97.7 | 98.7  | 99.6  | 100.6 | 101.6 | 102.6 | 103.5 | 104.3 | 102.8 | 100.9 | 99.4     | 98.3  |  |  |
| 240                | 0.53 | 98.5 | 99.5  | 100.5 | 101.5 | 102.4 | 103.4 | 104.3 | 104.1 | 102.4 | 100.7 | 98.7     | 97.2  |  |  |
| 200                | 0.44 | 98.0 | 99.0  | 99.9  | 100.9 | 101.9 | 102.9 | 103.8 | 102.6 | 100.5 | 98.0  | 96.2     | 95.3  |  |  |
| 18000 FT PRESS ALT |      |      |       |       |       |       |       |       |       |       |       | TAT (°C) |       |  |  |
| KIAS               | M    | -25  | -20   | -15   | -10   | -5    | 0     | 5     | 10    | 15    | 20    | 25       | 30    |  |  |
| 360                | 0.75 | 94.4 | 95.4  | 96.3  | 97.2  | 98.2  | 99.1  | 100.0 | 100.9 | 101.8 | 102.0 | 100.6    | 99.4  |  |  |
| 320                | 0.67 | 96.7 | 97.7  | 98.6  | 99.6  | 100.5 | 101.4 | 102.4 | 103.3 | 102.9 | 101.2 | 99.7     | 98.6  |  |  |
| 280                | 0.59 | 98.5 | 99.5  | 100.5 | 101.5 | 102.4 | 103.4 | 104.3 | 104.0 | 102.3 | 100.4 | 98.9     | 97.8  |  |  |
| 240                | 0.51 | 99.6 | 100.6 | 101.6 | 102.6 | 103.6 | 104.5 | 104.9 | 103.9 | 101.9 | 100.0 | 98.4     | 97.2  |  |  |
| 200                | 0.42 | 97.2 | 98.2  | 99.2  | 100.1 | 101.1 | 101.9 | 102.0 | 100.8 | 98.8  | 97.3  | 95.8     | 94.4  |  |  |

## %N1 Adjustments for Engine Bleed

| BLEED CONFIGURATION     | PRESSURE ALTITUDE (1000 FT) |      |      |      |      |
|-------------------------|-----------------------------|------|------|------|------|
|                         | 25                          | 24   | 22   | 20   | 18   |
| ENGINE A/I ON           | -0.2                        | -0.2 | -0.2 | -0.2 | -0.2 |
| WING A/I ON - PACKS ON  | -0.3                        | -0.3 | -0.3 | -0.2 | -0.3 |
| WING A/I ON - PACKS OFF | -0.4                        | -0.4 | -0.4 | -0.3 | -0.5 |

## ENGINE INOP

### Max Continuous %N1

Based on engine bleed for packs on or off and anti-ice off  
16000 FT to 5000 FT Pressure Altitudes

| 16000 FT PRESS ALT |      |      |       |       |       |       |       |       |       |       |       |       | TAT (°C) |  |
|--------------------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|--|
| KIAS               | M    | -25  | -20   | -15   | -10   | -5    | 0     | 5     | 10    | 15    | 20    | 25    | 30       |  |
| 360                | 0.72 | 94.8 | 95.8  | 96.7  | 97.6  | 98.6  | 99.5  | 100.4 | 101.3 | 102.2 | 103.1 | 101.7 | 100.2    |  |
| 320                | 0.64 | 96.9 | 97.9  | 98.8  | 99.8  | 100.7 | 101.7 | 102.6 | 103.5 | 104.4 | 102.7 | 100.9 | 99.4     |  |
| 280                | 0.57 | 98.7 | 99.7  | 100.7 | 101.6 | 102.6 | 103.5 | 104.5 | 105.4 | 104.1 | 102.2 | 100.3 | 98.8     |  |
| 240                | 0.49 | 99.1 | 100.1 | 101.1 | 102.0 | 103.0 | 104.0 | 104.9 | 104.5 | 103.0 | 100.9 | 99.2  | 97.9     |  |
| 200                | 0.41 | 96.2 | 97.2  | 98.1  | 99.1  | 100.0 | 100.9 | 101.5 | 101.3 | 99.8  | 98.3  | 97.0  | 95.4     |  |
| 14000 FT PRESS ALT |      |      |       |       |       |       |       |       |       |       |       |       | TAT (°C) |  |
| KIAS               | M    | -20  | -15   | -10   | -5    | 0     | 5     | 10    | 15    | 20    | 25    | 30    | 35       |  |
| 360                | 0.69 | 94.9 | 95.9  | 96.8  | 97.7  | 98.6  | 99.5  | 100.4 | 101.3 | 102.2 | 102.2 | 100.8 | 99.5     |  |
| 320                | 0.62 | 97.1 | 98.1  | 99.0  | 99.9  | 100.9 | 101.8 | 102.7 | 103.6 | 103.4 | 101.5 | 100.0 | 98.9     |  |
| 280                | 0.54 | 99.2 | 100.1 | 101.1 | 102.1 | 103.0 | 103.9 | 104.9 | 104.9 | 103.0 | 101.0 | 99.5  | 98.4     |  |
| 240                | 0.47 | 97.3 | 98.2  | 99.2  | 100.1 | 101.1 | 102.0 | 102.8 | 102.5 | 100.6 | 99.0  | 97.8  | 96.7     |  |
| 200                | 0.39 | 96.1 | 97.0  | 98.0  | 98.9  | 99.8  | 100.7 | 101.4 | 100.7 | 99.0  | 97.6  | 96.5  | 95.6     |  |
| 12000 FT PRESS ALT |      |      |       |       |       |       |       |       |       |       |       |       | TAT (°C) |  |
| KIAS               | M    | -15  | -10   | -5    | 0     | 5     | 10    | 15    | 20    | 25    | 30    | 35    | 40       |  |
| 360                | 0.67 | 95.4 | 96.3  | 97.2  | 98.1  | 99.0  | 99.9  | 100.8 | 101.6 | 102.5 | 101.3 | 100.0 | 99.0     |  |
| 320                | 0.60 | 97.3 | 98.2  | 99.2  | 100.1 | 101.0 | 101.9 | 102.8 | 103.7 | 102.3 | 100.6 | 99.4  | 98.4     |  |
| 280                | 0.52 | 99.7 | 100.6 | 101.6 | 102.5 | 103.5 | 104.4 | 105.3 | 104.0 | 102.0 | 100.2 | 99.1  | 98.1     |  |
| 240                | 0.45 | 96.5 | 97.4  | 98.3  | 99.3  | 100.2 | 101.1 | 101.4 | 100.6 | 99.2  | 98.0  | 96.9  | 96.0     |  |
| 200                | 0.38 | 96.7 | 97.7  | 98.6  | 99.5  | 100.4 | 101.2 | 101.3 | 100.2 | 98.7  | 97.4  | 96.4  | 95.8     |  |
| 10000 FT PRESS ALT |      |      |       |       |       |       |       |       |       |       |       |       | TAT (°C) |  |
| KIAS               | M    | -15  | -10   | -5    | 0     | 5     | 10    | 15    | 20    | 25    | 30    | 35    | 40       |  |
| 360                | 0.65 | 94.2 | 95.2  | 96.1  | 96.9  | 97.8  | 98.7  | 99.6  | 100.4 | 101.3 | 101.5 | 100.2 | 99.1     |  |
| 320                | 0.58 | 96.1 | 97.1  | 98.0  | 98.9  | 99.8  | 100.7 | 101.6 | 102.4 | 102.6 | 101.0 | 99.7  | 98.6     |  |
| 280                | 0.51 | 98.5 | 99.4  | 100.4 | 101.3 | 102.2 | 103.1 | 104.0 | 104.6 | 102.3 | 100.5 | 99.4  | 98.4     |  |
| 240                | 0.43 | 95.6 | 96.6  | 97.5  | 98.4  | 99.3  | 100.2 | 101.0 | 101.1 | 100.3 | 99.1  | 97.8  | 96.9     |  |
| 200                | 0.36 | 96.6 | 97.5  | 98.4  | 99.3  | 100.2 | 101.1 | 101.6 | 101.2 | 100.1 | 98.5  | 97.5  | 96.6     |  |
| 5000 FT PRESS ALT  |      |      |       |       |       |       |       |       |       |       |       |       | TAT (°C) |  |
| KIAS               | M    | -10  | -5    | 0     | 5     | 10    | 15    | 20    | 25    | 30    | 35    | 40    | 45       |  |
| 360                | 0.59 | 92.6 | 93.5  | 94.3  | 95.2  | 96.0  | 96.9  | 97.7  | 98.5  | 99.4  | 100.2 | 99.3  | 98.5     |  |
| 320                | 0.53 | 94.0 | 94.9  | 95.8  | 96.7  | 97.5  | 98.4  | 99.2  | 100.1 | 100.9 | 100.1 | 99.1  | 98.2     |  |
| 280                | 0.46 | 95.0 | 95.9  | 96.8  | 97.6  | 98.5  | 99.4  | 100.2 | 101.1 | 100.9 | 99.8  | 98.8  | 97.8     |  |
| 240                | 0.40 | 95.7 | 96.6  | 97.5  | 98.4  | 99.3  | 100.2 | 101.0 | 101.6 | 100.5 | 99.4  | 98.3  | 97.4     |  |
| 200                | 0.33 | 97.0 | 97.9  | 98.8  | 99.7  | 100.6 | 101.5 | 102.4 | 101.7 | 100.3 | 99.1  | 98.1  | 97.3     |  |

### %N1 Adjustments for Engine Bleed

| BLEED CONFIGURATION     | PRESSURE ALTITUDE (1000 FT) |      |      |      |      |
|-------------------------|-----------------------------|------|------|------|------|
|                         | 16                          | 14   | 12   | 10   | 5    |
| ENGINE A/I ON           | -0.3                        | -0.2 | -0.4 | -0.5 | -0.5 |
| WING A/I ON - PACKS ON  | -0.4                        | -0.5 | -0.6 | -0.7 | -0.8 |
| WING A/I ON - PACKS OFF | -0.6                        | -0.7 | -0.8 | -0.9 | -1.1 |



**ENGINE INOP**

**MAX CONTINUOUS THRUST**

**Driftdown Speed/Level Off Altitude**

**100 ft/min residual rate of climb**

**Includes APU fuel burn**

| WEIGHT (1000 KG)       |              | OPTIMUM<br>DRIFTDOWN<br>SPEED<br>(KIAS) | LEVEL OFF PRESSURE ALTITUDE (FT) |            |            |
|------------------------|--------------|-----------------------------------------|----------------------------------|------------|------------|
| START<br>DRIFT<br>DOWN | LEVEL<br>OFF |                                         | ISA + 10°C<br>& BELOW            | ISA + 15°C | ISA + 20°C |
| 360                    | 350          | 300                                     | 17500                            | 16300      | 15100      |
| 340                    | 330          | 292                                     | 19000                            | 17800      | 16600      |
| 320                    | 311          | 284                                     | 20400                            | 19400      | 18300      |
| 300                    | 292          | 275                                     | 21600                            | 20800      | 19900      |
| 280                    | 272          | 266                                     | 23300                            | 22300      | 21300      |
| 260                    | 252          | 257                                     | 25300                            | 24400      | 23100      |
| 240                    | 232          | 247                                     | 27500                            | 26700      | 25300      |
| 220                    | 214          | 237                                     | 29900                            | 29200      | 27900      |
| 200                    | 194          | 226                                     | 31700                            | 31300      | 30500      |
| 180                    | 175          | 215                                     | 33600                            | 33400      | 33000      |
| 160                    | 155          | 203                                     | 35800                            | 35700      | 35600      |

**ENGINE INOP**

**MAX CONTINUOUS THRUST**

**Driftdown/LRC Cruise Range Capability  
Ground to Air Miles Conversion**

| AIR DISTANCE (NM)        |      |      |      |      | GROUND<br>DISTANCE<br>(NM) | AIR DISTANCE (NM)        |      |      |      |      |
|--------------------------|------|------|------|------|----------------------------|--------------------------|------|------|------|------|
| HEADWIND COMPONENT (KTS) |      |      |      |      |                            | TAILWIND COMPONENT (KTS) |      |      |      |      |
| 100                      | 80   | 60   | 40   | 20   |                            | 20                       | 40   | 60   | 80   | 100  |
| 134                      | 126  | 118  | 111  | 105  | 100                        | 95                       | 90   | 86   | 82   | 79   |
| 269                      | 251  | 236  | 222  | 210  | 200                        | 190                      | 181  | 173  | 165  | 159  |
| 403                      | 377  | 354  | 334  | 316  | 300                        | 285                      | 272  | 260  | 248  | 238  |
| 536                      | 502  | 472  | 445  | 421  | 400                        | 380                      | 362  | 346  | 332  | 318  |
| 670                      | 627  | 589  | 556  | 526  | 500                        | 475                      | 453  | 433  | 415  | 398  |
| 803                      | 752  | 707  | 667  | 632  | 600                        | 571                      | 544  | 520  | 498  | 478  |
| 936                      | 877  | 824  | 778  | 737  | 700                        | 666                      | 635  | 607  | 582  | 558  |
| 1068                     | 1001 | 942  | 889  | 842  | 800                        | 761                      | 726  | 695  | 665  | 639  |
| 1201                     | 1126 | 1059 | 1000 | 947  | 900                        | 856                      | 817  | 782  | 749  | 719  |
| 1333                     | 1250 | 1176 | 1111 | 1052 | 1000                       | 952                      | 908  | 869  | 833  | 799  |
| 1466                     | 1374 | 1293 | 1222 | 1157 | 1100                       | 1047                     | 1000 | 956  | 916  | 880  |
| 1598                     | 1499 | 1411 | 1332 | 1262 | 1200                       | 1142                     | 1091 | 1043 | 1000 | 960  |
| 1731                     | 1623 | 1528 | 1443 | 1368 | 1300                       | 1238                     | 1182 | 1131 | 1084 | 1040 |
| 1863                     | 1747 | 1645 | 1554 | 1473 | 1400                       | 1333                     | 1273 | 1218 | 1167 | 1121 |
| 1996                     | 1872 | 1762 | 1665 | 1578 | 1500                       | 1428                     | 1364 | 1305 | 1251 | 1201 |
| 2129                     | 1997 | 1880 | 1776 | 1683 | 1600                       | 1524                     | 1455 | 1392 | 1334 | 1281 |
| 2262                     | 2121 | 1997 | 1887 | 1788 | 1700                       | 1619                     | 1546 | 1479 | 1418 | 1361 |
| 2395                     | 2246 | 2115 | 1998 | 1894 | 1800                       | 1714                     | 1637 | 1566 | 1501 | 1441 |

**Driftdown/Cruise Fuel and Time**

| AIR<br>DIST<br>(NM) | FUEL REQUIRED (1000 KG)                |      |      |      |      |      |      |      |      |      |      | TIME<br>(HR:MIN) |
|---------------------|----------------------------------------|------|------|------|------|------|------|------|------|------|------|------------------|
|                     | WEIGHT AT START OF DRIFTDOWN (1000 KG) |      |      |      |      |      |      |      |      |      |      |                  |
|                     | 160                                    | 180  | 200  | 220  | 240  | 260  | 280  | 300  | 320  | 340  | 360  |                  |
| 100                 | 1.1                                    | 1.1  | 1.2  | 1.3  | 1.5  | 1.6  | 1.7  | 1.8  | 1.8  | 1.9  | 2.0  | 0:16             |
| 200                 | 2.4                                    | 2.5  | 2.8  | 3.1  | 3.3  | 3.5  | 3.7  | 3.9  | 4.1  | 4.3  | 4.6  | 0:31             |
| 300                 | 3.7                                    | 4.1  | 4.5  | 4.9  | 5.3  | 5.6  | 6.0  | 6.3  | 6.6  | 7.0  | 7.4  | 0:46             |
| 400                 | 5.1                                    | 5.6  | 6.2  | 6.8  | 7.3  | 7.8  | 8.2  | 8.7  | 9.2  | 9.7  | 10.3 | 1:01             |
| 500                 | 6.4                                    | 7.0  | 7.8  | 8.5  | 9.2  | 9.8  | 10.4 | 11.0 | 11.6 | 12.3 | 13.0 | 1:16             |
| 600                 | 7.7                                    | 8.4  | 9.3  | 10.1 | 11.0 | 11.7 | 12.5 | 13.2 | 13.9 | 14.8 | 15.6 | 1:31             |
| 700                 | 8.9                                    | 9.8  | 10.8 | 11.8 | 12.8 | 13.7 | 14.5 | 15.4 | 16.2 | 17.2 | 18.2 | 1:46             |
| 800                 | 10.1                                   | 11.2 | 12.3 | 13.4 | 14.5 | 15.6 | 16.5 | 17.5 | 18.5 | 19.6 | 20.8 | 2:01             |
| 900                 | 11.3                                   | 12.5 | 13.8 | 15.1 | 16.3 | 17.4 | 18.5 | 19.6 | 20.7 | 22.0 | 23.3 | 2:15             |
| 1000                | 12.6                                   | 13.9 | 15.3 | 16.7 | 18.0 | 19.3 | 20.5 | 21.8 | 23.0 | 24.4 | 25.9 | 2:30             |
| 1100                | 13.8                                   | 15.2 | 16.8 | 18.3 | 19.8 | 21.2 | 22.5 | 23.9 | 25.2 | 26.8 | 28.4 | 2:45             |
| 1200                | 14.9                                   | 16.6 | 18.2 | 19.9 | 21.5 | 23.0 | 24.5 | 26.0 | 27.4 | 29.2 | 30.9 | 2:59             |
| 1300                | 16.1                                   | 17.9 | 19.7 | 21.5 | 23.2 | 24.8 | 26.4 | 28.0 | 29.7 | 31.5 | 33.4 | 3:14             |
| 1400                | 17.3                                   | 19.2 | 21.1 | 23.0 | 24.9 | 26.6 | 28.4 | 30.1 | 31.8 | 33.8 | 35.8 | 3:29             |
| 1500                | 18.5                                   | 20.5 | 22.5 | 24.6 | 26.5 | 28.4 | 30.3 | 32.2 | 34.0 | 36.1 | 38.3 | 3:43             |
| 1600                | 19.6                                   | 21.7 | 23.9 | 26.1 | 28.2 | 30.2 | 32.2 | 34.2 | 36.2 | 38.4 | 40.7 | 3:58             |
| 1700                | 20.8                                   | 23.0 | 25.3 | 27.6 | 29.8 | 32.0 | 34.1 | 36.2 | 38.3 | 40.7 | 43.1 | 4:13             |
| 1800                | 21.9                                   | 24.3 | 26.7 | 29.1 | 31.5 | 33.8 | 36.0 | 38.2 | 40.5 | 43.0 | 45.5 | 4:28             |

Includes APU fuel burn.

Driftdown at optimum driftdown speed and cruise at LRC speed.



**ENGINE INOP**

**MAX CONTINUOUS THRUST**

**Long Range Cruise Altitude Capability**

**100 ft/min residual rate of climb**

| WEIGHT<br>(1000 KG) | PRESSURE ALTITUDE (FT) |            |            |
|---------------------|------------------------|------------|------------|
|                     | ISA + 10°C<br>& BELOW  | ISA + 15°C | ISA + 20°C |
| 360                 | 15000                  | 13600      | 12000      |
| 350                 | 15500                  | 14200      | 12600      |
| 340                 | 16400                  | 14900      | 13100      |
| 330                 | 17200                  | 15700      | 13900      |
| 320                 | 18100                  | 16600      | 14900      |
| 310                 | 19000                  | 17500      | 15800      |
| 300                 | 19900                  | 18400      | 16700      |
| 290                 | 20600                  | 19400      | 17800      |
| 280                 | 21200                  | 20200      | 18800      |
| 270                 | 21900                  | 20900      | 19900      |
| 260                 | 22800                  | 21600      | 20600      |
| 250                 | 23800                  | 22500      | 21400      |
| 240                 | 24900                  | 23700      | 22100      |
| 230                 | 26200                  | 24900      | 23400      |
| 220                 | 27600                  | 26300      | 24600      |
| 210                 | 29100                  | 27700      | 26000      |
| 200                 | 30400                  | 29100      | 27600      |
| 190                 | 31400                  | 30500      | 29100      |
| 180                 | 32400                  | 31700      | 30600      |
| 170                 | 33400                  | 33000      | 32000      |
| 160                 | 34600                  | 34400      | 33500      |

**With engine anti-ice on, no altitude capability adjustment is required.**

**With engine and wing anti-ice on, decrease altitude capability by 300 ft.**

**ENGINE INOP**

**MAX CONTINUOUS THRUST**

**Long Range Cruise Control**

| WEIGHT<br>(1000 KG) |        | PRESSURE ALTITUDE (1000 FT) |       |       |       |      |      |      |      |      |      |
|---------------------|--------|-----------------------------|-------|-------|-------|------|------|------|------|------|------|
|                     |        | 10                          | 15    | 17    | 19    | 21   | 23   | 25   | 27   | 29   | 31   |
| 360                 | %N1    | 91.6                        | 97.3  |       |       |      |      |      |      |      |      |
|                     | MACH   | .602                        | .664  |       |       |      |      |      |      |      |      |
|                     | KIAS   | 334                         | 337   |       |       |      |      |      |      |      |      |
|                     | FF/ENG | 10335                       | 11118 |       |       |      |      |      |      |      |      |
| 340                 | %N1    | 90.6                        | 95.5  | 98.6  |       |      |      |      |      |      |      |
|                     | MACH   | .602                        | .662  | .681  |       |      |      |      |      |      |      |
|                     | KIAS   | 334                         | 337   | 333   |       |      |      |      |      |      |      |
|                     | FF/ENG | 9977                        | 10586 | 10771 |       |      |      |      |      |      |      |
| 320                 | %N1    | 89.7                        | 93.7  | 95.9  | 99.2  |      |      |      |      |      |      |
|                     | MACH   | .602                        | .650  | .667  | .686  |      |      |      |      |      |      |
|                     | KIAS   | 334                         | 330   | 326   | 323   |      |      |      |      |      |      |
|                     | FF/ENG | 9633                        | 9884  | 9949  | 10098 |      |      |      |      |      |      |
| 300                 | %N1    | 87.7                        | 92.0  | 93.7  | 96.1  |      |      |      |      |      |      |
|                     | MACH   | .584                        | .637  | .653  | .671  |      |      |      |      |      |      |
|                     | KIAS   | 324                         | 323   | 319   | 316   |      |      |      |      |      |      |
|                     | FF/ENG | 8949                        | 9222  | 9239  | 9287  |      |      |      |      |      |      |
| 280                 | %N1    | 85.7                        | 90.1  | 91.8  | 93.5  | 96.3 |      |      |      |      |      |
|                     | MACH   | .566                        | .619  | .640  | .656  | .674 |      |      |      |      |      |
|                     | KIAS   | 314                         | 314   | 312   | 308   | 305  |      |      |      |      |      |
|                     | FF/ENG | 8313                        | 8533  | 8592  | 8583  | 8659 |      |      |      |      |      |
| 260                 | %N1    | 83.8                        | 88.1  | 89.8  | 91.5  | 93.2 | 96.3 |      |      |      |      |
|                     | MACH   | .548                        | .599  | .621  | .642  | .658 | .677 |      |      |      |      |
|                     | KIAS   | 304                         | 303   | 303   | 301   | 297  | 294  |      |      |      |      |
|                     | FF/ENG | 7698                        | 7830  | 7916  | 7948  | 7953 | 8065 |      |      |      |      |
| 240                 | %N1    | 81.5                        | 85.7  | 87.6  | 89.3  | 91.0 | 92.9 | 96.0 |      |      |      |
|                     | MACH   | .529                        | .577  | .599  | .622  | .643 | .659 | .678 |      |      |      |
|                     | KIAS   | 293                         | 292   | 292   | 292   | 290  | 286  | 283  |      |      |      |
|                     | FF/ENG | 7105                        | 7147  | 7227  | 7288  | 7324 | 7345 | 7467 |      |      |      |
| 220                 | %N1    | 79.3                        | 83.3  | 85.1  | 86.9  | 88.7 | 90.4 | 92.3 | 95.4 | 99.4 |      |
|                     | MACH   | .510                        | .555  | .576  | .598  | .621 | .642 | .659 | .679 | .701 |      |
|                     | KIAS   | 282                         | 280   | 280   | 280   | 280  | 278  | 274  | 271  | 269  |      |
|                     | FF/ENG | 6519                        | 6489  | 6557  | 6617  | 6672 | 6717 | 6737 | 6844 | 7112 |      |
| 200                 | %N1    | 76.7                        | 80.6  | 82.5  | 84.2  | 86.1 | 87.8 | 89.6 | 91.5 | 94.5 | 98.6 |
|                     | MACH   | .490                        | .532  | .552  | .572  | .594 | .618 | .640 | .658 | .677 | .700 |
|                     | KIAS   | 271                         | 269   | 268   | 267   | 267  | 267  | 266  | 262  | 259  | 257  |
|                     | FF/ENG | 5935                        | 5852  | 5910  | 5967  | 6007 | 6064 | 6109 | 6120 | 6208 | 6468 |
| 180                 | %N1    | 74.1                        | 77.8  | 79.6  | 81.5  | 83.1 | 85.0 | 86.7 | 88.5 | 90.3 | 93.3 |
|                     | MACH   | .470                        | .509  | .527  | .546  | .567 | .589 | .613 | .636 | .654 | .674 |
|                     | KIAS   | 260                         | 256   | 255   | 255   | 254  | 254  | 254  | 253  | 250  | 247  |
|                     | FF/ENG | 5363                        | 5237  | 5285  | 5340  | 5374 | 5402 | 5453 | 5494 | 5502 | 5567 |
| 160                 | %N1    | 71.2                        | 74.8  | 76.6  | 78.3  | 80.1 | 81.7 | 83.6 | 85.3 | 87.1 | 88.9 |
|                     | MACH   | .449                        | .485  | .501  | .519  | .538 | .559 | .581 | .605 | .629 | .649 |
|                     | KIAS   | 248                         | 244   | 243   | 242   | 241  | 241  | 240  | 240  | 240  | 237  |
|                     | FF/ENG | 4809                        | 4648  | 4682  | 4735  | 4758 | 4774 | 4797 | 4837 | 4878 | 4892 |

# ENGINE INOP

## MAX CONTINUOUS THRUST

### Long Range Cruise Diversion Fuel and Time

#### Ground to Air Miles Conversion

| AIR DISTANCE (NM)        |      |      |      |      | GROUND<br>DISTANCE<br>(NM) | AIR DISTANCE (NM)        |      |      |      |      |
|--------------------------|------|------|------|------|----------------------------|--------------------------|------|------|------|------|
| HEADWIND COMPONENT (KTS) |      |      |      |      |                            | TAILWIND COMPONENT (KTS) |      |      |      |      |
| 100                      | 80   | 60   | 40   | 20   |                            | 20                       | 40   | 60   | 80   | 100  |
| 286                      | 264  | 244  | 227  | 213  | 200                        | 190                      | 181  | 173  | 166  | 159  |
| 569                      | 525  | 487  | 454  | 425  | 400                        | 381                      | 364  | 348  | 333  | 320  |
| 853                      | 788  | 730  | 681  | 638  | 600                        | 572                      | 546  | 522  | 501  | 482  |
| 1138                     | 1051 | 974  | 908  | 851  | 800                        | 763                      | 729  | 698  | 669  | 643  |
| 1424                     | 1316 | 1219 | 1136 | 1064 | 1000                       | 954                      | 911  | 872  | 836  | 803  |
| 1711                     | 1580 | 1464 | 1364 | 1278 | 1200                       | 1144                     | 1093 | 1046 | 1003 | 964  |
| 1999                     | 1846 | 1709 | 1592 | 1491 | 1400                       | 1335                     | 1275 | 1220 | 1170 | 1124 |
| 2288                     | 2111 | 1954 | 1820 | 1704 | 1600                       | 1526                     | 1457 | 1394 | 1337 | 1285 |
| 2578                     | 2378 | 2201 | 2049 | 1918 | 1800                       | 1717                     | 1639 | 1568 | 1504 | 1445 |
| 2869                     | 2646 | 2447 | 2278 | 2132 | 2000                       | 1907                     | 1821 | 1742 | 1670 | 1605 |

### Reference Fuel and Time Required at Check Point

| AIR<br>DIST<br>(NM) | PRESSURE ALTITUDE (1000 FT) |                  |                   |                  |                   |                  |                   |                  |                   |                  |
|---------------------|-----------------------------|------------------|-------------------|------------------|-------------------|------------------|-------------------|------------------|-------------------|------------------|
|                     | 10                          |                  | 14                |                  | 18                |                  | 22                |                  | 26                |                  |
|                     | FUEL<br>(1000 KG)           | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) |
| 200                 | 4.0                         | 0:39             | 3.5               | 0:38             | 3.2               | 0:36             | 2.8               | 0:36             | 2.6               | 0:35             |
| 400                 | 8.4                         | 1:15             | 7.6               | 1:11             | 7.1               | 1:08             | 6.7               | 1:06             | 6.4               | 1:03             |
| 600                 | 12.7                        | 1:50             | 11.7              | 1:45             | 11.1              | 1:40             | 10.4              | 1:36             | 10.2              | 1:32             |
| 800                 | 16.9                        | 2:26             | 15.7              | 2:19             | 14.9              | 2:11             | 14.2              | 2:06             | 13.9              | 2:02             |
| 1000                | 21.1                        | 3:02             | 19.7              | 2:53             | 18.8              | 2:44             | 17.9              | 2:37             | 17.6              | 2:31             |
| 1200                | 25.3                        | 3:38             | 23.7              | 3:27             | 22.6              | 3:16             | 21.5              | 3:07             | 21.2              | 3:00             |
| 1400                | 29.4                        | 4:15             | 27.6              | 4:02             | 26.3              | 3:49             | 25.1              | 3:38             | 24.7              | 3:30             |
| 1600                | 33.5                        | 4:52             | 31.4              | 4:37             | 30.1              | 4:21             | 28.7              | 4:09             | 28.2              | 4:00             |
| 1800                | 37.6                        | 5:29             | 35.2              | 5:12             | 33.8              | 4:55             | 32.3              | 4:40             | 31.6              | 4:29             |
| 2000                | 41.6                        | 6:07             | 39.0              | 5:47             | 37.4              | 5:28             | 35.8              | 5:11             | 35.0              | 5:00             |

### Fuel Required Adjustment (1000 KG)

| REFERENCE FUEL REQUIRED<br>(1000 KG) | WEIGHT AT CHECK POINT (1000 KG) |      |      |      |     |     |     |      |      |      |
|--------------------------------------|---------------------------------|------|------|------|-----|-----|-----|------|------|------|
|                                      | 170                             | 190  | 210  | 230  | 250 | 270 | 290 | 310  | 330  | 350  |
| 5                                    | -0.8                            | -0.6 | -0.4 | -0.2 | 0.0 | 0.3 | 0.7 | 1.2  | 1.7  | 2.3  |
| 10                                   | -1.8                            | -1.3 | -0.9 | -0.4 | 0.0 | 0.8 | 1.6 | 2.6  | 3.7  | 4.9  |
| 15                                   | -2.7                            | -2.0 | -1.3 | -0.7 | 0.0 | 1.2 | 2.5 | 4.0  | 5.6  | 7.4  |
| 20                                   | -3.7                            | -2.7 | -1.8 | -0.9 | 0.0 | 1.6 | 3.3 | 5.3  | 7.5  | 9.8  |
| 25                                   | -4.6                            | -3.4 | -2.3 | -1.1 | 0.0 | 2.0 | 4.2 | 6.6  | 9.3  | 12.2 |
| 30                                   | -5.6                            | -4.2 | -2.7 | -1.4 | 0.0 | 2.3 | 4.9 | 7.8  | 11.0 | 14.4 |
| 35                                   | -6.5                            | -4.9 | -3.2 | -1.6 | 0.0 | 2.7 | 5.7 | 9.0  | 12.6 | 16.6 |
| 40                                   | -7.5                            | -5.6 | -3.7 | -1.8 | 0.0 | 3.1 | 6.4 | 10.2 | 14.2 | 18.6 |
| 45                                   | -8.5                            | -6.3 | -4.2 | -2.1 | 0.0 | 3.4 | 7.1 | 11.3 | 15.8 | 20.6 |

Includes APU fuel burn.

**ENGINE INOP**

**MAX CONTINUOUS THRUST**

**Holding  
Flaps Up**

| WEIGHT<br>(1000 KG) |        | PRESSURE ALTITUDE (FT) |      |       |       |       |       |       |
|---------------------|--------|------------------------|------|-------|-------|-------|-------|-------|
|                     |        | 1500                   | 5000 | 10000 | 15000 | 20000 | 25000 | 30000 |
| 360                 | %N1    | 81.1                   | 84.5 | 89.2  | 94.5  |       |       |       |
|                     | KIAS   | 272                    | 273  | 275   | 298   |       |       |       |
|                     | FF/ENG | 9270                   | 9350 | 9640  | 10310 |       |       |       |
| 340                 | %N1    | 79.3                   | 82.6 | 87.4  | 92.2  |       |       |       |
|                     | KIAS   | 264                    | 266  | 267   | 282   |       |       |       |
|                     | FF/ENG | 8720                   | 8760 | 8990  | 9410  |       |       |       |
| 320                 | %N1    | 77.6                   | 80.6 | 85.4  | 90.1  | 98.4  |       |       |
|                     | KIAS   | 257                    | 257  | 259   | 265   | 294   |       |       |
|                     | FF/ENG | 8170                   | 8190 | 8350  | 8590  | 9780  |       |       |
| 300                 | %N1    | 75.6                   | 78.6 | 83.4  | 88.1  | 94.5  |       |       |
|                     | KIAS   | 249                    | 249  | 251   | 252   | 277   |       |       |
|                     | FF/ENG | 7640                   | 7640 | 7740  | 7890  | 8730  |       |       |
| 280                 | %N1    | 73.7                   | 76.6 | 81.1  | 86.0  | 91.3  |       |       |
|                     | KIAS   | 240                    | 241  | 242   | 243   | 258   |       |       |
|                     | FF/ENG | 7120                   | 7090 | 7150  | 7250  | 7830  |       |       |
| 260                 | %N1    | 71.6                   | 74.5 | 78.8  | 83.7  | 88.8  | 97.3  |       |
|                     | KIAS   | 232                    | 232  | 233   | 234   | 240   | 266   |       |
|                     | FF/ENG | 6600                   | 6570 | 6570  | 6640  | 7030  | 7980  |       |
| 240                 | %N1    | 69.3                   | 72.3 | 76.5  | 81.3  | 86.3  | 92.6  |       |
|                     | KIAS   | 226                    | 226  | 226   | 226   | 226   | 248   |       |
|                     | FF/ENG | 6090                   | 6060 | 6040  | 6080  | 6360  | 6920  |       |
| 220                 | %N1    | 67.0                   | 69.9 | 74.1  | 78.6  | 83.8  | 88.8  | 99.1  |
|                     | KIAS   | 220                    | 220  | 220   | 220   | 220   | 226   | 246   |
|                     | FF/ENG | 5600                   | 5570 | 5530  | 5540  | 5750  | 6060  | 7020  |
| 200                 | %N1    | 64.7                   | 67.4 | 71.6  | 76.0  | 80.9  | 85.8  | 93.5  |
|                     | KIAS   | 213                    | 213  | 213   | 213   | 213   | 213   | 233   |
|                     | FF/ENG | 5130                   | 5090 | 5030  | 5040  | 5180  | 5360  | 5950  |
| 180                 | %N1    | 62.2                   | 64.8 | 68.9  | 73.2  | 77.9  | 83.0  | 88.0  |
|                     | KIAS   | 206                    | 206  | 206   | 206   | 206   | 206   | 208   |
|                     | FF/ENG | 4670                   | 4620 | 4560  | 4560  | 4640  | 4780  | 5000  |
| 160                 | %N1    | 59.5                   | 62.1 | 65.9  | 70.3  | 74.7  | 79.8  | 84.5  |
|                     | KIAS   | 199                    | 199  | 199   | 199   | 199   | 199   | 199   |
|                     | FF/ENG | 4230                   | 4170 | 4110  | 4100  | 4150  | 4230  | 4360  |

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



**ENGINE INOP**

**ADVISORY INFORMATION**

**Gear Down Landing Rate of Climb Available  
Flaps 20**

| TAT<br>(°C) | RATE OF CLIMB (FT/MIN) |     |      |      |      |      |
|-------------|------------------------|-----|------|------|------|------|
|             | PRESSURE ALTITUDE (FT) |     |      |      |      |      |
|             | -2000                  | 0   | 2000 | 4000 | 6000 | 8000 |
| 52          | 450                    | 340 |      |      |      |      |
| 50          | 500                    | 390 | 230  |      |      |      |
| 48          | 550                    | 440 | 290  |      |      |      |
| 46          | 590                    | 490 | 340  | 180  |      |      |
| 44          | 640                    | 550 | 390  | 230  |      |      |
| 42          | 690                    | 590 | 430  | 270  | 110  |      |
| 40          | 730                    | 640 | 480  | 310  | 140  |      |
| 38          | 760                    | 690 | 530  | 350  | 170  |      |
| 36          | 760                    | 730 | 560  | 390  | 200  | -10  |
| 34          | 760                    | 780 | 600  | 420  | 230  | 20   |
| 32          | 770                    | 780 | 630  | 460  | 260  | 50   |
| 30          | 770                    | 790 | 660  | 480  | 300  | 70   |
| 20          | 790                    | 800 | 670  | 530  | 370  | 190  |
| 10          | 810                    | 820 | 620  | 440  | 280  | 140  |
| 0           | 830                    | 830 | 610  | 380  | 150  | -90  |
| -20         | 860                    | 870 | 630  | 390  | 150  | -90  |
| -40         | 900                    | 900 | 660  | 410  | 160  | -100 |

Rate of climb capability shown is valid for 225000 kg, gear down at VREF20 + 5.  
Decrease rate of climb 40 ft/min per 5000 kg greater than 225000 kg.  
Increase rate of climb 50 ft/min per 5000 kg less than 225000 kg.

**Flaps 25**

| TAT<br>(°C) | RATE OF CLIMB (FT/MIN) |     |      |      |      |      |
|-------------|------------------------|-----|------|------|------|------|
|             | PRESSURE ALTITUDE (FT) |     |      |      |      |      |
|             | -2000                  | 0   | 2000 | 4000 | 6000 | 8000 |
| 52          | 100                    | -10 |      |      |      |      |
| 50          | 150                    | 40  | -120 |      |      |      |
| 48          | 190                    | 80  | -70  |      |      |      |
| 46          | 230                    | 130 | -20  | -170 |      |      |
| 44          | 280                    | 180 | 30   | -130 |      |      |
| 42          | 320                    | 230 | 70   | -90  | -250 |      |
| 40          | 360                    | 270 | 110  | -50  | -220 |      |
| 38          | 390                    | 320 | 150  | -20  | -200 | -400 |
| 36          | 390                    | 360 | 190  | 10   | -170 | -370 |
| 34          | 390                    | 390 | 220  | 50   | -140 | -340 |
| 32          | 400                    | 410 | 250  | 80   | -110 | -320 |
| 30          | 400                    | 410 | 280  | 100  | -80  | -300 |
| 20          | 410                    | 420 | 290  | 140  | -10  | -190 |
| 10          | 420                    | 430 | 280  | 0    | -180 | -340 |
| 0           | 430                    | 440 | 220  | -10  | -230 | -470 |
| -20         | 450                    | 450 | 230  | -10  | -240 | -480 |
| -40         | 470                    | 470 | 230  | -10  | -250 | -500 |

Rate of climb capability shown is valid for 225000 kg, gear down at VREF25 + 5.  
Decrease rate of climb 40 ft/min per 5000 kg greater than 225000 kg.  
Increase rate of climb 50 ft/min per 5000 kg less than 225000 kg.



ENGINE INOP

ADVISORY INFORMATION

Gear Down Landing Rate of Climb Available  
Flaps 30

| TAT<br>(°C) | RATE OF CLIMB (FT/MIN) |      |      |      |      |      |
|-------------|------------------------|------|------|------|------|------|
|             | PRESSURE ALTITUDE (FT) |      |      |      |      |      |
|             | -2000                  | 0    | 2000 | 4000 | 6000 | 8000 |
| 52          | -120                   | -230 |      |      |      |      |
| 50          | -80                    | -190 | -340 |      |      |      |
| 48          | -40                    | -140 | -300 |      |      |      |
| 46          | 10                     | -100 | -250 | -400 |      |      |
| 44          | 50                     | -50  | -200 | -360 |      |      |
| 42          | 90                     | -10  | -160 | -320 | -480 |      |
| 40          | 120                    | 40   | -130 | -290 | -450 |      |
| 38          | 160                    | 80   | -90  | -260 | -430 |      |
| 36          | 160                    | 120  | -50  | -230 | -400 | -600 |
| 34          | 160                    | 150  | -20  | -190 | -380 | -580 |
| 32          | 160                    | 170  | 10   | -160 | -350 | -560 |
| 30          | 160                    | 170  | 30   | -140 | -320 | -530 |
| 20          | 170                    | 170  | 40   | -100 | -250 | -440 |
| 10          | 180                    | 180  | 20   | -130 | -280 | -640 |
| 0           | 180                    | 180  | -30  | -250 | -480 | -710 |
| -20         | 190                    | 190  | -40  | -260 | -490 | -730 |
| -40         | 200                    | 190  | -40  | -280 | -510 | -760 |

Rate of climb capability shown is valid for 225000 kg, gear down at VREF30 + 5.  
Decrease rate of climb 40 ft/min per 5000 kg greater than 225000 kg.  
Increase rate of climb 50 ft/min per 5000 kg less than 225000 kg.



## Performance Inflight - QRH

## Chapter PI-QRH

## Gear Down

## Section 33

## GEAR DOWN

## 220 KIAS Max Climb %N1

| TAT<br>(°C) | PRESSURE ALTITUDE (1000 FT) |      |      |      |      |       |       |       |       |       |       |       |       |       |       |
|-------------|-----------------------------|------|------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|             | 0                           | 5    | 10   | 12   | 14   | 16    | 18    | 20    | 22    | 24    | 26    | 28    | 30    | 32    | 34    |
| 55          | 88.2                        | 88.3 | 91.4 | 91.1 | 92.1 | 91.3  | 94.0  | 95.2  | 95.4  | 98.1  | 99.9  | 101.1 | 102.4 | 102.9 | 103.4 |
| 50          | 89.5                        | 88.8 | 90.7 | 90.4 | 91.4 | 92.1  | 93.3  | 94.5  | 94.7  | 97.3  | 99.2  | 100.3 | 101.6 | 102.1 | 102.6 |
| 45          | 90.5                        | 90.1 | 90.0 | 89.7 | 90.7 | 91.4  | 92.6  | 93.8  | 93.9  | 96.6  | 98.4  | 99.6  | 100.8 | 101.3 | 101.8 |
| 40          | 91.6                        | 91.2 | 91.2 | 89.7 | 89.9 | 90.7  | 91.9  | 93.0  | 93.2  | 95.8  | 97.6  | 98.8  | 100.0 | 100.5 | 101.0 |
| 35          | 92.6                        | 92.3 | 92.2 | 92.1 | 90.6 | 89.9  | 91.1  | 92.3  | 92.5  | 95.0  | 96.8  | 98.0  | 99.2  | 99.7  | 100.2 |
| 30          | 93.0                        | 93.2 | 93.2 | 93.0 | 92.2 | 91.2  | 90.9  | 91.5  | 91.7  | 94.3  | 96.0  | 97.2  | 98.4  | 98.9  | 99.4  |
| 25          | 92.2                        | 94.2 | 94.1 | 94.0 | 93.7 | 92.8  | 92.1  | 92.0  | 91.1  | 93.5  | 95.2  | 96.4  | 97.6  | 98.0  | 98.5  |
| 20          | 91.4                        | 94.2 | 95.1 | 95.0 | 94.9 | 94.4  | 93.4  | 93.0  | 92.8  | 93.6  | 94.4  | 95.6  | 96.8  | 97.2  | 97.7  |
| 15          | 90.7                        | 93.4 | 96.7 | 96.4 | 96.3 | 96.1  | 94.8  | 94.1  | 94.5  | 94.8  | 95.2  | 95.3  | 96.0  | 96.4  | 96.9  |
| 10          | 89.9                        | 92.6 | 96.3 | 97.9 | 98.1 | 98.1  | 96.8  | 95.5  | 96.5  | 96.2  | 96.4  | 96.4  | 96.6  | 96.1  | 96.0  |
| 5           | 89.1                        | 91.7 | 95.4 | 97.1 | 98.9 | 100.3 | 99.0  | 97.9  | 98.2  | 97.8  | 97.8  | 97.9  | 97.9  | 97.3  | 96.8  |
| 0           | 88.3                        | 90.9 | 94.6 | 96.2 | 98.0 | 100.1 | 100.8 | 100.3 | 100.1 | 99.7  | 99.4  | 99.4  | 99.5  | 98.6  | 98.1  |
| -5          | 87.4                        | 90.1 | 93.7 | 95.3 | 97.1 | 99.1  | 99.9  | 100.8 | 101.9 | 101.5 | 101.1 | 101.1 | 101.1 | 100.2 | 99.6  |
| -10         | 86.6                        | 89.2 | 92.8 | 94.4 | 96.1 | 98.2  | 98.9  | 99.8  | 101.4 | 102.8 | 102.6 | 102.6 | 103.0 | 101.6 | 100.8 |
| -15         | 85.8                        | 88.4 | 91.9 | 93.5 | 95.2 | 97.3  | 98.0  | 98.9  | 100.4 | 101.8 | 102.5 | 103.2 | 103.8 | 102.5 | 101.4 |
| -20         | 85.0                        | 87.5 | 91.1 | 92.6 | 94.3 | 96.3  | 97.0  | 97.9  | 99.4  | 100.8 | 101.5 | 102.2 | 103.3 | 102.4 | 101.3 |

## %N1 Adjustments for Engine Bleed

| BLEED CONFIGURATION              | PRESSURE ALTITUDE (1000 FT) |      |      |      |      |      |      |      |
|----------------------------------|-----------------------------|------|------|------|------|------|------|------|
|                                  | 0                           | 5    | 10   | 15   | 20   | 25   | 30   | 35   |
| 2 PACKS ON - 1 BLEED SOURCE      | -0.4                        | -0.5 | -0.4 | -0.3 | -0.2 | -0.3 | -0.3 | -0.4 |
| 1 PACK ON - 1 OR 2 BLEED SOURCES | -0.4                        | -0.5 | -0.4 | -0.3 | -0.2 | -0.3 | -0.3 | -0.4 |
| ENGINE ANTI-ICE ON               | -0.3                        | -0.5 | -0.4 | -0.3 | -0.1 | -0.2 | -0.2 | -0.2 |
| ENGINE & WING ANTI-ICE ON*       | -0.6                        | -0.8 | -0.7 | -0.5 | -0.2 | -0.3 | -0.3 | -0.4 |
| ENGINE & WING ANTI-ICE ON**      | -1.1                        | -0.9 | -0.9 | -0.6 | -0.3 | -0.4 | -0.5 | -0.5 |

\*Packs on or off with 2 bleed sources.

\*\*Packs off with 1 bleed source.

## GEAR DOWN

## Long Range Cruise Altitude Capability

**Max Climb Thrust, 300 ft/min residual rate of climb**

| WEIGHT<br>(1000 KG) | PRESSURE ALTITUDE (FT) |            |            |
|---------------------|------------------------|------------|------------|
|                     | ISA + 10°C<br>& BELOW  | ISA + 15°C | ISA + 20°C |
| 360                 | 18200                  | 16100      | 13700      |
| 350                 | 18800                  | 16900      | 14400      |
| 340                 | 19400                  | 17600      | 15100      |
| 330                 | 20000                  | 18200      | 15800      |
| 320                 | 20700                  | 19100      | 16800      |
| 310                 | 21800                  | 20300      | 18000      |
| 300                 | 22800                  | 21400      | 19300      |
| 290                 | 24000                  | 22500      | 20600      |
| 280                 | 25100                  | 23700      | 22000      |
| 270                 | 26200                  | 24800      | 23300      |
| 260                 | 27300                  | 26100      | 24600      |
| 250                 | 28500                  | 27500      | 26000      |
| 240                 | 29700                  | 28900      | 27400      |
| 230                 | 30600                  | 30200      | 28900      |
| 220                 | 31400                  | 31100      | 30300      |
| 210                 | 32300                  | 32000      | 31400      |
| 200                 | 33200                  | 33000      | 32500      |
| 190                 | 34100                  | 34000      | 33700      |
| 180                 | 35000                  | 34900      | 34800      |
| 170                 | 36000                  | 36000      | 35800      |
| 160                 | 37000                  | 37000      | 36800      |

# GEAR DOWN

## Long Range Cruise Control

| WEIGHT<br>(1000 KG) |        | PRESSURE ALTITUDE (1000 FT) |      |      |      |      |      |      |      |      |      |
|---------------------|--------|-----------------------------|------|------|------|------|------|------|------|------|------|
|                     |        | 10                          | 15   | 17   | 19   | 21   | 23   | 25   | 27   | 29   | 31   |
| 360                 | %N1    | 84.7                        | 89.1 | 91.1 | 93.6 |      |      |      |      |      |      |
|                     | MACH   | .488                        | .535 | .556 | .578 |      |      |      |      |      |      |
|                     | KIAS   | 270                         | 270  | 270  | 270  |      |      |      |      |      |      |
|                     | FF/ENG | 7616                        | 7771 | 7912 | 8126 |      |      |      |      |      |      |
| 340                 | %N1    | 83.8                        | 88.1 | 90.0 | 92.2 |      |      |      |      |      |      |
|                     | MACH   | .488                        | .535 | .556 | .578 |      |      |      |      |      |      |
|                     | KIAS   | 270                         | 270  | 270  | 270  |      |      |      |      |      |      |
|                     | FF/ENG | 7360                        | 7485 | 7589 | 7762 |      |      |      |      |      |      |
| 320                 | %N1    | 82.6                        | 86.9 | 88.8 | 90.8 | 93.3 |      |      |      |      |      |
|                     | MACH   | .483                        | .531 | .552 | .574 | .597 |      |      |      |      |      |
|                     | KIAS   | 267                         | 268  | 268  | 268  | 269  |      |      |      |      |      |
|                     | FF/ENG | 7053                        | 7156 | 7240 | 7378 | 7571 |      |      |      |      |      |
| 300                 | %N1    | 80.5                        | 84.9 | 87.0 | 88.8 | 90.8 | 93.8 |      |      |      |      |
|                     | MACH   | .468                        | .514 | .535 | .556 | .579 | .603 |      |      |      |      |
|                     | KIAS   | 259                         | 259  | 259  | 260  | 260  | 260  |      |      |      |      |
|                     | FF/ENG | 6575                        | 6634 | 6706 | 6789 | 6934 | 7132 |      |      |      |      |
| 280                 | %N1    | 78.4                        | 82.9 | 85.0 | 86.8 | 88.6 | 90.7 | 94.0 |      |      |      |
|                     | MACH   | .453                        | .498 | .517 | .538 | .560 | .584 | .609 |      |      |      |
|                     | KIAS   | 250                         | 251  | 251  | 251  | 251  | 252  | 252  |      |      |      |
|                     | FF/ENG | 6101                        | 6136 | 6179 | 6258 | 6335 | 6478 | 6688 |      |      |      |
| 260                 | %N1    | 76.2                        | 80.7 | 82.7 | 84.7 | 86.4 | 88.3 | 90.4 | 94.0 |      |      |
|                     | MACH   | .437                        | .481 | .500 | .520 | .541 | .563 | .587 | .613 |      |      |
|                     | KIAS   | 242                         | 242  | 242  | 242  | 242  | 242  | 243  | 243  |      |      |
|                     | FF/ENG | 5630                        | 5659 | 5680 | 5728 | 5802 | 5878 | 6014 | 6228 |      |      |
| 240                 | %N1    | 73.8                        | 78.3 | 80.3 | 82.3 | 84.2 | 85.9 | 87.8 | 90.0 | 93.8 |      |
|                     | MACH   | .421                        | .463 | .481 | .500 | .520 | .542 | .565 | .589 | .615 |      |
|                     | KIAS   | 233                         | 232  | 233  | 233  | 233  | 233  | 233  | 234  | 234  |      |
|                     | FF/ENG | 5171                        | 5184 | 5206 | 5227 | 5275 | 5340 | 5416 | 5541 | 5751 |      |
| 220                 | %N1    | 71.4                        | 75.8 | 77.7 | 79.7 | 81.6 | 83.5 | 85.3 | 87.1 | 89.4 | 93.4 |
|                     | MACH   | .404                        | .444 | .461 | .480 | .499 | .520 | .542 | .565 | .590 | .617 |
|                     | KIAS   | 223                         | 223  | 223  | 223  | 223  | 223  | 223  | 224  | 224  | 225  |
|                     | FF/ENG | 4720                        | 4715 | 4736 | 4756 | 4775 | 4819 | 4878 | 4949 | 5062 | 5264 |
| 200                 | %N1    | 68.7                        | 73.1 | 75.0 | 76.9 | 78.9 | 80.8 | 82.7 | 84.4 | 86.3 | 88.6 |
|                     | MACH   | .387                        | .425 | .442 | .460 | .479 | .498 | .519 | .541 | .564 | .589 |
|                     | KIAS   | 213                         | 213  | 213  | 213  | 213  | 213  | 213  | 213  | 213  | 214  |
|                     | FF/ENG | 4284                        | 4281 | 4290 | 4310 | 4323 | 4339 | 4375 | 4426 | 4480 | 4578 |
| 180                 | %N1    | 66.3                        | 70.8 | 72.6 | 74.5 | 76.5 | 78.5 | 80.2 | 82.2 | 83.9 | 85.7 |
|                     | MACH   | .374                        | .412 | .428 | .445 | .463 | .482 | .503 | .524 | .546 | .570 |
|                     | KIAS   | 206                         | 206  | 206  | 206  | 206  | 206  | 206  | 206  | 206  | 206  |
|                     | FF/ENG | 3937                        | 3935 | 3933 | 3945 | 3959 | 3969 | 3984 | 4021 | 4066 | 4112 |
| 160                 | %N1    | 64.0                        | 68.2 | 70.1 | 71.9 | 74.0 | 75.9 | 77.7 | 79.5 | 81.4 | 83.1 |
|                     | MACH   | .361                        | .397 | .413 | .429 | .447 | .465 | .485 | .505 | .527 | .550 |
|                     | KIAS   | 199                         | 199  | 199  | 199  | 199  | 199  | 199  | 199  | 199  | 199  |
|                     | FF/ENG | 3592                        | 3585 | 3584 | 3585 | 3591 | 3602 | 3612 | 3628 | 3663 | 3702 |

**GEAR DOWN**

**Long Range Cruise Enroute Fuel and Time  
Ground to Air Miles Conversion**

| AIR DISTANCE (NM)        |      |      |      |      | GROUND<br>DISTANCE<br>(NM) | AIR DISTANCE (NM)        |      |      |      |      |
|--------------------------|------|------|------|------|----------------------------|--------------------------|------|------|------|------|
| HEADWIND COMPONENT (KTS) |      |      |      |      |                            | TAILWIND COMPONENT (KTS) |      |      |      |      |
| 100                      | 80   | 60   | 40   | 20   |                            | 20                       | 40   | 60   | 80   | 100  |
| 316                      | 284  | 257  | 235  | 216  | 200                        | 189                      | 180  | 171  | 162  | 155  |
| 634                      | 570  | 515  | 470  | 433  | 400                        | 379                      | 359  | 341  | 326  | 312  |
| 956                      | 859  | 774  | 706  | 650  | 600                        | 568                      | 539  | 512  | 489  | 468  |
| 1282                     | 1149 | 1035 | 943  | 867  | 800                        | 757                      | 718  | 683  | 651  | 623  |
| 1610                     | 1442 | 1297 | 1180 | 1084 | 1000                       | 947                      | 898  | 853  | 813  | 778  |
| 1942                     | 1737 | 1560 | 1419 | 1302 | 1200                       | 1136                     | 1077 | 1024 | 976  | 933  |
| 2276                     | 2034 | 1825 | 1658 | 1520 | 1400                       | 1325                     | 1256 | 1193 | 1137 | 1087 |
| 2614                     | 2333 | 2091 | 1898 | 1739 | 1600                       | 1514                     | 1434 | 1362 | 1298 | 1241 |
| 2954                     | 2634 | 2358 | 2138 | 1958 | 1800                       | 1702                     | 1613 | 1531 | 1459 | 1394 |
| 3297                     | 2936 | 2626 | 2379 | 2176 | 2000                       | 1891                     | 1791 | 1701 | 1619 | 1547 |
| 3642                     | 3240 | 2894 | 2620 | 2396 | 2200                       | 2080                     | 1969 | 1869 | 1780 | 1700 |
| 3991                     | 3546 | 3164 | 2862 | 2615 | 2400                       | 2268                     | 2147 | 2037 | 1939 | 1852 |
| 4342                     | 3853 | 3435 | 3104 | 2835 | 2600                       | 2456                     | 2324 | 2205 | 2098 | 2004 |
| 4697                     | 4164 | 3707 | 3347 | 3055 | 2800                       | 2644                     | 2502 | 2373 | 2258 | 2156 |
| 5054                     | 4476 | 3981 | 3591 | 3275 | 3000                       | 2832                     | 2679 | 2541 | 2416 | 2307 |
| 5414                     | 4789 | 4255 | 3836 | 3495 | 3200                       | 3020                     | 2856 | 2708 | 2575 | 2458 |
| 5778                     | 5105 | 4531 | 4081 | 3716 | 3400                       | 3208                     | 3033 | 2875 | 2734 | 2609 |
| 6146                     | 5424 | 4808 | 4326 | 3937 | 3600                       | 3396                     | 3210 | 3041 | 2891 | 2759 |
| 6516                     | 5744 | 5086 | 4572 | 4159 | 3800                       | 3584                     | 3386 | 3208 | 3049 | 2909 |
| 6889                     | 6066 | 5365 | 4819 | 4380 | 4000                       | 3772                     | 3564 | 3375 | 3207 | 3059 |

**Reference Fuel and Time Required at Check Point**

| AIR<br>DIST<br>(NM) | PRESSURE ALTITUDE (1000 FT) |                  |                   |                  |                   |                  |                   |                  |                   |                  |
|---------------------|-----------------------------|------------------|-------------------|------------------|-------------------|------------------|-------------------|------------------|-------------------|------------------|
|                     | 10                          |                  | 14                |                  | 20                |                  | 24                |                  | 28                |                  |
|                     | FUEL<br>(1000 KG)           | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) |
| 200                 | 7.4                         | 0:47             | 6.7               | 0:45             | 5.9               | 0:42             | 5.5               | 0:40             | 5.2               | 0:39             |
| 400                 | 15.0                        | 1:32             | 13.9              | 1:27             | 12.6              | 1:21             | 11.9              | 1:16             | 11.5              | 1:12             |
| 600                 | 22.6                        | 2:17             | 21.1              | 2:10             | 19.3              | 1:59             | 18.3              | 1:52             | 17.7              | 1:46             |
| 800                 | 29.9                        | 3:04             | 28.1              | 2:53             | 25.7              | 2:39             | 24.5              | 2:29             | 23.7              | 2:20             |
| 1000                | 37.3                        | 3:50             | 35.0              | 3:37             | 32.1              | 3:18             | 30.6              | 3:06             | 29.7              | 2:55             |
| 1200                | 44.3                        | 4:38             | 41.7              | 4:22             | 38.3              | 3:59             | 36.6              | 3:44             | 35.4              | 3:30             |
| 1400                | 51.4                        | 5:27             | 48.4              | 5:07             | 44.5              | 4:40             | 42.5              | 4:22             | 41.2              | 4:06             |
| 1600                | 58.2                        | 6:16             | 54.8              | 5:53             | 50.5              | 5:21             | 48.2              | 5:01             | 46.7              | 4:42             |
| 1800                | 65.0                        | 7:05             | 61.3              | 6:39             | 56.5              | 6:03             | 53.9              | 5:40             | 52.2              | 5:19             |
| 2000                | 71.6                        | 7:55             | 67.5              | 7:26             | 62.3              | 6:46             | 59.5              | 6:20             | 57.5              | 5:56             |
| 2200                | 78.1                        | 8:46             | 73.8              | 8:14             | 68.1              | 7:28             | 65.0              | 7:00             | 62.8              | 6:33             |
| 2400                | 84.5                        | 9:37             | 79.8              | 9:02             | 73.8              | 8:11             | 70.3              | 7:40             | 68.0              | 7:10             |
| 2600                | 90.8                        | 10:29            | 85.9              | 9:50             | 79.4              | 8:55             | 75.7              | 8:20             | 73.1              | 7:48             |
| 2800                | 97.0                        | 11:22            | 91.7              | 10:39            | 84.8              | 9:39             | 80.9              | 9:02             | 78.1              | 8:26             |
| 3000                | 103.1                       | 12:15            | 97.5              | 11:28            | 90.2              | 10:23            | 86.1              | 9:43             | 83.0              | 9:05             |
| 3200                | 109.0                       | 13:09            | 103.2             | 12:18            | 95.5              | 11:08            | 91.1              | 10:25            | 87.8              | 9:44             |
| 3400                | 114.9                       | 14:03            | 108.8             | 13:09            | 100.8             | 11:53            | 96.1              | 11:07            | 92.7              | 10:23            |
| 3600                | 120.6                       | 14:58            | 114.3             | 14:00            | 105.9             | 12:39            | 101.0             | 11:49            | 97.3              | 11:02            |
| 3800                | 126.4                       | 15:53            | 119.7             | 14:51            | 111.0             | 13:25            | 105.8             | 12:32            | 102.0             | 11:42            |
| 4000                | 132.0                       | 16:50            | 125.0             | 15:44            | 115.9             | 14:12            | 110.6             | 13:15            | 106.5             | 12:22            |

## GEAR DOWN

### Long Range Cruise Enroute Fuel and Time

#### Fuel Required Adjustment (1000 KG)

| REFERENCE FUEL REQUIRED<br>(1000 KG) | WEIGHT AT CHECK POINT (1000 KG) |       |       |      |     |     |      |      |      |      |
|--------------------------------------|---------------------------------|-------|-------|------|-----|-----|------|------|------|------|
|                                      | 170                             | 190   | 210   | 230  | 250 | 270 | 290  | 310  | 330  | 350  |
| 10                                   | -1.7                            | -1.3  | -0.9  | -0.4 | 0.0 | 1.0 | 2.0  | 3.1  | 4.2  | 5.5  |
| 20                                   | -3.6                            | -2.7  | -1.8  | -0.9 | 0.0 | 1.7 | 3.7  | 5.8  | 8.1  | 10.7 |
| 30                                   | -5.5                            | -4.1  | -2.8  | -1.4 | 0.0 | 2.5 | 5.3  | 8.4  | 11.8 | 15.5 |
| 40                                   | -7.3                            | -5.5  | -3.7  | -1.8 | 0.0 | 3.2 | 6.7  | 10.7 | 15.1 | 19.9 |
| 50                                   | -9.1                            | -6.9  | -4.6  | -2.3 | 0.0 | 3.8 | 8.1  | 12.9 | 18.2 | 24.0 |
| 60                                   | -10.8                           | -8.2  | -5.5  | -2.8 | 0.0 | 4.4 | 9.4  | 14.9 | 21.0 | 27.6 |
| 70                                   | -12.5                           | -9.5  | -6.4  | -3.2 | 0.0 | 5.0 | 10.5 | 16.7 | 23.5 | 30.9 |
| 80                                   | -14.2                           | -10.8 | -7.3  | -3.7 | 0.0 | 5.5 | 11.6 | 18.3 | 25.7 | 33.7 |
| 90                                   | -15.9                           | -12.1 | -8.1  | -4.1 | 0.0 | 5.9 | 12.5 | 19.7 | 27.6 | 36.2 |
| 100                                  | -17.5                           | -13.3 | -9.0  | -4.5 | 0.0 | 6.3 | 13.3 | 21.0 | 29.3 | 38.3 |
| 110                                  | -19.1                           | -14.6 | -9.8  | -4.9 | 0.0 | 6.7 | 14.0 | 22.0 | 30.7 | 40.0 |
| 120                                  | -20.6                           | -15.8 | -10.7 | -5.4 | 0.0 | 7.0 | 14.6 | 22.9 | 31.8 | 41.4 |
| 130                                  | -22.1                           | -16.9 | -11.5 | -5.8 | 0.0 | 7.2 | 15.1 | 23.5 | 32.6 | 42.3 |
| 140                                  | -23.5                           | -18.1 | -12.3 | -6.2 | 0.0 | 7.4 | 15.5 | 24.0 | 33.2 | 42.9 |

Based on Long Range Cruise and VREF30+80 descent.

#### Descent at VREF30+80

| PRESSURE ALTITUDE<br>(1000 FT) | 17 | 19 | 21 | 23 | 25 | 27 | 29 | 31 | 33 | 35 |
|--------------------------------|----|----|----|----|----|----|----|----|----|----|
| DISTANCE (NM)                  | 35 | 39 | 43 | 48 | 52 | 56 | 60 | 64 | 69 | 73 |
| TIME (MINUTES)                 | 11 | 12 | 12 | 13 | 14 | 15 | 15 | 16 | 17 | 17 |

**GEAR DOWN**

**Holding  
Flaps Up**

| WEIGHT<br>(1000 KG) |        | PRESSURE ALTITUDE (FT) |      |       |       |       |       |       |
|---------------------|--------|------------------------|------|-------|-------|-------|-------|-------|
|                     |        | 1500                   | 5000 | 10000 | 15000 | 20000 | 25000 | 30000 |
| 360                 | %N1    | 76.2                   |      |       |       |       |       |       |
|                     | KIAS   | 262                    |      |       |       |       |       |       |
|                     | FF/ENG | 7790                   |      |       |       |       |       |       |
| 340                 | %N1    | 75.0                   | 78.1 |       |       |       |       |       |
|                     | KIAS   | 260                    | 260  |       |       |       |       |       |
|                     | FF/ENG | 7470                   | 7470 |       |       |       |       |       |
| 320                 | %N1    | 73.3                   | 76.3 |       |       |       |       |       |
|                     | KIAS   | 253                    | 253  |       |       |       |       |       |
|                     | FF/ENG | 7010                   | 7000 |       |       |       |       |       |
| 300                 | %N1    | 71.2                   | 74.3 | 78.7  |       |       |       |       |
|                     | KIAS   | 244                    | 244  | 244   |       |       |       |       |
|                     | FF/ENG | 6510                   | 6490 | 6470  |       |       |       |       |
| 280                 | %N1    | 69.2                   | 72.5 | 76.8  |       |       |       |       |
|                     | KIAS   | 238                    | 238  | 238   |       |       |       |       |
|                     | FF/ENG | 6080                   | 6070 | 6040  |       |       |       |       |
| 260                 | %N1    | 67.4                   | 70.5 | 74.9  | 79.5  |       |       |       |
|                     | KIAS   | 232                    | 232  | 232   | 232   |       |       |       |
|                     | FF/ENG | 5680                   | 5680 | 5640  | 5670  |       |       |       |
| 240                 | %N1    | 65.6                   | 68.5 | 72.9  | 77.5  | 82.4  |       |       |
|                     | KIAS   | 226                    | 226  | 226   | 226   | 226   |       |       |
|                     | FF/ENG | 5300                   | 5290 | 5250  | 5270  | 5320  |       |       |
| 220                 | %N1    | 63.8                   | 66.5 | 71.0  | 75.4  | 80.3  |       |       |
|                     | KIAS   | 220                    | 220  | 220   | 220   | 220   |       |       |
|                     | FF/ENG | 4940                   | 4920 | 4880  | 4880  | 4930  |       |       |
| 200                 | %N1    | 61.8                   | 64.5 | 68.7  | 73.1  | 77.9  | 82.7  |       |
|                     | KIAS   | 213                    | 213  | 213   | 213   | 213   | 213   |       |
|                     | FF/ENG | 4580                   | 4540 | 4500  | 4500  | 4530  | 4590  |       |
| 180                 | %N1    | 59.6                   | 62.4 | 66.3  | 70.8  | 75.4  | 80.2  | 84.8  |
|                     | KIAS   | 206                    | 206  | 206   | 206   | 206   | 206   | 206   |
|                     | FF/ENG | 4230                   | 4190 | 4130  | 4130  | 4150  | 4180  | 4290  |
| 160                 | %N1    | 57.3                   | 60.0 | 64.0  | 68.2  | 72.8  | 77.7  | 82.3  |
|                     | KIAS   | 199                    | 199  | 199   | 199   | 199   | 199   | 199   |
|                     | FF/ENG | 3880                   | 3830 | 3770  | 3760  | 3770  | 3790  | 3870  |

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



# GEAR DOWN

## Holding

### Flaps 1

| WEIGHT<br>(1000 KG) |        | PRESSURE ALTITUDE (FT) |      |       |       |       |
|---------------------|--------|------------------------|------|-------|-------|-------|
|                     |        | 1500                   | 5000 | 10000 | 15000 | 20000 |
| 360                 | %N1    | 75.9                   | 78.9 | 83.8  | 88.3  | 94.3  |
|                     | KIAS   | 242                    | 242  | 242   | 242   | 242   |
|                     | FF/ENG | 7650                   | 7690 | 7680  | 7800  | 8180  |
| 340                 | %N1    | 74.5                   | 77.6 | 82.2  | 86.9  | 92.0  |
|                     | KIAS   | 240                    | 240  | 240   | 240   | 240   |
|                     | FF/ENG | 7290                   | 7310 | 7300  | 7400  | 7690  |
| 320                 | %N1    | 72.7                   | 75.7 | 80.2  | 85.1  | 89.9  |
|                     | KIAS   | 233                    | 233  | 233   | 233   | 233   |
|                     | FF/ENG | 6820                   | 6820 | 6820  | 6880  | 7100  |
| 300                 | %N1    | 70.5                   | 73.6 | 78.0  | 83.0  | 87.8  |
|                     | KIAS   | 224                    | 224  | 224   | 224   | 224   |
|                     | FF/ENG | 6310                   | 6310 | 6300  | 6360  | 6490  |
| 280                 | %N1    | 68.4                   | 71.6 | 76.0  | 80.8  | 85.7  |
|                     | KIAS   | 218                    | 218  | 218   | 218   | 218   |
|                     | FF/ENG | 5870                   | 5870 | 5850  | 5910  | 6010  |
| 260                 | %N1    | 66.4                   | 69.5 | 73.9  | 78.6  | 83.7  |
|                     | KIAS   | 212                    | 212  | 212   | 212   | 212   |
|                     | FF/ENG | 5470                   | 5460 | 5430  | 5480  | 5550  |
| 240                 | %N1    | 64.5                   | 67.3 | 71.8  | 76.3  | 81.4  |
|                     | KIAS   | 206                    | 206  | 206   | 206   | 206   |
|                     | FF/ENG | 5070                   | 5050 | 5020  | 5060  | 5110  |
| 220                 | %N1    | 62.5                   | 65.2 | 69.6  | 74.0  | 79.0  |
|                     | KIAS   | 200                    | 200  | 200   | 200   | 200   |
|                     | FF/ENG | 4690                   | 4660 | 4620  | 4640  | 4690  |
| 200                 | %N1    | 60.2                   | 62.9 | 67.0  | 71.5  | 76.2  |
|                     | KIAS   | 193                    | 193  | 193   | 193   | 193   |
|                     | FF/ENG | 4310                   | 4260 | 4220  | 4230  | 4270  |
| 180                 | %N1    | 57.7                   | 60.5 | 64.4  | 68.9  | 73.5  |
|                     | KIAS   | 186                    | 186  | 186   | 186   | 186   |
|                     | FF/ENG | 3940                   | 3890 | 3830  | 3830  | 3860  |
| 160                 | %N1    | 55.2                   | 57.8 | 61.8  | 65.9  | 70.5  |
|                     | KIAS   | 179                    | 179  | 179   | 179   | 179   |
|                     | FF/ENG | 3580                   | 3520 | 3460  | 3430  | 3460  |

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

Intentionally  
Blank



Performance Inflight - QRH

Chapter PI-QRH

Gear Down, Engine INOP

Section 34

GEAR DOWN

ENGINE INOP

MAX CONTINUOUS THRUST

Driftdown Speed/Level Off Altitude

100 ft/min residual rate of climb

Includes APU fuel burn

| WEIGHT (1000 KG)       |              | VREF30 + 80<br>DRIFTDOWN<br>SPEED<br>(KIAS) | LEVEL OFF ALTITUDE (FT) |            |            |
|------------------------|--------------|---------------------------------------------|-------------------------|------------|------------|
| START<br>DRIFT<br>DOWN | LEVEL<br>OFF |                                             | ISA + 10°C<br>& BELOW   | ISA + 15°C | ISA + 20°C |
| 320                    | 308          | 254                                         | 5000                    | 3700       | 1300       |
| 300                    | 288          | 246                                         | 7100                    | 6100       | 4500       |
| 280                    | 269          | 238                                         | 9200                    | 8500       | 7400       |
| 260                    | 249          | 231                                         | 11200                   | 10500      | 9400       |
| 240                    | 230          | 225                                         | 13200                   | 12600      | 11500      |
| 220                    | 211          | 219                                         | 15200                   | 14800      | 13700      |
| 200                    | 192          | 213                                         | 17500                   | 16900      | 15900      |
| 180                    | 173          | 206                                         | 19900                   | 19700      | 18600      |
| 160                    | 154          | 198                                         | 22300                   | 21700      | 20900      |



**GEAR DOWN**

**ENGINE INOP**

**MAX CONTINUOUS THRUST**

**Long Range Cruise Altitude Capability**

**100 ft/min residual rate of climb**

| WEIGHT<br>(1000 KG) | PRESSURE ALTITUDE (FT) |            |            |
|---------------------|------------------------|------------|------------|
|                     | ISA + 10°C<br>& BELOW  | ISA + 15°C | ISA + 20°C |
| 340                 | 200                    |            |            |
| 330                 | 1700                   |            |            |
| 320                 | 3200                   | 600        |            |
| 310                 | 4500                   | 2400       |            |
| 300                 | 5500                   | 4200       | 1300       |
| 290                 | 6600                   | 5500       | 3200       |
| 280                 | 7800                   | 6800       | 5000       |
| 270                 | 8900                   | 8200       | 6700       |
| 260                 | 10100                  | 9400       | 8300       |
| 250                 | 11200                  | 10500      | 9400       |
| 240                 | 12300                  | 11600      | 10400      |
| 230                 | 13200                  | 12700      | 11500      |
| 220                 | 14300                  | 13800      | 12600      |
| 210                 | 15400                  | 14900      | 13800      |
| 200                 | 16500                  | 16000      | 15100      |
| 190                 | 17800                  | 17100      | 16200      |
| 180                 | 19000                  | 18700      | 17400      |
| 170                 | 20300                  | 20100      | 19000      |
| 160                 | 21600                  | 21100      | 20400      |



**GEAR DOWN**  
**ENGINE INOP**

**MAX CONTINUOUS THRUST**

**Long Range Cruise Control**

| WEIGHT<br>(1000 KG) |        | PRESSURE ALTITUDE (1000 FT) |       |       |       |       |       |      |      |
|---------------------|--------|-----------------------------|-------|-------|-------|-------|-------|------|------|
|                     |        | 5                           | 7     | 9     | 11    | 13    | 15    | 17   | 19   |
| 300                 | %N1    | 96.0                        | 99.0  |       |       |       |       |      |      |
|                     | MACH   | .413                        | .427  |       |       |       |       |      |      |
|                     | KIAS   | 250                         | 249   |       |       |       |       |      |      |
|                     | FF/ENG | 12977                       | 13257 |       |       |       |       |      |      |
| 280                 | %N1    | 93.5                        | 95.6  | 98.8  |       |       |       |      |      |
|                     | MACH   | .400                        | .414  | .429  |       |       |       |      |      |
|                     | KIAS   | 242                         | 242   | 241   |       |       |       |      |      |
|                     | FF/ENG | 12015                       | 12091 | 12444 |       |       |       |      |      |
| 260                 | %N1    | 91.2                        | 92.9  | 95.0  | 98.4  |       |       |      |      |
|                     | MACH   | .387                        | .400  | .414  | .429  |       |       |      |      |
|                     | KIAS   | 234                         | 234   | 233   | 233   |       |       |      |      |
|                     | FF/ENG | 11137                       | 11108 | 11216 | 11560 |       |       |      |      |
| 240                 | %N1    | 88.9                        | 90.6  | 92.3  | 94.7  | 98.4  |       |      |      |
|                     | MACH   | .374                        | .388  | .402  | .418  | .434  |       |      |      |
|                     | KIAS   | 226                         | 226   | 226   | 226   | 226   |       |      |      |
|                     | FF/ENG | 10249                       | 10257 | 10303 | 10449 | 10806 |       |      |      |
| 220                 | %N1    | 86.7                        | 88.4  | 90.1  | 91.9  | 94.4  | 98.4  |      |      |
|                     | MACH   | .364                        | .378  | .392  | .407  | .422  | .439  |      |      |
|                     | KIAS   | 220                         | 220   | 220   | 220   | 220   | 220   |      |      |
|                     | FF/ENG | 9466                        | 9490  | 9517  | 9591  | 9723  | 10067 |      |      |
| 200                 | %N1    | 84.1                        | 86.0  | 87.7  | 89.5  | 91.4  | 93.9  | 98.1 |      |
|                     | MACH   | .353                        | .366  | .380  | .394  | .409  | .425  | .442 |      |
|                     | KIAS   | 213                         | 213   | 213   | 213   | 213   | 213   | 213  |      |
|                     | FF/ENG | 8676                        | 8685  | 8711  | 8768  | 8843  | 8965  | 9313 |      |
| 180                 | %N1    | 81.3                        | 83.3  | 85.1  | 87.0  | 88.8  | 90.6  | 93.2 | 97.4 |
|                     | MACH   | .341                        | .354  | .367  | .381  | .396  | .412  | .428 | .445 |
|                     | KIAS   | 206                         | 206   | 206   | 206   | 206   | 206   | 206  | 206  |
|                     | FF/ENG | 7917                        | 7917  | 7918  | 7967  | 8039  | 8106  | 8230 | 8570 |
| 160                 | %N1    | 78.4                        | 80.3  | 82.2  | 84.1  | 86.1  | 87.8  | 89.7 | 92.2 |
|                     | MACH   | .329                        | .341  | .354  | .368  | .382  | .397  | .413 | .429 |
|                     | KIAS   | 199                         | 199   | 199   | 199   | 199   | 199   | 199  | 199  |
|                     | FF/ENG | 7154                        | 7160  | 7151  | 7167  | 7230  | 7299  | 7359 | 7481 |

**GEAR DOWN**

**ENGINE INOP**

**MAX CONTINUOUS THRUST**

**Long Range Cruise Diversion Fuel and Time  
Ground to Air Miles Conversion**

| AIR DISTANCE (NM)        |      |      |      |      | GROUND<br>DISTANCE<br>(NM) | AIR DISTANCE (NM)        |     |     |     |     |
|--------------------------|------|------|------|------|----------------------------|--------------------------|-----|-----|-----|-----|
| HEADWIND COMPONENT (KTS) |      |      |      |      |                            | TAILWIND COMPONENT (KTS) |     |     |     |     |
| 100                      | 80   | 60   | 40   | 20   |                            | 20                       | 40  | 60  | 80  | 100 |
| 165                      | 145  | 129  | 117  | 108  | 100                        | 93                       | 87  | 81  | 77  | 73  |
| 332                      | 295  | 263  | 238  | 218  | 200                        | 187                      | 175 | 165 | 156 | 148 |
| 500                      | 444  | 396  | 358  | 327  | 300                        | 281                      | 263 | 247 | 234 | 222 |
| 669                      | 593  | 528  | 477  | 436  | 400                        | 374                      | 350 | 329 | 311 | 295 |
| 839                      | 743  | 662  | 597  | 545  | 500                        | 467                      | 438 | 411 | 388 | 368 |
| 1009                     | 894  | 795  | 718  | 655  | 600                        | 561                      | 525 | 494 | 466 | 442 |
| 1180                     | 1044 | 928  | 838  | 764  | 700                        | 654                      | 612 | 575 | 543 | 515 |
| 1351                     | 1196 | 1063 | 958  | 874  | 800                        | 747                      | 700 | 657 | 620 | 588 |
| 1523                     | 1347 | 1197 | 1079 | 983  | 900                        | 840                      | 787 | 739 | 697 | 661 |
| 1696                     | 1499 | 1331 | 1199 | 1093 | 1000                       | 933                      | 874 | 820 | 773 | 733 |

**Reference Fuel and Time Required at Check Point**

| AIR<br>DIST<br>(NM) | PRESSURE ALTITUDE (1000 FT) |                  |                   |                  |                   |                  |                   |                  |                   |                  |
|---------------------|-----------------------------|------------------|-------------------|------------------|-------------------|------------------|-------------------|------------------|-------------------|------------------|
|                     | 6                           |                  | 8                 |                  | 10                |                  | 12                |                  | 14                |                  |
|                     | FUEL<br>(1000 KG)           | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) |
| 100                 | 4.1                         | 0:27             | 3.9               | 0:26             | 3.7               | 0:25             | 3.5               | 0:25             | 3.5               | 0:24             |
| 200                 | 8.3                         | 0:51             | 8.0               | 0:50             | 7.7               | 0:48             | 7.5               | 0:47             | 7.5               | 0:46             |
| 300                 | 12.5                        | 1:15             | 12.1              | 1:13             | 11.7              | 1:11             | 11.5              | 1:09             | 11.6              | 1:08             |
| 400                 | 16.7                        | 1:40             | 16.1              | 1:37             | 15.7              | 1:34             | 15.4              | 1:32             | 15.5              | 1:29             |
| 500                 | 20.9                        | 2:04             | 20.2              | 2:01             | 19.6              | 1:58             | 19.3              | 1:54             | 19.4              | 1:51             |
| 600                 | 24.9                        | 2:29             | 24.1              | 2:25             | 23.5              | 2:21             | 23.2              | 2:17             | 23.3              | 2:13             |
| 700                 | 29.0                        | 2:54             | 28.1              | 2:49             | 27.4              | 2:44             | 27.0              | 2:40             | 27.1              | 2:35             |
| 800                 | 33.0                        | 3:19             | 32.0              | 3:13             | 31.2              | 3:08             | 30.7              | 3:02             | 30.8              | 2:57             |
| 900                 | 37.0                        | 3:44             | 35.9              | 3:38             | 35.0              | 3:31             | 34.4              | 3:25             | 34.4              | 3:20             |
| 1000                | 40.9                        | 4:09             | 39.7              | 4:02             | 38.7              | 3:55             | 38.1              | 3:48             | 38.0              | 3:42             |

**Fuel Required Adjustment (1000 KG)**

| REFERENCE FUEL REQUIRED<br>(1000 KG) | WEIGHT AT CHECK POINT (1000 KG) |      |      |      |     |     |     |      |      |      |
|--------------------------------------|---------------------------------|------|------|------|-----|-----|-----|------|------|------|
|                                      | 170                             | 190  | 210  | 230  | 250 | 270 | 290 | 310  | 330  | 350  |
| 5                                    | -0.9                            | -0.7 | -0.4 | -0.2 | 0.0 | 0.5 | 1.0 | 1.5  | 1.9  | 2.4  |
| 10                                   | -1.9                            | -1.4 | -0.9 | -0.5 | 0.0 | 1.1 | 2.1 | 3.2  | 4.2  | 5.2  |
| 15                                   | -2.9                            | -2.1 | -1.4 | -0.7 | 0.0 | 1.6 | 3.2 | 4.8  | 6.3  | 7.9  |
| 20                                   | -3.8                            | -2.9 | -1.9 | -1.0 | 0.0 | 2.1 | 4.2 | 6.3  | 8.4  | 10.5 |
| 25                                   | -4.8                            | -3.6 | -2.4 | -1.2 | 0.0 | 2.6 | 5.1 | 7.8  | 10.4 | 13.1 |
| 30                                   | -5.8                            | -4.3 | -2.9 | -1.4 | 0.0 | 3.0 | 6.0 | 9.2  | 12.4 | 15.6 |
| 35                                   | -6.8                            | -5.1 | -3.4 | -1.7 | 0.0 | 3.4 | 6.8 | 10.5 | 14.2 | 18.1 |
| 40                                   | -7.8                            | -5.8 | -3.9 | -1.9 | 0.0 | 3.7 | 7.6 | 11.7 | 16.0 | 20.5 |
| 45                                   | -8.8                            | -6.6 | -4.4 | -2.2 | 0.0 | 4.0 | 8.3 | 12.9 | 17.7 | 22.8 |

Based on Long Range Cruise and VREF30+80 descent. Includes APU fuel burn.

**GEAR DOWN****ENGINE INOP****MAX CONTINUOUS THRUST****Holding  
Flaps Up**

| WEIGHT<br>(1000 KG) |        | PRESSURE ALTITUDE (FT) |       |       |       |
|---------------------|--------|------------------------|-------|-------|-------|
|                     |        | 1500                   | 5000  | 10000 | 15000 |
| 340                 | %N1    | 96.1                   |       |       |       |
|                     | KIAS   | 260                    |       |       |       |
|                     | FF/ENG | 15250                  |       |       |       |
| 320                 | %N1    | 94.0                   | 98.2  |       |       |
|                     | KIAS   | 253                    | 253   |       |       |
|                     | FF/ENG | 14280                  | 14490 |       |       |
| 300                 | %N1    | 91.8                   | 95.1  |       |       |
|                     | KIAS   | 244                    | 244   |       |       |
|                     | FF/ENG | 13280                  | 13280 |       |       |
| 280                 | %N1    | 89.9                   | 92.9  |       |       |
|                     | KIAS   | 238                    | 238   |       |       |
|                     | FF/ENG | 12380                  | 12370 |       |       |
| 260                 | %N1    | 87.9                   | 90.9  | 96.3  |       |
|                     | KIAS   | 232                    | 232   | 232   |       |
|                     | FF/ENG | 11520                  | 11580 | 11870 |       |
| 240                 | %N1    | 85.6                   | 88.9  | 93.4  |       |
|                     | KIAS   | 226                    | 226   | 226   |       |
|                     | FF/ENG | 10680                  | 10760 | 10880 |       |
| 220                 | %N1    | 83.3                   | 86.7  | 91.0  | 98.4  |
|                     | KIAS   | 220                    | 220   | 220   | 220   |
|                     | FF/ENG | 9870                   | 9940  | 10020 | 10570 |
| 200                 | %N1    | 80.8                   | 84.1  | 88.6  | 93.9  |
|                     | KIAS   | 213                    | 213   | 213   | 213   |
|                     | FF/ENG | 9060                   | 9110  | 9170  | 9410  |
| 180                 | %N1    | 78.2                   | 81.3  | 86.1  | 90.6  |
|                     | KIAS   | 206                    | 206   | 206   | 206   |
|                     | FF/ENG | 8270                   | 8310  | 8330  | 8510  |
| 160                 | %N1    | 75.5                   | 78.4  | 83.1  | 87.8  |
|                     | KIAS   | 199                    | 199   | 199   | 199   |
|                     | FF/ENG | 7490                   | 7510  | 7510  | 7660  |

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

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**Performance Inflight - QRH****Chapter PI-QRH****Text****Section 35****Introduction**

This chapter contains information to supplement performance data from the Flight Management Computer. 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 Flight Manual, the Flight Manual shall always take precedence.

**General****Flight With Unreliable Airspeed / Turbulent Air Penetration**

Body 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 may also cause unreliable airspeed/Mach indications. Climb, cruise and descent information is based on the recommended turbulent air penetration speed schedule: 270 knots below 25,000 feet, 280 knots or 0.82 Mach whichever is lower at 25,000 feet and above; maintain a minimum speed of 15 knots above the minimum maneuvering speed when below 0.82 Mach. This schedule provides ample protection from stall and high speed buffet, while also providing protection from exceeding structural limits. The Climb, Cruise and Descent tables in this section may also be used for turbulent air penetration. The Flight with Unreliable Airspeed - FINAL APPROACH table includes a 10 knot margin for landing.

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

**Max Climb %N1**

This table shows Max Climb %N1 for a 310/.84 climb speed schedule, normal engine bleed for packs on and anti-ice off. Enter the table with airport pressure altitude and TAT and read %N1. %N1 adjustments are shown for anti-ice operation.

**Go-Around %N1**

To find Go-Around %N1 based on normal engine bleed for packs on and anti-ice off, enter the Go-Around %N1 table with airport pressure altitude and reported OAT or TAT and read %N1. %N1 adjustments are shown for engine bleeds for various conditions.

---

## VREF Speeds

This table contains flaps 30, 25 and 20 reference speeds for a given weight.

---

## Advisory Information

### Normal Configuration Landing Distance

Tables are provided as advisory information for normal configuration landing distance on dry runways and slippery runways with good, medium, and poor reported braking action. These values are actual landing distances and do not include the 1.67 regulatory factor. Therefore, they cannot be used to determine the dispatch required landing field length.

To use these tables, determine the reference landing distance for the selected braking configuration. Then adjust the reference distance for landing weight, altitude, wind, slope, temperature, approach speed, and the number of operative thrust reversers to obtain the actual landing distance.

When landing on slippery runways or runways contaminated with ice, snow, slush, or standing water, the reported braking action must be considered. If the surface is affected by water, snow, or ice and the braking action is reported as "good", conditions should not be expected to be as good as on clean, dry runways. The value "good" is comparative and is intended to mean that airplanes should not experience braking or directional control difficulties when landing. The performance level used to calculate the "good" data is consistent with wet runway testing done on early Boeing jets. The performance level used to calculate "poor" data reflects runways covered with wet ice.

Use of the autobrake system commands the airplane to a constant deceleration rate. In some conditions, such as a runway with "poor" braking action, the airplane may not be able to achieve these deceleration rates. In these cases, runway slope and inoperative reversers influence the stopping distance. Since it cannot be determined quickly when this becomes a factor, it is conservative to add the effects of slope and inoperative reversers when using the autobrake system.

### Non-normal Configuration Landing Distance

Advisory information is provided to support non-normal configurations that affect the landing performance of the airplane. Landing distances and adjustments are provided for dry runways and runways with good, medium, and poor reported braking action.

Enter the table with the applicable non-normal configuration and read the normal approach speed. The reference landing distance is a reference distance from 50 ft above the threshold to stop based on a reference landing weight and speed at sea level, zero wind, and zero slope. Subsequent columns provide adjustments for off-reference landing weight, altitude, wind, slope, and speed conditions. Each adjustment is independently added to the reference landing distance. Landing distance includes the effects of max manual braking and reverse thrust.

For an engine inoperative landing, check the rate of climb capability shown in Gear Down Landing Rate of Climb Available tables to ensure adequate climb performance.

## Recommended Brake Cooling Schedule

Advisory information is provided to assist in avoiding problems associated with hot brakes. For normal operation, most landings are at weights below the AFM quick turnaround limit weight.

Use of the recommended cooling schedule will help avoid brake overheat and fuse plug problems that could result from repeated landings at short time intervals or a rejected takeoff.

Enter the Recommended Brake Cooling Schedule table with the airplane weight and brakes on speed, adjusted for wind, at the appropriate temperature and altitude condition. Instructions for applying wind adjustments are included below the table. Linear interpolation may be used to obtain intermediate values. The resulting number is the reference brake energy per brake in millions of foot-pounds, and represents the amount of energy absorbed by each brake during a rejected takeoff.

To determine the energy per brake absorbed during landing, enter the appropriate Event Adjusted Brake Energy Table (No Reverse Thrust or 2 Engine Reverse) with the reference brake energy per brake and the type of braking used during landing (Max Manual, Max Auto, or Autobrake). The resulting number is the adjusted brake energy per brake and represents the energy absorbed in each brake during the landing. The recommended cooling time is found in the final table by entering with the adjusted brake energy per brake. Times are provided for ground cooling and inflight gear down cooling.

Brake Temperature Monitor System (BTMS) indications are also shown. If brake cooling is determined from the BTMS, the hottest brake indication 10 to 15 minutes after the airplane has come to a complete stop, or inflight with gear retracted, may be used to determine recommended cooling schedule by entering at the bottom of the chart. An EICAS advisory message, BRAKE TEMP, will appear when any brake registers 5.0 or higher on the EICAS indication and disappear as the hottest brake cools with an EICAS indication of 3.5. Note that even without an EICAS advisory message, brake cooling is recommended.

## Approach or Landing Climb Limited Weight

In the event an overweight landing is necessary and the fuel dump system is unavailable, approach or landing climb limits should be checked if a Flaps 25 or 30 landing is planned. Enter the table with airport OAT and pressure altitude to read approach or landing climb limited weight. Apply the noted adjustments as required. At weights exceeding those shown, plan a Flaps 20 landing.

The table "Approach or Landing Climb Limited Weight" presents the data which are the more limiting of Approach Climb Limit Weight and Landing Climb Limit Weight.

---

## 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 Mach number of .84 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 engine bleed for packs on or off and all anti-ice bleeds off. Enter the table with pressure altitude and IAS or Mach to read %N1.

It is desirable to maintain engine thrust level within the limits of the Max Cruise thrust rating. However, where thrust level in excess of Max Cruise rating is required, such as for meeting terrain clearance, ATC altitude assignments, or to attain maximum range capability, it is permissible to use the thrust needed up to the Max Continuous thrust rating. The Max Continuous thrust rating is intended primarily for emergency use at the discretion of the pilot and is the maximum thrust that may be used continuously.

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## 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/Cruise 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 correct 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 Diversion Fuel and Time table.

## Long Range Cruise Altitude Capability

Table show the maximum altitude that can be maintained at a given weight and air temperature (ISA deviation), based on LRC speed, Max Continuous thrust, and 100 ft/min residual rate of climb.

## Long Range Cruise Control

The table provides target %N1, engine inoperative Long Range Cruise Mach number, IAS and fuel flow for the airplane weight and pressure altitude. The fuel flow values in this table reflect single engine fuel burn.

## Long Range Cruise Diversion Fuel and Time

Tables are provided for crews to determine the fuel and time required to proceed to an alternate airfield with one engine inoperative. The data is based on single engine Long Range Cruise speed and .84/310/250 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 corrections table with the fuel required for the reference weight and the actual weight at checkpoint. Read fuel and time required for the actual weight.

---

## Holding

Single engine holding data is provided in the same format as the all engine holding data and is based on the same assumptions.

## Gear Down Landing Rate of Climb Available

Rate of climb data is provided as guidance information in the event an engine inoperative landing is planned. The tables show gear down rate of climb available for Flaps 20, Flaps 25 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 for all phases of flight. The data is based on engine bleeds for normal air conditioning.

Note: The Flight Management Computer System (FMCS) does not contain special provisions for operation with landing gear extended. As a result, the FMCS will generate inaccurate enroute speed schedules, display non-conservative predictions of fuel burn, estimated time of arrival (ETA), maximum altitude, and compute overly shallow descent path. To obtain accurate ETA predictions, gear down cruise speed and altitude should be entered on the CLB and CRZ pages. Gear down cruise speed should also be entered on the DES page and a STEP SIZE of zero should be entered on the PERF INIT or CRZ page. Use of VNAV during descent under these circumstances is not recommended.

Tables for gear down performance in this section are identical in format and used in the same manner as tables for the gear up configuration previously described.

**Performance Inflight - QRH****Chapter PI-QRH****Table of Contents****Section 40****777-300ER GE90-115BL KG M JAA PAX GAS TO-10 TO2-20****Pkg Model Identification ..... PI-QRH.ModID.40.1****General ..... PI-QRH.40.1**

Flight With Unreliable Airspeed /

Turbulent Air Penetration ..... PI-QRH.40.1

Max Climb %N1 ..... PI-QRH.40.4

Go-Around %N1 ..... PI-QRH.40.5

VREF ..... PI-QRH.40.6

**Advisory Information..... PI-QRH.41.1**

Normal Configuration Landing Distance ..... PI-QRH.41.1

Non-Normal Configuration Landing Distance ..... PI-QRH.41.4

ADIRU/GPS DISAGREE (Flaps 25) ..... PI-QRH.41.4

ADIRU/GPS DISAGREE (Flaps 30) ..... PI-QRH.41.5

AIR DATA SYS (Flaps 20) ..... PI-QRH.41.6

Airspeed Unreliable (Flaps 20) ..... PI-QRH.41.7

ANTISKID (Flaps 25)..... PI-QRH.41.8

ANTISKID (Flaps 30)..... PI-QRH.41.9

ENG SHUTDOWN L, R (Flaps 20) ..... PI-QRH.41.10

ENG SHUTDOWN L, R (Flaps 30) ..... PI-QRH.41.11

FLAP / SLAT CONTROL (Flaps 20) ..... PI-QRH.41.12

FLAPS DRIVE (Flaps  $\leq 5$ ) ..... PI-QRH.41.13FLAPS DRIVE ( $5 < \text{Flaps} < 20$ ) ..... PI-QRH.41.14FLAPS DRIVE (Flaps  $\geq 20$ ) ..... PI-QRH.41.15

FLAPS PRIMARY FAIL (Flaps 20) ..... PI-QRH.41.16

FLIGHT CONTROL MODE (Flaps 20)..... PI-QRH.41.17

FLIGHT CONTROLS (Flaps 20) ..... PI-QRH.41.18

HYD PRESS SYS C (Flaps 20) ..... PI-QRH.41.19

HYD PRESS SYS L (Flaps 25)..... PI-QRH.41.20

HYD PRESS SYS L (Flaps 30)..... PI-QRH.41.21



---

|                                               |              |
|-----------------------------------------------|--------------|
| HYD PRESS SYS L+C (Flaps 20) .....            | PI-QRH.41.22 |
| HYD PRESS SYS L+R (Flaps 20) .....            | PI-QRH.41.23 |
| HYD PRESS SYS R (Flaps 25).....               | PI-QRH.41.24 |
| HYD PRESS SYS R (Flaps 30).....               | PI-QRH.41.25 |
| HYD PRESS SYS R+C (Flaps 20) .....            | PI-QRH.41.26 |
| NAV AIR DATA SYS (Flaps 20).....              | PI-QRH.41.27 |
| PITCH DOWN AUTHORITY (Flaps 25).....          | PI-QRH.41.28 |
| PITCH DOWN AUTHORITY (Flaps 30).....          | PI-QRH.41.29 |
| PITCH UP AUTHORITY (Flaps $\leq$ 15) .....    | PI-QRH.41.30 |
| PITCH UP AUTHORITY (Flaps $\geq$ 20) .....    | PI-QRH.41.31 |
| PRI FLIGHT COMPUTERS (Flaps 20) .....         | PI-QRH.41.32 |
| SLATS DRIVE (Flaps 20).....                   | PI-QRH.41.33 |
| SPOILERS (Flaps 25) .....                     | PI-QRH.41.34 |
| SPOILERS (Flaps 30) .....                     | PI-QRH.41.35 |
| STABILIZER (Flaps 20) .....                   | PI-QRH.41.36 |
| Recommended Brake Cooling Schedule. ....      | PI-QRH.41.37 |
| Approach or Landing Climb Limited Weight..... | PI-QRH.41.39 |

**Engine Inoperative .....PI-QRH.42.1**

|                                                 |              |
|-------------------------------------------------|--------------|
| Initial Max Continuous %N1 .....                | PI-QRH.42.1  |
| Max Continuous %N1.....                         | PI-QRH.42.2  |
| Driftdown Speed/Level Off Altitude.....         | PI-QRH.42.5  |
| Driftdown/LRC Cruise Range Capability.....      | PI-QRH.42.6  |
| Long Range Cruise Altitude Capability .....     | PI-QRH.42.7  |
| Long Range Cruise Control .....                 | PI-QRH.42.8  |
| Long Range Cruise Diversion Fuel and Time.....  | PI-QRH.42.9  |
| Holding .....                                   | PI-QRH.42.10 |
| Gear Down Landing Rate of Climb Available ..... | PI-QRH.42.11 |

**Gear Down.....PI-QRH.43.1**

|                                               |             |
|-----------------------------------------------|-------------|
| 220 KIAS Max Climb %N1 .....                  | PI-QRH.43.1 |
| Long Range Cruise Altitude Capability .....   | PI-QRH.43.2 |
| Long Range Cruise Control .....               | PI-QRH.43.3 |
| Long Range Cruise Enroute Fuel and Time ..... | PI-QRH.43.4 |





777 Flight Crew Operations Manual

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|                                                 |                    |
|-------------------------------------------------|--------------------|
| Descent at VREF30+80 .....                      | PI-QRH.43.5        |
| Holding .....                                   | PI-QRH.43.6        |
| <b>Gear Down, Engine Inoperative .....</b>      | <b>PI-QRH.44.1</b> |
| Driftdown Speed/Level Off Altitude .....        | PI-QRH.44.1        |
| Long Range Cruise Altitude Capability .....     | PI-QRH.44.2        |
| Long Range Cruise Control .....                 | PI-QRH.44.3        |
| Long Range Cruise Diversion Fuel and Time ..... | PI-QRH.44.4        |
| Holding .....                                   | PI-QRH.44.5        |
| <b>Text .....</b>                               | <b>PI-QRH.45.1</b> |
| Introduction .....                              | PI-QRH.45.1        |
| General .....                                   | PI-QRH.45.1        |
| Advisory Information .....                      | PI-QRH.45.2        |
| Engine Inoperative .....                        | PI-QRH.45.4        |
| Gear Down .....                                 | PI-QRH.45.6        |



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**Performance Inflight - QRH**  
**Pkg Model Identification****Chapter PI-QRH**  
**Section 40****General**

The table below shows the airplanes that have been identified with the following performance package. Note, some airplanes may be identified with more than one performance package. This configuration table information reflects the Boeing delivered configuration updated for service bulletin incorporations in conformance with the policy stated in the introduction section of the FCOM. The performance data is prepared for the owner/operator named on the title page. The intent of this information is to assist flight crews and airlines in knowing which performance package is applicable to a given airplane. The performance package model identification information is based on Boeing's knowledge of the airline's fleet at a point in time approximately three months prior to the page date. Notice of Errata (NOE) will not be provided to airlines to identify airplanes that are moved between performance packages within this manual or airplanes added to the airline's fleet whose performance packages are already represented in this manual. These types of changes will be updated in the next block revision.

Owners/operators are responsible for ensuring the operational documentation they are using is complete and matches the current configuration of their airplanes, and the accuracy and validity of all information furnished by the owner/operator or any other party. Owners/operators receiving active revision service are responsible to ensure that any modifications to the listed airplanes are properly reflected in this manual.

Airplane number is supplied by the operator. Registry number is supplied by the national regulatory agency. Serial and tabulation numbers are supplied by Boeing.

| Airplane Number | Registry Number | Serial Number | Tabulation Number |
|-----------------|-----------------|---------------|-------------------|
| 101             | AP-BMS          | 35782         | WD981             |

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## Performance Inflight - QRH

## Chapter PI-QRH

## General

## Section 40

**Flight With Unreliable Airspeed / Turbulent Air Penetration**

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

**Climb****Flaps Up, Set Max Climb Thrust**

| PRESSURE ALTITUDE (FT)<br>(SPEED) |                                  | WEIGHT (1000 KG)    |                     |                     |                     |                     |
|-----------------------------------|----------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
|                                   |                                  | 160                 | 210                 | 260                 | 310                 | 360                 |
| 40000<br>(.82M)                   | <b>PITCH ATT</b><br>V/S (FT/MIN) | <b>4.5</b><br>2200  | <b>4.0</b><br>800   |                     |                     |                     |
| 30000<br>(280 KIAS)               | <b>PITCH ATT</b><br>V/S (FT/MIN) | <b>6.0</b><br>3300  | <b>5.0</b><br>2300  | <b>5.0</b><br>1600  | <b>4.5</b><br>1200  | <b>4.0</b><br>800   |
| 20000<br>(270 KIAS)               | <b>PITCH ATT</b><br>V/S (FT/MIN) | <b>9.0</b><br>4700  | <b>8.0</b><br>3400  | <b>7.5</b><br>2500  | <b>7.5</b><br>1900  | <b>7.0</b><br>1300  |
| 10000<br>(270 KIAS)               | <b>PITCH ATT</b><br>V/S (FT/MIN) | <b>13.0</b><br>6200 | <b>10.5</b><br>4500 | <b>10.0</b><br>3500 | <b>9.5</b><br>2700  | <b>9.0</b><br>2100  |
| SEA LEVEL<br>(270 KIAS)           | <b>PITCH ATT</b><br>V/S (FT/MIN) | <b>16.5</b><br>7200 | <b>13.5</b><br>5300 | <b>12.0</b><br>4100 | <b>11.5</b><br>3300 | <b>11.0</b><br>2700 |

**Cruise****Flaps Up, Set Thrust for Level Flight**

| PRESSURE ALTITUDE (FT)<br>(SPEED) |                         | WEIGHT (1000 KG)   |                    |                    |                    |                    |
|-----------------------------------|-------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
|                                   |                         | 160                | 210                | 260                | 310                | 360                |
| 40000<br>(.82M)                   | <b>PITCH ATT</b><br>%N1 | <b>2.0</b><br>80.2 | <b>3.0</b><br>84.8 |                    |                    |                    |
| 35000<br>(280 KIAS)               | <b>PITCH ATT</b><br>%N1 | <b>1.5</b><br>77.7 | <b>2.0</b><br>80.4 | <b>2.5</b><br>84.1 | <b>3.5</b><br>90.4 |                    |
| 30000<br>(280 KIAS)               | <b>PITCH ATT</b><br>%N1 | <b>1.5</b><br>73.5 | <b>2.0</b><br>76.0 | <b>3.0</b><br>79.8 | <b>3.0</b><br>84.2 | <b>3.0</b><br>88.5 |
| 25000<br>(280 KIAS)               | <b>PITCH ATT</b><br>%N1 | <b>1.5</b><br>69.6 | <b>2.5</b><br>72.1 | <b>3.0</b><br>75.2 | <b>3.5</b><br>79.3 | <b>3.5</b><br>83.4 |
| 20000<br>(270 KIAS)               | <b>PITCH ATT</b><br>%N1 | <b>1.5</b><br>64.7 | <b>2.5</b><br>67.3 | <b>3.5</b><br>70.5 | <b>4.0</b><br>74.6 | <b>4.0</b><br>78.7 |
| 15000<br>(270 KIAS)               | <b>PITCH ATT</b><br>%N1 | <b>1.5</b><br>60.9 | <b>2.5</b><br>63.3 | <b>3.5</b><br>66.4 | <b>4.5</b><br>69.7 | <b>4.5</b><br>74.1 |

**Descent****Flaps Up, Set Idle Thrust**

| PRESSURE ALTITUDE (FT)<br>(SPEED) |                                  | WEIGHT (1000 KG)     |                      |                     |                     |                     |
|-----------------------------------|----------------------------------|----------------------|----------------------|---------------------|---------------------|---------------------|
|                                   |                                  | 160                  | 210                  | 260                 | 310                 | 360                 |
| 40000<br>(.82M)                   | <b>PITCH ATT</b><br>V/S (FT/MIN) | <b>-1.5</b><br>-2900 | <b>-0.5</b><br>-2600 |                     |                     |                     |
| 30000<br>(280 KIAS)               | <b>PITCH ATT</b><br>V/S (FT/MIN) | <b>-1.5</b><br>-2400 | <b>-0.5</b><br>-2000 | <b>0.5</b><br>-1900 | <b>0.5</b><br>-2100 | <b>0.5</b><br>-2500 |
| 20000<br>(270 KIAS)               | <b>PITCH ATT</b><br>V/S (FT/MIN) | <b>-1.5</b><br>-1900 | <b>0.0</b><br>-1700  | <b>1.0</b><br>-1600 | <b>2.0</b><br>-1500 | <b>1.5</b><br>-1600 |
| 10000<br>(270 KIAS)               | <b>PITCH ATT</b><br>V/S (FT/MIN) | <b>-1.5</b><br>-1700 | <b>0.0</b><br>-1500  | <b>1.0</b><br>-1400 | <b>2.0</b><br>-1400 | <b>2.5</b><br>-1400 |
| SEA LEVEL<br>(270 KIAS)           | <b>PITCH ATT</b><br>V/S (FT/MIN) | <b>-2.0</b><br>-1600 | <b>-0.5</b><br>-1300 | <b>1.0</b><br>-1200 | <b>2.0</b><br>-1200 | <b>2.5</b><br>-1200 |

In shaded areas, data reflects the minimum speed limitation of 15 knots above minimum maneuvering speed.

## Flight With Unreliable Airspeed / Turbulent Air Penetration

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

### Holding

#### Flaps Up, Set Thrust for Level Flight

| PRESSURE ALTITUDE (FT) |                  | WEIGHT (1000 KG) |            |            |            |            |
|------------------------|------------------|------------------|------------|------------|------------|------------|
|                        |                  | 160              | 210        | 260        | 310        | 360        |
| 10000                  | <b>PITCH ATT</b> | <b>4.0</b>       | <b>5.0</b> | <b>5.5</b> | <b>5.5</b> | <b>5.5</b> |
|                        | %N1              | 50.4             | 55.8       | 60.8       | 65.5       | 69.5       |
|                        | KIAS             | 199              | 217        | 233        | 255        | 275        |
| 5000                   | <b>PITCH ATT</b> | <b>4.0</b>       | <b>5.0</b> | <b>5.5</b> | <b>5.5</b> | <b>5.5</b> |
|                        | %N1              | 46.7             | 52.3       | 56.9       | 61.3       | 65.4       |
|                        | KIAS             | 199              | 217        | 232        | 253        | 273        |

### Terminal Area (5000 FT)

#### Set Thrust for Level Flight

| FLAP POSITION<br>(VREF + INCREMENT)  |                  | WEIGHT (1000 KG) |            |            |            |            |
|--------------------------------------|------------------|------------------|------------|------------|------------|------------|
|                                      |                  | 160              | 210        | 260        | 310        | 360        |
| FLAPS UP<br>GEAR UP<br>(VREF30+80)   | <b>PITCH ATT</b> | <b>4.5</b>       | <b>5.5</b> | <b>6.0</b> | <b>6.0</b> | <b>6.5</b> |
|                                      | %N1              | 46.9             | 52.6       | 57.4       | 61.9       | 66.2       |
|                                      | KIAS             | 201              | 217        | 232        | 248        | 264        |
| FLAPS 1<br>GEAR UP<br>(VREF30+60)    | <b>PITCH ATT</b> | <b>6.0</b>       | <b>7.0</b> | <b>7.5</b> | <b>7.5</b> | <b>8.0</b> |
|                                      | %N1              | 47.7             | 53.6       | 58.7       | 63.6       | 67.8       |
|                                      | KIAS             | 181              | 197        | 212        | 228        | 244        |
| FLAPS 5<br>GEAR UP<br>(VREF30+40)    | <b>PITCH ATT</b> | <b>5.5</b>       | <b>6.0</b> | <b>6.5</b> | <b>6.5</b> | <b>6.5</b> |
|                                      | %N1              | 48.3             | 54.3       | 59.8       | 64.5       | 68.9       |
|                                      | KIAS             | 161              | 177        | 192        | 208        | 224        |
| FLAPS 15<br>GEAR UP<br>(VREF30+20)   | <b>PITCH ATT</b> | <b>6.0</b>       | <b>6.5</b> | <b>7.0</b> | <b>7.0</b> | <b>7.0</b> |
|                                      | %N1              | 49.2             | 55.6       | 61.5       | 66.3       | 70.9       |
|                                      | KIAS             | 141              | 157        | 172        | 188        | 204        |
| FLAPS 20<br>GEAR DOWN<br>(VREF30+20) | <b>PITCH ATT</b> | <b>4.5</b>       | <b>5.0</b> | <b>5.5</b> | <b>5.5</b> | <b>5.5</b> |
|                                      | %N1              | 54.9             | 61.7       | 67.8       | 73.2       | 77.9       |
|                                      | KIAS             | 141              | 157        | 172        | 188        | 204        |

### Final Approach (1500 FT)

#### Gear Down, Set Thrust for 3° Glideslope

| FLAP POSITION<br>(VREF + INCREMENT) |                  | WEIGHT (1000 KG) |            |            |            |            |
|-------------------------------------|------------------|------------------|------------|------------|------------|------------|
|                                     |                  | 160              | 210        | 260        | 310        | 360        |
| FLAPS 20<br>(VREF20+10)             | <b>PITCH ATT</b> | <b>1.0</b>       | <b>1.0</b> | <b>1.5</b> | <b>1.5</b> | <b>2.0</b> |
|                                     | %N1              | 37.7             | 42.4       | 46.8       | 50.6       | 53.7       |
|                                     | KIAS             | 144              | 164        | 181        | 196        | 208        |
| FLAPS 25<br>(VREF25+10)             | <b>PITCH ATT</b> | <b>1.5</b>       | <b>1.5</b> | <b>2.0</b> | <b>2.0</b> | <b>2.0</b> |
|                                     | %N1              | 47.6             | 53.0       | 57.5       | 61.6       | 64.5       |
|                                     | KIAS             | 135              | 154        | 170        | 184        | 195        |
| FLAPS 30<br>(VREF30+10)             | <b>PITCH ATT</b> | <b>1.0</b>       | <b>1.0</b> | <b>1.5</b> | <b>1.0</b> | <b>1.0</b> |
|                                     | %N1              | 52.5             | 57.7       | 62.6       | 68.2       | 73.3       |
|                                     | KIAS             | 131              | 147        | 162        | 178        | 194        |

**Flight With Unreliable Airspeed / Turbulent Air Penetration**

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

**Go-Around****Flaps 20, Gear Up, Set Go-Around Thrust**

| PRESSURE ALTITUDE (FT) |                  | WEIGHT (1000 KG) |             |             |             |             |
|------------------------|------------------|------------------|-------------|-------------|-------------|-------------|
|                        |                  | 160              | 210         | 260         | 310         | 360         |
| 10000                  | <b>PITCH ATT</b> | <b>20.5</b>      | <b>15.5</b> | <b>13.0</b> | <b>10.5</b> | <b>9.0</b>  |
|                        | V/S (FT/MIN)     | 4600             | 3500        | 2600        | 2100        | 1600        |
|                        | KIAS             | 139              | 157         | 172         | 189         | 204         |
| 5000                   | <b>PITCH ATT</b> | <b>26.0</b>      | <b>19.5</b> | <b>16.0</b> | <b>13.0</b> | <b>11.0</b> |
|                        | V/S (FT/MIN)     | 5700             | 4400        | 3400        | 2800        | 2300        |
|                        | KIAS             | 139              | 157         | 172         | 189         | 204         |
| SEA LEVEL              | <b>PITCH ATT</b> | <b>30.5</b>      | <b>23.0</b> | <b>18.5</b> | <b>15.5</b> | <b>13.0</b> |
|                        | V/S (FT/MIN)     | 6500             | 5100        | 4100        | 3400        | 2800        |
|                        | KIAS             | 141              | 157         | 172         | 188         | 204         |

**Max Climb %N1**

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

| TAT<br>(°C) | PRESSURE ALTITUDE (1000 FT) / SPEED (KIAS OR MACH) |      |      |      |      |      |       |       |       |       |
|-------------|----------------------------------------------------|------|------|------|------|------|-------|-------|-------|-------|
|             | 0                                                  | 5    | 10   | 15   | 20   | 25   | 30    | 35    | 40    | 43    |
|             | 310                                                | 310  | 310  | 310  | 310  | 310  | 310   | 0.84  | 0.84  | 0.84  |
| 60          | 88.3                                               | 88.1 | 90.3 | 91.0 | 93.1 | 96.7 | 99.6  | 101.7 | 101.8 | 101.3 |
| 50          | 90.6                                               | 90.4 | 90.2 | 89.6 | 91.7 | 95.3 | 98.0  | 100.1 | 100.2 | 99.7  |
| 40          | 92.5                                               | 92.4 | 92.4 | 92.2 | 90.5 | 93.8 | 96.5  | 98.6  | 98.7  | 98.2  |
| 30          | 91.6                                               | 94.1 | 94.2 | 94.0 | 93.1 | 94.2 | 95.2  | 97.0  | 97.1  | 96.6  |
| 20          | 90.1                                               | 92.5 | 95.1 | 95.8 | 95.9 | 95.9 | 96.9  | 95.9  | 95.5  | 95.0  |
| 15          | 89.3                                               | 91.7 | 94.3 | 96.9 | 96.9 | 96.9 | 97.8  | 96.6  | 95.8  | 95.4  |
| 10          | 88.6                                               | 90.9 | 93.5 | 96.1 | 98.4 | 98.1 | 98.8  | 97.2  | 96.5  | 96.0  |
| 5           | 87.8                                               | 90.1 | 92.7 | 95.2 | 98.1 | 99.6 | 100.1 | 98.1  | 97.2  | 96.8  |
| 0           | 87.0                                               | 89.3 | 91.8 | 94.4 | 97.3 | 99.9 | 101.5 | 99.3  | 98.1  | 97.6  |
| -5          | 86.2                                               | 88.5 | 91.0 | 93.5 | 96.4 | 99.0 | 101.9 | 100.5 | 99.5  | 98.8  |
| -10         | 85.4                                               | 87.7 | 90.1 | 92.6 | 95.5 | 98.1 | 100.9 | 101.3 | 100.5 | 100.0 |
| -15         | 84.6                                               | 86.8 | 89.3 | 91.7 | 94.5 | 97.1 | 100.0 | 101.0 | 100.9 | 100.5 |
| -20         | 83.7                                               | 86.0 | 88.4 | 90.8 | 93.6 | 96.2 | 99.0  | 100.1 | 99.9  | 99.5  |
| -25         | 82.9                                               | 85.1 | 87.5 | 89.9 | 92.7 | 95.2 | 98.0  | 99.1  | 98.9  | 98.5  |
| -30         | 82.1                                               | 84.3 | 86.7 | 89.0 | 91.8 | 94.3 | 97.0  | 98.1  | 97.9  | 97.5  |
| -35         | 81.2                                               | 83.4 | 85.8 | 88.1 | 90.8 | 93.3 | 96.0  | 97.0  | 96.9  | 96.5  |
| -40         | 80.4                                               | 82.5 | 84.9 | 87.2 | 89.8 | 92.3 | 95.0  | 96.0  | 95.9  | 95.5  |

**%N1 Adjustments for Engine Bleed**

| BLEED CONFIGURATION              | PRESSURE ALTITUDE (1000 FT) |      |      |      |      |      |      |      |      |      |
|----------------------------------|-----------------------------|------|------|------|------|------|------|------|------|------|
|                                  | 0                           | 5    | 10   | 15   | 20   | 25   | 30   | 35   | 40   | 43   |
| 2 PACKS ON - 1 BLEED SOURCE      | -0.4                        | -0.5 | -0.4 | -0.3 | -0.2 | -0.3 | -0.3 | -0.4 | -0.4 | -0.5 |
| 1 PACK ON - 1 OR 2 BLEED SOURCES | -0.4                        | -0.5 | -0.4 | -0.3 | -0.2 | -0.3 | -0.3 | -0.4 | -0.4 | -0.5 |
| ENGINE ANTI-ICE ON               | -0.3                        | -0.5 | -0.4 | -0.3 | -0.1 | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 |
| ENGINE & WING ANTI-ICE ON*       | -0.6                        | -0.8 | -0.7 | -0.5 | -0.2 | -0.3 | -0.3 | -0.4 | -0.4 | -0.4 |
| ENGINE & WING ANTI-ICE ON**      | -1.1                        | -0.9 | -0.9 | -0.6 | -0.3 | -0.4 | -0.5 | -0.5 | -0.6 | -0.6 |

\*Packs on or off with 2 bleed sources.

\*\*Packs off with 1 bleed source.



**Go-Around %N1****Based on engine bleed for packs on, engine anti-ice on or off, and wing anti-ice off**

| REPORTED OAT |     | TAT (°C) | AIRPORT PRESSURE ALTITUDE (1000 FT) |       |       |       |       |       |       |       |       |       |       |       |       |
|--------------|-----|----------|-------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| °C           | °F  |          | -2                                  | -1    | 0     | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    |
| 66           | 150 | 70       | 93.7                                | 93.8  | 94.1  | 93.9  | 93.8  | 93.7  | 93.6  | 93.4  | 93.3  | 92.6  | 91.5  | 90.5  | 89.6  |
| 56           | 133 | 60       | 96.5                                | 96.6  | 96.9  | 96.7  | 96.6  | 96.5  | 96.4  | 96.2  | 96.1  | 95.4  | 94.3  | 93.4  | 92.5  |
| 51           | 124 | 55       | 97.8                                | 98.0  | 98.3  | 98.1  | 97.9  | 97.9  | 97.7  | 97.6  | 97.4  | 96.7  | 95.7  | 94.7  | 93.9  |
| 46           | 115 | 50       | 99.1                                | 99.3  | 99.6  | 99.4  | 99.3  | 99.2  | 99.1  | 98.9  | 98.7  | 98.0  | 97.0  | 96.1  | 95.2  |
| 41           | 106 | 45       | 100.2                               | 100.7 | 101.1 | 101.0 | 100.9 | 100.7 | 100.5 | 100.4 | 100.0 | 99.3  | 98.3  | 97.3  | 96.5  |
| 36           | 97  | 40       | 101.5                               | 102.4 | 103.2 | 103.2 | 102.8 | 102.6 | 102.3 | 102.0 | 101.4 | 100.5 | 99.5  | 98.6  | 97.8  |
| 31           | 88  | 35       | 101.2                               | 103.9 | 105.8 | 105.4 | 105.1 | 104.7 | 104.3 | 103.8 | 102.7 | 101.7 | 100.6 | 99.7  | 98.9  |
| 26           | 79  | 30       | 100.4                               | 103.1 | 105.9 | 106.8 | 107.3 | 106.8 | 106.6 | 106.4 | 105.0 | 103.4 | 101.9 | 100.8 | 100.0 |
| 21           | 70  | 25       | 99.5                                | 102.2 | 105.0 | 105.9 | 106.5 | 107.0 | 107.4 | 107.4 | 106.8 | 105.7 | 104.0 | 102.3 | 101.3 |
| 16           | 61  | 20       | 98.7                                | 101.4 | 104.1 | 105.0 | 105.6 | 106.1 | 106.5 | 107.0 | 106.8 | 106.3 | 105.2 | 104.2 | 103.3 |
| 11           | 53  | 15       | 97.9                                | 100.5 | 103.2 | 104.1 | 104.7 | 105.2 | 105.6 | 106.1 | 105.9 | 105.5 | 104.9 | 104.4 | 104.0 |
| 7            | 44  | 10       | 97.0                                | 99.6  | 102.3 | 103.2 | 103.8 | 104.3 | 104.7 | 105.1 | 105.0 | 104.6 | 104.0 | 103.5 | 103.4 |
| 2            | 35  | 5        | 96.1                                | 98.7  | 101.4 | 102.3 | 102.9 | 103.4 | 103.8 | 104.2 | 104.1 | 103.7 | 103.1 | 102.6 | 102.5 |
| -3           | 26  | 0        | 95.3                                | 97.8  | 100.5 | 101.4 | 102.0 | 102.4 | 102.8 | 103.3 | 103.1 | 102.7 | 102.2 | 101.7 | 101.6 |
| -13          | 8   | -10      | 93.5                                | 96.0  | 98.6  | 99.5  | 100.1 | 100.5 | 100.9 | 101.4 | 101.2 | 100.8 | 100.3 | 99.8  | 99.7  |
| -23          | -10 | -20      | 91.7                                | 94.2  | 96.7  | 97.6  | 98.2  | 98.6  | 99.0  | 99.4  | 99.3  | 98.9  | 98.3  | 97.9  | 97.8  |
| -33          | -27 | -30      | 89.9                                | 92.3  | 94.8  | 95.6  | 96.2  | 96.6  | 97.0  | 97.4  | 97.3  | 96.9  | 96.4  | 95.9  | 95.8  |
| -43          | -45 | -40      | 88.0                                | 90.4  | 92.8  | 93.6  | 94.2  | 94.6  | 95.0  | 95.4  | 95.3  | 94.9  | 94.4  | 93.9  | 93.9  |
| -53          | -63 | -50      | 86.1                                | 88.4  | 90.8  | 91.6  | 92.2  | 92.6  | 93.0  | 93.3  | 93.2  | 92.9  | 92.3  | 91.9  | 91.8  |

**%N1 Adjustments for Engine Bleed**

| BLEED<br>CONFIGURATION | AIRPORT PRESSURE ALTITUDE (1000 FT) |      |      |      |      |      |      |      |      |      |      |      |      |
|------------------------|-------------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
|                        | -2                                  | -1   | 0    | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   |
| PACKS OFF              | 0.2                                 | 0.2  | 0.3  | 0.4  | 0.4  | 0.4  | 0.4  | 0.4  | 0.4  | 0.3  | 0.3  | 0.3  | 0.3  |
| 1 PACK ON              | -0.2                                | -0.2 | -0.3 | -0.4 | -0.4 | -0.4 | -0.4 | -0.4 | -0.4 | -0.3 | -0.3 | -0.3 | -0.3 |
| WING ANTI-ICE ON       | -0.2                                | -0.3 | -0.4 | -0.5 | -0.4 | -0.4 | -0.4 | -0.4 | -0.4 | -0.4 | -0.4 | -0.4 | -0.4 |

**VREF**

| WEIGHT<br>(1000 KG) | VREF (KIAS) |     |     |
|---------------------|-------------|-----|-----|
|                     | FLAPS       |     |     |
|                     | 30          | 25  | 20  |
| 360                 | 184         | 186 | 199 |
| 340                 | 180         | 183 | 196 |
| 320                 | 173         | 177 | 190 |
| 300                 | 164         | 172 | 184 |
| 280                 | 158         | 166 | 178 |
| 260                 | 152         | 160 | 172 |
| 240                 | 146         | 154 | 165 |
| 220                 | 140         | 148 | 158 |
| 200                 | 134         | 141 | 151 |
| 180                 | 126         | 133 | 143 |
| 160                 | 119         | 125 | 134 |

# Performance Inflight - QRH

## Advisory Information

# Chapter PI-QRH

## Section 41

### ADVISORY INFORMATION

#### Normal Configuration Landing Distance

##### Flaps 30

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                                 |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|---------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ               | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF30 | ONE<br>REV               | NO<br>REV |

##### Dry Runway

|               |      |        |     |          |        |        |     |     |     |
|---------------|------|--------|-----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1125 | 30/-10 | 25  | -45/150  | 10/-10 | 25/-25 | 40  | 25  | 60  |
| AUTOBRAKE MAX | 1530 | 30/-25 | 35  | -65/220  | 0/0    | 40/-40 | 75  | 0   | 0   |
| AUTOBRAKE 4   | 2000 | 40/-30 | 50  | -90/310  | 0/0    | 50/-60 | 110 | 0   | 0   |
| AUTOBRAKE 3   | 2370 | 45/-40 | 70  | -115/385 | 0/-10  | 70/-70 | 120 | 0   | 0   |
| AUTOBRAKE 2   | 2630 | 50/-45 | 80  | -130/445 | 35/-60 | 75/-75 | 100 | 75  | 75  |
| AUTOBRAKE 1   | 2860 | 65/-50 | 100 | -150/520 | 85/-90 | 80/-80 | 100 | 295 | 370 |

##### Good Reported Braking Action

|               |      |        |     |          |        |        |     |     |     |
|---------------|------|--------|-----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1600 | 30/-25 | 40  | -75/265  | 40/-35 | 40/-40 | 60  | 105 | 245 |
| AUTOBRAKE MAX | 1660 | 30/-25 | 45  | -75/270  | 35/-30 | 40/-40 | 70  | 110 | 260 |
| AUTOBRAKE 4   | 2005 | 40/-30 | 50  | -90/315  | 10/-5  | 60/-60 | 110 | 5   | 45  |
| AUTOBRAKE 3   | 2370 | 45/-40 | 70  | -115/385 | 5/-10  | 70/-70 | 120 | 0   | 0   |
| AUTOBRAKE 2   | 2630 | 50/-45 | 80  | -130/445 | 35/-60 | 75/-75 | 100 | 75  | 75  |
| AUTOBRAKE 1   | 2860 | 65/-50 | 100 | -150/520 | 85/-90 | 80/-80 | 100 | 295 | 370 |

##### Medium Reported Braking Action

|               |      |        |     |          |          |        |     |     |     |
|---------------|------|--------|-----|----------|----------|--------|-----|-----|-----|
| MAX MANUAL    | 2145 | 40/-35 | 70  | -115/420 | 90/-75   | 60/-60 | 75  | 280 | 720 |
| AUTOBRAKE MAX | 2145 | 45/-35 | 70  | -115/420 | 100/-75  | 60/-60 | 80  | 275 | 715 |
| AUTOBRAKE 4   | 2220 | 45/-35 | 70  | -120/430 | 75/-45   | 60/-65 | 110 | 260 | 705 |
| AUTOBRAKE 3   | 2475 | 50/-40 | 70  | -125/460 | 45/-40   | 70/-70 | 120 | 120 | 485 |
| AUTOBRAKE 2   | 2685 | 50/-45 | 80  | -140/495 | 70/-80   | 75/-75 | 100 | 140 | 375 |
| AUTOBRAKE 1   | 2870 | 65/-50 | 100 | -150/530 | 110/-100 | 80/-80 | 100 | 315 | 495 |

##### Poor Reported Braking Action

|               |      |        |     |          |          |        |     |     |      |
|---------------|------|--------|-----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2720 | 60/-50 | 90  | -165/645 | 200/-140 | 75/-75 | 85  | 580 | 1710 |
| AUTOBRAKE MAX | 2725 | 60/-50 | 90  | -165/645 | 205/-145 | 75/-75 | 85  | 580 | 1710 |
| AUTOBRAKE 4   | 2725 | 65/-50 | 90  | -165/645 | 205/-130 | 75/-75 | 100 | 580 | 1710 |
| AUTOBRAKE 3   | 2820 | 65/-50 | 90  | -175/655 | 175/-115 | 80/-80 | 120 | 525 | 1655 |
| AUTOBRAKE 2   | 2940 | 65/-50 | 100 | -180/665 | 180/-140 | 80/-80 | 100 | 465 | 1555 |
| AUTOBRAKE 1   | 3050 | 65/-60 | 105 | -185/690 | 200/-150 | 85/-85 | 100 | 545 | 1490 |

Reference distance is based on sea level, standard day, no wind or slope, VREF30, two-engine maximum 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 60 m.

Reference Distance includes an air distance allowance of 305 m from threshold to touchdown.

All reference distances and adjustments shown have been increased by 15%.

## ADVISORY INFORMATION

### Normal Configuration Landing Distance Flaps 25

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                                 |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|---------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ               | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF25 | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |      |        |     |          |          |        |     |     |     |
|---------------|------|--------|-----|----------|----------|--------|-----|-----|-----|
| MAX MANUAL    | 1185 | 30/-15 | 30  | -45/155  | 15/-10   | 30/-30 | 40  | 30  | 65  |
| AUTOBRAKE MAX | 1645 | 25/-25 | 40  | -70/225  | 0/0      | 40/-40 | 80  | 0   | 0   |
| AUTOBRAKE 4   | 2160 | 30/-35 | 60  | -100/320 | 0/0      | 60/-60 | 115 | 0   | 0   |
| AUTOBRAKE 3   | 2570 | 40/-45 | 75  | -120/405 | 0/-25    | 75/-75 | 120 | 5   | 5   |
| AUTOBRAKE 2   | 2830 | 45/-50 | 90  | -140/460 | 40/-70   | 80/-80 | 105 | 115 | 115 |
| AUTOBRAKE 1   | 3065 | 60/-60 | 105 | -155/535 | 100/-100 | 85/-90 | 105 | 350 | 455 |

#### Good Reported Braking Action

|               |      |        |     |          |          |        |     |     |     |
|---------------|------|--------|-----|----------|----------|--------|-----|-----|-----|
| MAX MANUAL    | 1690 | 25/-25 | 45  | -75/270  | 40/-35   | 40/-40 | 65  | 115 | 270 |
| AUTOBRAKE MAX | 1760 | 25/-30 | 45  | -80/275  | 35/-25   | 45/-45 | 80  | 120 | 290 |
| AUTOBRAKE 4   | 2175 | 30/-35 | 60  | -100/335 | 10/-5    | 60/-65 | 115 | 5   | 45  |
| AUTOBRAKE 3   | 2570 | 40/-45 | 75  | -120/405 | 5/-25    | 75/-75 | 120 | 5   | 5   |
| AUTOBRAKE 2   | 2830 | 45/-50 | 90  | -140/460 | 40/-70   | 80/-80 | 105 | 115 | 115 |
| AUTOBRAKE 1   | 3065 | 60/-60 | 105 | -155/535 | 100/-100 | 85/-90 | 105 | 350 | 455 |

#### Medium Reported Braking Action

|               |      |        |     |          |          |        |     |     |     |
|---------------|------|--------|-----|----------|----------|--------|-----|-----|-----|
| MAX MANUAL    | 2275 | 40/-40 | 75  | -120/430 | 100/-80  | 65/-65 | 75  | 310 | 800 |
| AUTOBRAKE MAX | 2275 | 40/-40 | 75  | -120/430 | 100/-75  | 65/-65 | 85  | 310 | 800 |
| AUTOBRAKE 4   | 2385 | 40/-40 | 75  | -120/445 | 70/-45   | 65/-65 | 115 | 260 | 765 |
| AUTOBRAKE 3   | 2680 | 40/-45 | 80  | -130/475 | 45/-50   | 75/-75 | 120 | 125 | 510 |
| AUTOBRAKE 2   | 2880 | 45/-50 | 90  | -145/510 | 80/-85   | 80/-80 | 105 | 180 | 430 |
| AUTOBRAKE 1   | 3075 | 60/-60 | 105 | -155/550 | 120/-105 | 90/-90 | 105 | 375 | 585 |

#### Poor Reported Braking Action

|               |      |        |     |          |          |        |     |     |      |
|---------------|------|--------|-----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2890 | 60/-50 | 105 | -175/660 | 215/-150 | 80/-80 | 90  | 640 | 1905 |
| AUTOBRAKE MAX | 2900 | 60/-50 | 105 | -175/660 | 220/-150 | 80/-80 | 90  | 645 | 1905 |
| AUTOBRAKE 4   | 2900 | 60/-50 | 105 | -175/660 | 215/-140 | 80/-80 | 100 | 645 | 1910 |
| AUTOBRAKE 3   | 3025 | 60/-60 | 105 | -180/675 | 180/-125 | 85/-85 | 120 | 550 | 1825 |
| AUTOBRAKE 2   | 3140 | 60/-60 | 110 | -185/690 | 195/-145 | 85/-85 | 100 | 530 | 1725 |
| AUTOBRAKE 1   | 3260 | 65/-65 | 115 | -190/705 | 215/-155 | 90/-90 | 105 | 615 | 1675 |

Reference distance is based on sea level, standard day, no wind or slope, VREF25, two-engine maximum reverse thrust, and auto speedbrakes.

For max manual braking and manual speedbrakes, increase reference landing distance by 80 m.

For autobrake and manual speedbrakes, increase reference landing distance by 70 m.

Reference Distance includes an air distance allowance of 305 m from threshold to touchdown.

All reference distances and adjustments shown have been increased by 15%.

## ADVISORY INFORMATION

### Normal Configuration Landing Distance

#### Flaps 20

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                                 |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|---------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ               | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF20 | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |      |        |     |          |          |          |     |     |     |
|---------------|------|--------|-----|----------|----------|----------|-----|-----|-----|
| MAX MANUAL    | 1290 | 35/-15 | 30  | -45/160  | 15/-15   | 30/-30   | 45  | 35  | 75  |
| AUTOBRAKE MAX | 1825 | 25/-30 | 45  | -70/240  | 0/0      | 45/-45   | 85  | 0   | 0   |
| AUTOBRAKE 4   | 2415 | 35/-40 | 70  | -105/345 | 0/0      | 70/-70   | 120 | 0   | 0   |
| AUTOBRAKE 3   | 2875 | 45/-50 | 85  | -125/425 | 5/-30    | 85/-85   | 130 | 10  | 10  |
| AUTOBRAKE 2   | 3165 | 50/-60 | 105 | -145/490 | 50/-75   | 90/-90   | 110 | 150 | 150 |
| AUTOBRAKE 1   | 3420 | 65/-70 | 120 | -165/565 | 110/-115 | 105/-105 | 110 | 425 | 560 |

#### Good Reported Braking Action

|               |      |        |     |          |          |          |     |     |     |
|---------------|------|--------|-----|----------|----------|----------|-----|-----|-----|
| MAX MANUAL    | 1855 | 30/-30 | 50  | -80/280  | 45/-40   | 45/-45   | 65  | 140 | 330 |
| AUTOBRAKE MAX | 1940 | 30/-30 | 50  | -85/295  | 40/-25   | 50/-50   | 85  | 140 | 340 |
| AUTOBRAKE 4   | 2420 | 35/-40 | 70  | -105/350 | 10/0     | 70/-70   | 120 | 5   | 50  |
| AUTOBRAKE 3   | 2875 | 45/-50 | 85  | -125/425 | 5/-30    | 85/-85   | 130 | 10  | 10  |
| AUTOBRAKE 2   | 3165 | 50/-60 | 105 | -145/490 | 50/-75   | 90/-90   | 110 | 150 | 150 |
| AUTOBRAKE 1   | 3420 | 65/-70 | 120 | -165/565 | 110/-115 | 105/-105 | 110 | 425 | 560 |

#### Medium Reported Braking Action

|               |      |        |     |          |          |          |     |     |     |
|---------------|------|--------|-----|----------|----------|----------|-----|-----|-----|
| MAX MANUAL    | 2520 | 45/-45 | 80  | -125/455 | 110/-85  | 70/-70   | 80  | 370 | 960 |
| AUTOBRAKE MAX | 2515 | 45/-45 | 80  | -125/455 | 110/-80  | 70/-70   | 90  | 360 | 955 |
| AUTOBRAKE 4   | 2645 | 45/-45 | 80  | -130/465 | 75/-50   | 75/-75   | 120 | 295 | 905 |
| AUTOBRAKE 3   | 2980 | 45/-50 | 90  | -145/505 | 60/-60   | 85/-85   | 125 | 150 | 610 |
| AUTOBRAKE 2   | 3215 | 60/-60 | 105 | -155/540 | 85/-90   | 90/-90   | 110 | 225 | 525 |
| AUTOBRAKE 1   | 3435 | 65/-70 | 120 | -165/580 | 130/-120 | 105/-105 | 110 | 455 | 705 |

#### Poor Reported Braking Action

|               |      |        |     |          |          |          |     |     |      |
|---------------|------|--------|-----|----------|----------|----------|-----|-----|------|
| MAX MANUAL    | 3195 | 65/-65 | 115 | -185/690 | 230/-160 | 85/-85   | 90  | 755 | 2270 |
| AUTOBRAKE MAX | 3205 | 65/-65 | 115 | -185/690 | 235/-165 | 90/-90   | 100 | 755 | 2270 |
| AUTOBRAKE 4   | 3205 | 65/-65 | 115 | -185/690 | 235/-150 | 90/-90   | 110 | 755 | 2275 |
| AUTOBRAKE 3   | 3350 | 65/-65 | 115 | -190/700 | 190/-140 | 100/-100 | 125 | 640 | 2170 |
| AUTOBRAKE 2   | 3485 | 65/-70 | 120 | -195/720 | 205/-160 | 100/-100 | 110 | 620 | 2060 |
| AUTOBRAKE 1   | 3615 | 70/-70 | 125 | -200/740 | 230/-175 | 105/-105 | 110 | 725 | 1995 |

Reference distance is based on sea level, standard day, no wind or slope, VREF20, two-engine maximum reverse thrust, and auto speedbrakes.

For max manual braking and manual speedbrakes, increase reference landing distance by 80 m.

For autobrake and manual speedbrakes, increase reference landing distance by 70 m.

Reference Distance includes an air distance allowance of 305 m from threshold to touchdown.

All reference distances and adjustments shown have been increased by 15%.



ADVISORY INFORMATION

Non-Normal Configuration Landing Distance  
ADIRU/GPS DISAGREE (Flaps 25)

VREF25

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

Dry Runway

|               |                       |        |    |         |        |        |    |    |     |
|---------------|-----------------------|--------|----|---------|--------|--------|----|----|-----|
| MAX MANUAL    | 1275                  | 40/-20 | 35 | -55/190 | 25/-20 | 30/-30 | 45 | 60 | 135 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |         |        |        |    |    |     |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |         |        |        |    |    |     |

Good Reported Braking Action

|               |                       |        |    |         |        |        |    |     |     |
|---------------|-----------------------|--------|----|---------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1780                  | 30/-30 | 55 | -90/315 | 65/-50 | 45/-45 | 60 | 195 | 480 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |         |        |        |    |     |     |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |         |        |        |    |     |     |

Medium Reported Braking Action

|               |                       |        |    |          |         |        |    |     |      |
|---------------|-----------------------|--------|----|----------|---------|--------|----|-----|------|
| MAX MANUAL    | 2255                  | 40/-40 | 75 | -125/470 | 130/-95 | 60/-60 | 75 | 400 | 1110 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |          |         |        |    |     |      |
| AUTOBRAKE 3   | Autobrake Inoperative |        |    |          |         |        |    |     |      |

Poor Reported Braking Action

|               |                       |        |     |          |          |        |    |     |      |
|---------------|-----------------------|--------|-----|----------|----------|--------|----|-----|------|
| MAX MANUAL    | 2890                  | 60/-55 | 105 | -190/760 | 335/-185 | 80/-80 | 85 | 860 | 2965 |
| 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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### ADIRU/GPS DISAGREE (Flaps 30)

#### VREF30

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |                       |        |    |         |        |        |    |    |     |
|---------------|-----------------------|--------|----|---------|--------|--------|----|----|-----|
| MAX MANUAL    | 1210                  | 40/-15 | 30 | -55/185 | 25/-20 | 30/-30 | 45 | 55 | 120 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |         |        |        |    |    |     |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |         |        |        |    |    |     |

#### Good Reported Braking Action

|               |                       |        |    |         |        |        |    |     |     |
|---------------|-----------------------|--------|----|---------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1680                  | 30/-25 | 50 | -85/310 | 60/-50 | 45/-45 | 60 | 175 | 430 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |         |        |        |    |     |     |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |         |        |        |    |     |     |

#### Medium Reported Braking Action

|               |                       |        |    |          |         |        |    |     |     |
|---------------|-----------------------|--------|----|----------|---------|--------|----|-----|-----|
| MAX MANUAL    | 2125                  | 45/-35 | 70 | -125/460 | 120/-90 | 55/-55 | 70 | 365 | 995 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |          |         |        |    |     |     |
| AUTOBRAKE 3   | Autobrake Inoperative |        |    |          |         |        |    |     |     |

#### Poor Reported Braking Action

|               |                       |        |     |          |          |        |    |     |      |
|---------------|-----------------------|--------|-----|----------|----------|--------|----|-----|------|
| MAX MANUAL    | 2720                  | 60/-50 | 100 | -185/740 | 325/-175 | 75/-75 | 80 | 785 | 2670 |
| 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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**AIR DATA SYS (Flaps 20)**

**VREF20**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |      |        |    |          |        |        |     |    |    |
|---------------|------|--------|----|----------|--------|--------|-----|----|----|
| MAX MANUAL    | 1295 | 30/-15 | 30 | -45/160  | 20/-15 | 30/-30 | 50  | 40 | 90 |
| AUTOBRAKE MAX | 1585 | 20/-25 | 40 | -60/210  | 0/0    | 40/-40 | 75  | 0  | 0  |
| AUTOBRAKE 2   | 2855 | 45/-50 | 90 | -130/435 | 15/-40 | 85/-85 | 130 | 30 | 30 |

**Good Reported Braking Action**

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1835 | 30/-30 | 55 | -80/270  | 50/-45 | 45/-45 | 70  | 155 | 380 |
| AUTOBRAKE MAX | 1820 | 30/-30 | 55 | -80/270  | 50/-40 | 50/-50 | 75  | 155 | 375 |
| AUTOBRAKE 2   | 2855 | 45/-50 | 90 | -130/435 | 15/-40 | 85/-85 | 130 | 30  | 30  |

**Medium Reported Braking Action**

|               |      |        |    |          |         |        |     |     |      |
|---------------|------|--------|----|----------|---------|--------|-----|-----|------|
| MAX MANUAL    | 2450 | 45/-45 | 80 | -120/425 | 110/-90 | 65/-65 | 90  | 400 | 1095 |
| AUTOBRAKE MAX | 2440 | 45/-45 | 85 | -120/425 | 120/-95 | 65/-65 | 90  | 400 | 1090 |
| AUTOBRAKE 3   | 2645 | 45/-45 | 80 | -125/445 | 65/-40  | 75/-75 | 130 | 220 | 910  |

**Poor Reported Braking Action**

|               |      |        |     |          |          |        |     |     |      |
|---------------|------|--------|-----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 3075 | 60/-60 | 115 | -170/635 | 230/-160 | 85/-85 | 100 | 805 | 2575 |
| AUTOBRAKE MAX | 3080 | 60/-60 | 115 | -170/635 | 240/-170 | 85/-85 | 100 | 805 | 2580 |
| AUTOBRAKE 3   | 3110 | 60/-60 | 110 | -170/635 | 225/-145 | 90/-90 | 115 | 775 | 2550 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.



## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### Airspeed Unreliable (Flaps 20)

#### VREF20

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |      |        |     |          |        |        |     |    |     |
|---------------|------|--------|-----|----------|--------|--------|-----|----|-----|
| MAX MANUAL    | 1400 | 30/-20 | 35  | -50/165  | 20/-20 | 35/-35 | N/A | 45 | 105 |
| AUTOBRAKE MAX | 1730 | 25/-25 | 45  | -65/220  | 0/0    | 45/-45 | N/A | 0  | 0   |
| AUTOBRAKE 2   | 3110 | 50/-55 | 100 | -135/455 | 35/-55 | 95/-95 | N/A | 80 | 80  |

#### Good Reported Braking Action

|               |      |        |     |          |        |        |     |     |     |
|---------------|------|--------|-----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1980 | 30/-30 | 60  | -80/280  | 55/-45 | 50/-50 | N/A | 180 | 430 |
| AUTOBRAKE MAX | 1970 | 30/-30 | 60  | -80/280  | 50/-45 | 55/-55 | N/A | 175 | 430 |
| AUTOBRAKE 2   | 3110 | 50/-55 | 100 | -135/455 | 35/-55 | 95/-95 | N/A | 80  | 80  |

#### Medium Reported Braking Action

|               |      |        |    |          |          |        |     |     |      |
|---------------|------|--------|----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2625 | 45/-45 | 90 | -125/435 | 120/-95  | 70/-70 | N/A | 440 | 1200 |
| AUTOBRAKE MAX | 2615 | 45/-45 | 90 | -125/435 | 125/-100 | 75/-75 | N/A | 440 | 1195 |
| AUTOBRAKE 3   | 2900 | 45/-50 | 90 | -135/465 | 65/-50   | 85/-85 | N/A | 205 | 945  |

#### Poor Reported Braking Action

|               |      |        |     |          |          |        |     |     |      |
|---------------|------|--------|-----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 3275 | 65/-65 | 120 | -175/650 | 240/-170 | 90/-90 | N/A | 860 | 2740 |
| AUTOBRAKE MAX | 3280 | 65/-65 | 125 | -175/650 | 250/-175 | 95/-95 | N/A | 860 | 2745 |
| AUTOBRAKE 3   | 3345 | 60/-60 | 120 | -175/655 | 225/-150 | 95/-95 | N/A | 795 | 2680 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**ANTISKID (Flaps 25)**

**VREF25**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |                       |        |    |          |        |        |    |     |     |
|---------------|-----------------------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1980                  | 35/-35 | 65 | -105/375 | 85/-70 | 55/-55 | 65 | 270 | 695 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |          |        |        |    |     |     |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |          |        |        |    |     |     |

**Good Reported Braking Action**

|               |                       |        |    |          |        |        |    |     |     |
|---------------|-----------------------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1980                  | 35/-35 | 65 | -105/375 | 85/-70 | 55/-55 | 65 | 270 | 695 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |          |        |        |    |     |     |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |          |        |        |    |     |     |

**Medium Reported Braking Action**

|               |                       |        |    |          |          |        |    |     |      |
|---------------|-----------------------|--------|----|----------|----------|--------|----|-----|------|
| MAX MANUAL    | 2515                  | 50/-45 | 90 | -150/575 | 185/-130 | 70/-70 | 75 | 555 | 1655 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |          |          |        |    |     |      |
| AUTOBRAKE 3   | Autobrake Inoperative |        |    |          |          |        |    |     |      |

**Poor Reported Braking Action**

|               |                       |        |     |           |           |        |    |      |      |
|---------------|-----------------------|--------|-----|-----------|-----------|--------|----|------|------|
| MAX MANUAL    | 3340                  | 70/-70 | 125 | -245/1055 | 1065/-280 | 90/-90 | 85 | 1460 | 2765 |
| 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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### ANTISKID (Flaps 30)

#### VREF30

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |                       |        |    |          |        |        |    |     |     |
|---------------|-----------------------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1865                  | 35/-30 | 60 | -100/365 | 80/-65 | 50/-50 | 65 | 245 | 625 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |          |        |        |    |     |     |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |          |        |        |    |     |     |

#### Good Reported Braking Action

|               |                       |        |    |          |        |        |    |     |     |
|---------------|-----------------------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1865                  | 35/-30 | 60 | -100/365 | 80/-65 | 50/-50 | 65 | 245 | 625 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |          |        |        |    |     |     |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |          |        |        |    |     |     |

#### Medium Reported Braking Action

|               |                       |        |    |          |          |        |    |     |      |
|---------------|-----------------------|--------|----|----------|----------|--------|----|-----|------|
| MAX MANUAL    | 2365                  | 50/-45 | 80 | -145/560 | 175/-120 | 65/-65 | 75 | 505 | 1485 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |          |          |        |    |     |      |
| AUTOBRAKE 3   | Autobrake Inoperative |        |    |          |          |        |    |     |      |

#### Poor Reported Braking Action

|               |                       |        |     |           |           |        |    |      |      |
|---------------|-----------------------|--------|-----|-----------|-----------|--------|----|------|------|
| MAX MANUAL    | 3145                  | 75/-65 | 115 | -240/1035 | 1030/-265 | 85/-85 | 85 | 1350 | 2955 |
| 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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**ENG SHUTDOWN L, R (Flaps 20)**

**VREF20**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |      |        |    |          |        |        |     |   |    |
|---------------|------|--------|----|----------|--------|--------|-----|---|----|
| MAX MANUAL    | 1135 | 35/-15 | 25 | -45/145  | 15/-15 | 25/-25 | 40  | 0 | 35 |
| AUTOBRAKE MAX | 1585 | 25/-25 | 40 | -60/210  | 0/0    | 40/-40 | 75  | 0 | 0  |
| AUTOBRAKE 2   | 2860 | 45/-50 | 85 | -130/435 | 10/-35 | 85/-85 | 130 | 0 | 0  |

**Good Reported Braking Action**

|               |      |        |    |          |        |        |     |   |     |
|---------------|------|--------|----|----------|--------|--------|-----|---|-----|
| MAX MANUAL    | 1700 | 25/-25 | 50 | -75/260  | 50/-40 | 45/-45 | 60  | 0 | 155 |
| AUTOBRAKE MAX | 1775 | 25/-30 | 50 | -80/270  | 45/-40 | 45/-45 | 70  | 0 | 165 |
| AUTOBRAKE 2   | 2860 | 45/-50 | 85 | -130/435 | 10/-35 | 85/-85 | 130 | 0 | 0   |

**Medium Reported Braking Action**

|               |      |        |    |          |          |        |     |   |     |
|---------------|------|--------|----|----------|----------|--------|-----|---|-----|
| MAX MANUAL    | 2425 | 40/-45 | 75 | -125/440 | 130/-100 | 70/-70 | 80  | 0 | 475 |
| AUTOBRAKE MAX | 2430 | 40/-45 | 80 | -125/440 | 125/-95  | 70/-70 | 90  | 0 | 470 |
| AUTOBRAKE 3   | 2680 | 45/-45 | 85 | -130/465 | 85/-60   | 80/-80 | 120 | 0 | 340 |

**Poor Reported Braking Action**

|               |      |        |     |          |          |          |     |   |      |
|---------------|------|--------|-----|----------|----------|----------|-----|---|------|
| MAX MANUAL    | 3265 | 60/-60 | 115 | -190/700 | 310/-205 | 95/-95   | 100 | 0 | 1150 |
| AUTOBRAKE MAX | 3265 | 60/-65 | 115 | -190/700 | 315/-210 | 95/-95   | 100 | 0 | 1150 |
| AUTOBRAKE 3   | 3310 | 65/-65 | 115 | -190/700 | 305/-190 | 100/-100 | 115 | 0 | 1165 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### ENG SHUTDOWN L, R (Flaps 30)

#### VREF30

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |      |        |    |          |        |        |     |   |    |
|---------------|------|--------|----|----------|--------|--------|-----|---|----|
| MAX MANUAL    | 990  | 25/-15 | 20 | -40/135  | 15/-10 | 20/-20 | 40  | 0 | 25 |
| AUTOBRAKE MAX | 1330 | 25/-20 | 30 | -55/190  | 0/0    | 35/-35 | 65  | 0 | 0  |
| AUTOBRAKE 2   | 2335 | 45/-40 | 65 | -115/390 | 10/-20 | 70/-70 | 120 | 0 | 0  |

#### Good Reported Braking Action

|               |      |        |    |          |        |        |     |   |     |
|---------------|------|--------|----|----------|--------|--------|-----|---|-----|
| MAX MANUAL    | 1450 | 25/-20 | 40 | -70/240  | 40/-35 | 35/-35 | 55  | 0 | 115 |
| AUTOBRAKE MAX | 1515 | 30/-25 | 40 | -70/245  | 35/-30 | 40/-40 | 65  | 0 | 120 |
| AUTOBRAKE 2   | 2335 | 45/-40 | 65 | -115/390 | 10/-20 | 70/-70 | 120 | 0 | 0   |

#### Medium Reported Braking Action

|               |      |        |    |          |         |        |     |   |     |
|---------------|------|--------|----|----------|---------|--------|-----|---|-----|
| MAX MANUAL    | 2035 | 40/-35 | 60 | -110/405 | 110/-85 | 55/-55 | 75  | 0 | 350 |
| AUTOBRAKE MAX | 2040 | 40/-35 | 65 | -110/405 | 110/-80 | 55/-55 | 85  | 0 | 345 |
| AUTOBRAKE 3   | 2220 | 45/-35 | 65 | -120/425 | 75/-55  | 65/-65 | 105 | 0 | 265 |

#### Poor Reported Braking Action

|               |      |        |    |          |          |        |    |   |     |
|---------------|------|--------|----|----------|----------|--------|----|---|-----|
| MAX MANUAL    | 2720 | 60/-50 | 90 | -170/645 | 265/-170 | 80/-80 | 90 | 0 | 840 |
| AUTOBRAKE MAX | 2725 | 60/-50 | 90 | -170/645 | 265/-175 | 80/-80 | 90 | 0 | 845 |
| AUTOBRAKE 3   | 2760 | 60/-50 | 95 | -170/645 | 260/-165 | 80/-80 | 95 | 0 | 855 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**FLAP / SLAT CONTROL (Flaps 20)**

**VREF20**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |      |        |    |          |        |        |    |     |     |
|---------------|------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1120 | 30/-15 | 25 | -40/140  | 15/-15 | 25/-25 | 40 | 30  | 65  |
| AUTOBRAKE MAX | 1585 | 20/-25 | 40 | -60/210  | 0/0    | 40/-40 | 75 | 0   | 0   |
| AUTOBRAKE 2   | 2750 | 45/-50 | 90 | -125/425 | 45/-65 | 80/-80 | 95 | 130 | 130 |

**Good Reported Braking Action**

|               |      |        |    |          |        |        |    |     |     |
|---------------|------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1615 | 25/-25 | 45 | -70/245  | 40/-35 | 40/-40 | 55 | 120 | 285 |
| AUTOBRAKE MAX | 1685 | 25/-25 | 45 | -75/255  | 35/-20 | 45/-45 | 75 | 120 | 295 |
| AUTOBRAKE 2   | 2750 | 45/-50 | 90 | -125/425 | 45/-65 | 80/-80 | 95 | 130 | 130 |

**Medium Reported Braking Action**

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 2190 | 40/-40 | 70 | -110/395 | 95/-75 | 60/-60 | 70  | 320 | 835 |
| AUTOBRAKE MAX | 2185 | 40/-40 | 70 | -110/395 | 95/-70 | 60/-60 | 75  | 315 | 830 |
| AUTOBRAKE 3   | 2590 | 40/-45 | 80 | -125/440 | 50/-50 | 75/-75 | 110 | 130 | 530 |

**Poor Reported Braking Action**

|               |      |        |     |          |          |        |     |     |      |
|---------------|------|--------|-----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2780 | 55/-55 | 100 | -160/600 | 200/-140 | 75/-75 | 80  | 655 | 1975 |
| AUTOBRAKE MAX | 2785 | 55/-55 | 100 | -160/600 | 205/-145 | 80/-80 | 80  | 655 | 1975 |
| AUTOBRAKE 3   | 2915 | 55/-55 | 100 | -165/610 | 165/-120 | 85/-85 | 110 | 555 | 1885 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### FLAPS DRIVE (Flaps ≤ 5)

#### VREF30 + 40

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV<br>NO<br>REV  |

#### Dry Runway

|               |      |        |     |          |        |          |     |     |     |
|---------------|------|--------|-----|----------|--------|----------|-----|-----|-----|
| MAX MANUAL    | 1260 | 50/-15 | 40  | -45/190  | 15/-15 | 35/-30   | 50  | 45  | 115 |
| AUTOBRAKE MAX | 1905 | 30/-25 | 50  | -70/230  | 0/0    | 50/-50   | 80  | 0   | 0   |
| AUTOBRAKE 2   | 3290 | 65/-60 | 115 | -140/465 | 60/-80 | 100/-100 | 110 | 270 | 270 |

#### Good Reported Braking Action

|               |      |        |     |          |        |          |     |     |     |
|---------------|------|--------|-----|----------|--------|----------|-----|-----|-----|
| MAX MANUAL    | 1815 | 30/-25 | 55  | -75/260  | 40/-35 | 50/-50   | 55  | 160 | 390 |
| AUTOBRAKE MAX | 1975 | 30/-25 | 55  | -80/270  | 20/-15 | 55/-55   | 80  | 95  | 330 |
| AUTOBRAKE 2   | 3290 | 65/-60 | 115 | -140/465 | 60/-80 | 100/-100 | 110 | 270 | 270 |

#### Medium Reported Braking Action

|               |      |        |     |          |         |        |     |     |      |
|---------------|------|--------|-----|----------|---------|--------|-----|-----|------|
| MAX MANUAL    | 2495 | 45/-40 | 85  | -115/415 | 100/-80 | 70/-70 | 70  | 435 | 1200 |
| AUTOBRAKE MAX | 2485 | 45/-40 | 85  | -115/415 | 100/-75 | 70/-70 | 80  | 430 | 1190 |
| AUTOBRAKE 3   | 3105 | 55/-50 | 100 | -135/475 | 55/-60  | 90/-90 | 115 | 175 | 710  |

#### Poor Reported Braking Action

|               |      |        |     |          |          |          |     |     |      |
|---------------|------|--------|-----|----------|----------|----------|-----|-----|------|
| MAX MANUAL    | 3200 | 65/-60 | 120 | -170/625 | 215/-150 | 90/-90   | 85  | 895 | 2980 |
| AUTOBRAKE MAX | 3195 | 65/-60 | 120 | -170/625 | 220/-155 | 90/-90   | 85  | 895 | 2975 |
| AUTOBRAKE 3   | 3405 | 70/-60 | 120 | -175/645 | 185/-125 | 100/-100 | 115 | 705 | 2790 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**FLAPS DRIVE (5 < Flaps < 20)**

**VREF30 + 20**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1130 | 40/-15 | 25 | -40/140  | 15/-15 | 25/-25 | 40  | 30  | 70  |
| AUTOBRAKE MAX | 1600 | 25/-20 | 40 | -65/210  | 0/0    | 40/-40 | 75  | 0   | 0   |
| AUTOBRAKE 2   | 2810 | 55/-50 | 90 | -130/430 | 40/-55 | 85/-85 | 110 | 110 | 110 |

**Good Reported Braking Action**

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1635 | 30/-25 | 45 | -70/250  | 40/-35 | 40/-40 | 55  | 135 | 320 |
| AUTOBRAKE MAX | 1690 | 30/-25 | 50 | -75/255  | 35/-20 | 45/-45 | 70  | 130 | 325 |
| AUTOBRAKE 2   | 2810 | 55/-50 | 90 | -130/430 | 40/-55 | 85/-85 | 110 | 110 | 110 |

**Medium Reported Braking Action**

|               |      |        |    |          |         |        |     |     |     |
|---------------|------|--------|----|----------|---------|--------|-----|-----|-----|
| MAX MANUAL    | 2230 | 45/-35 | 75 | -110/400 | 95/-80  | 60/-60 | 75  | 355 | 960 |
| AUTOBRAKE MAX | 2225 | 45/-35 | 75 | -110/400 | 100/-80 | 60/-60 | 75  | 355 | 955 |
| AUTOBRAKE 3   | 2625 | 50/-40 | 80 | -125/440 | 45/-40  | 75/-75 | 120 | 130 | 635 |

**Poor Reported Braking Action**

|               |      |        |     |          |          |        |     |     |      |
|---------------|------|--------|-----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2850 | 60/-50 | 105 | -160/605 | 205/-145 | 80/-80 | 85  | 735 | 2335 |
| AUTOBRAKE MAX | 2850 | 60/-50 | 105 | -160/605 | 210/-145 | 80/-80 | 85  | 735 | 2340 |
| AUTOBRAKE 3   | 2950 | 60/-50 | 100 | -165/615 | 180/-110 | 85/-85 | 115 | 640 | 2245 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.



## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### FLAPS DRIVE (Flaps ≥ 20)

#### VREF20

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |      |        |    |          |        |        |    |     |     |
|---------------|------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1120 | 30/-15 | 25 | -40/140  | 15/-15 | 25/-25 | 40 | 30  | 65  |
| AUTOBRAKE MAX | 1585 | 20/-25 | 40 | -60/210  | 0/0    | 40/-40 | 75 | 0   | 0   |
| AUTOBRAKE 2   | 2750 | 45/-50 | 90 | -125/425 | 45/-65 | 80/-80 | 95 | 130 | 130 |

#### Good Reported Braking Action

|               |      |        |    |          |        |        |    |     |     |
|---------------|------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1615 | 25/-25 | 45 | -70/245  | 40/-35 | 40/-40 | 55 | 120 | 285 |
| AUTOBRAKE MAX | 1675 | 25/-25 | 45 | -75/250  | 35/-20 | 45/-45 | 75 | 120 | 295 |
| AUTOBRAKE 2   | 2750 | 45/-50 | 90 | -125/425 | 45/-65 | 80/-80 | 95 | 130 | 130 |

#### Medium Reported Braking Action

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 2190 | 40/-40 | 70 | -110/395 | 95/-75 | 60/-60 | 70  | 320 | 835 |
| AUTOBRAKE MAX | 2185 | 40/-40 | 70 | -110/395 | 95/-70 | 60/-60 | 75  | 315 | 830 |
| AUTOBRAKE 3   | 2585 | 40/-45 | 80 | -125/440 | 50/-50 | 75/-75 | 110 | 130 | 530 |

#### Poor Reported Braking Action

|               |      |        |     |          |          |        |     |     |      |
|---------------|------|--------|-----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2780 | 55/-55 | 100 | -160/600 | 200/-140 | 75/-75 | 80  | 655 | 1975 |
| AUTOBRAKE MAX | 2785 | 55/-55 | 100 | -160/600 | 205/-145 | 80/-80 | 80  | 655 | 1975 |
| AUTOBRAKE 3   | 2915 | 55/-55 | 100 | -165/610 | 165/-120 | 85/-85 | 110 | 555 | 1885 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**FLAPS PRIMARY FAIL (Flaps 20)**

**VREF20**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |      |        |    |          |        |        |     |    |    |
|---------------|------|--------|----|----------|--------|--------|-----|----|----|
| MAX MANUAL    | 1280 | 30/-15 | 30 | -45/155  | 15/-15 | 30/-30 | 50  | 40 | 85 |
| AUTOBRAKE MAX | 1585 | 20/-25 | 40 | -60/210  | 0/0    | 40/-40 | 75  | 0  | 0  |
| AUTOBRAKE 2   | 2835 | 45/-50 | 90 | -130/435 | 25/-45 | 85/-85 | 120 | 50 | 50 |

**Good Reported Braking Action**

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1805 | 25/-30 | 50 | -75/265  | 45/-40 | 45/-45 | 70  | 150 | 355 |
| AUTOBRAKE MAX | 1795 | 30/-30 | 50 | -75/265  | 45/-40 | 45/-45 | 75  | 150 | 355 |
| AUTOBRAKE 2   | 2835 | 45/-50 | 90 | -130/435 | 25/-45 | 85/-85 | 120 | 50  | 50  |

**Medium Reported Braking Action**

|               |      |        |    |          |         |        |     |     |      |
|---------------|------|--------|----|----------|---------|--------|-----|-----|------|
| MAX MANUAL    | 2400 | 40/-40 | 80 | -120/420 | 105/-85 | 65/-65 | 85  | 380 | 1020 |
| AUTOBRAKE MAX | 2390 | 40/-40 | 80 | -115/415 | 115/-90 | 65/-65 | 85  | 375 | 1010 |
| AUTOBRAKE 3   | 2635 | 40/-45 | 80 | -125/445 | 60/-45  | 75/-75 | 125 | 180 | 800  |

**Poor Reported Braking Action**

|               |      |        |     |          |          |        |     |     |      |
|---------------|------|--------|-----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 3005 | 60/-60 | 110 | -165/625 | 225/-155 | 85/-85 | 95  | 755 | 2370 |
| AUTOBRAKE MAX | 3010 | 60/-60 | 110 | -170/625 | 230/-160 | 85/-85 | 95  | 755 | 2375 |
| AUTOBRAKE 3   | 3055 | 60/-55 | 110 | -170/630 | 215/-135 | 85/-85 | 115 | 710 | 2330 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### FLIGHT CONTROL MODE (Flaps 20)

#### VREF20

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |      |        |    |          |        |        |     |    |    |
|---------------|------|--------|----|----------|--------|--------|-----|----|----|
| MAX MANUAL    | 1295 | 30/-15 | 30 | -45/160  | 20/-15 | 30/-30 | 50  | 40 | 90 |
| AUTOBRAKE MAX | 1585 | 20/-25 | 40 | -60/210  | 0/0    | 40/-40 | 75  | 0  | 0  |
| AUTOBRAKE 2   | 2855 | 45/-50 | 90 | -130/435 | 15/-40 | 85/-85 | 130 | 30 | 30 |

#### Good Reported Braking Action

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1835 | 30/-30 | 55 | -80/270  | 50/-45 | 45/-45 | 70  | 155 | 380 |
| AUTOBRAKE MAX | 1820 | 30/-30 | 55 | -80/270  | 50/-40 | 50/-50 | 75  | 155 | 375 |
| AUTOBRAKE 2   | 2855 | 45/-50 | 90 | -130/435 | 15/-40 | 85/-85 | 130 | 30  | 30  |

#### Medium Reported Braking Action

|               |      |        |    |          |         |        |     |     |      |
|---------------|------|--------|----|----------|---------|--------|-----|-----|------|
| MAX MANUAL    | 2450 | 45/-45 | 80 | -120/425 | 110/-90 | 65/-65 | 90  | 400 | 1095 |
| AUTOBRAKE MAX | 2440 | 45/-45 | 85 | -120/425 | 120/-95 | 65/-65 | 90  | 400 | 1090 |
| AUTOBRAKE 3   | 2645 | 45/-45 | 80 | -125/445 | 65/-40  | 75/-75 | 130 | 220 | 910  |

#### Poor Reported Braking Action

|               |      |        |     |          |          |        |     |     |      |
|---------------|------|--------|-----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 3075 | 60/-60 | 115 | -170/635 | 230/-160 | 85/-85 | 100 | 805 | 2575 |
| AUTOBRAKE MAX | 3080 | 60/-60 | 115 | -170/635 | 240/-170 | 85/-85 | 100 | 805 | 2580 |
| AUTOBRAKE 3   | 3110 | 60/-60 | 110 | -170/635 | 225/-145 | 90/-90 | 115 | 775 | 2550 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**FLIGHT CONTROLS (Flaps 20)**

**VREF30 + 20**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |      |        |    |          |        |        |     |    |     |
|---------------|------|--------|----|----------|--------|--------|-----|----|-----|
| MAX MANUAL    | 1345 | 30/-15 | 35 | -50/165  | 25/-20 | 35/-35 | 65  | 60 | 130 |
| AUTOBRAKE MAX | 1600 | 25/-20 | 40 | -65/210  | 0/0    | 40/-40 | 75  | 0  | 10  |
| AUTOBRAKE 2   | 2905 | 55/-50 | 90 | -130/440 | 10/-35 | 85/-85 | 135 | 20 | 20  |

**Good Reported Braking Action**

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1930 | 35/-30 | 60 | -80/280  | 60/-50 | 50/-50 | 85  | 210 | 520 |
| AUTOBRAKE MAX | 1915 | 35/-30 | 60 | -80/280  | 65/-55 | 50/-50 | 85  | 205 | 505 |
| AUTOBRAKE 2   | 2905 | 55/-50 | 90 | -130/440 | 10/-35 | 85/-85 | 135 | 20  | 20  |

**Medium Reported Braking Action**

|               |      |        |    |          |          |        |     |     |      |
|---------------|------|--------|----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2570 | 50/-45 | 90 | -125/440 | 130/-105 | 70/-70 | 100 | 495 | 1405 |
| AUTOBRAKE MAX | 2565 | 50/-45 | 90 | -125/440 | 135/-105 | 70/-70 | 100 | 495 | 1400 |
| AUTOBRAKE 3   | 2685 | 50/-40 | 85 | -130/450 | 95/-45   | 80/-80 | 125 | 370 | 1275 |

**Poor Reported Braking Action**

|               |      |        |     |          |          |        |     |     |      |
|---------------|------|--------|-----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 3205 | 70/-60 | 125 | -175/650 | 255/-180 | 90/-90 | 110 | 945 | 3160 |
| AUTOBRAKE MAX | 3210 | 70/-60 | 125 | -175/650 | 260/-180 | 90/-90 | 110 | 945 | 3160 |
| AUTOBRAKE 3   | 3220 | 70/-60 | 125 | -175/650 | 255/-160 | 90/-90 | 120 | 935 | 3150 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### HYD PRESS SYS C (Flaps 20)

#### VREF20

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |      |        |    |          |        |        |     |    |    |
|---------------|------|--------|----|----------|--------|--------|-----|----|----|
| MAX MANUAL    | 1280 | 30/-15 | 30 | -45/155  | 15/-15 | 30/-30 | 50  | 40 | 85 |
| AUTOBRAKE MAX | 1585 | 20/-25 | 40 | -60/210  | 0/0    | 40/-40 | 75  | 0  | 0  |
| AUTOBRAKE 2   | 2835 | 45/-50 | 90 | -130/435 | 25/-45 | 85/-85 | 120 | 50 | 50 |

#### Good Reported Braking Action

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1805 | 25/-30 | 50 | -75/265  | 45/-40 | 45/-45 | 70  | 150 | 355 |
| AUTOBRAKE MAX | 1795 | 30/-30 | 50 | -75/265  | 45/-40 | 45/-45 | 75  | 150 | 355 |
| AUTOBRAKE 2   | 2835 | 45/-50 | 90 | -130/435 | 25/-45 | 85/-85 | 120 | 50  | 50  |

#### Medium Reported Braking Action

|               |      |        |    |          |         |        |     |     |      |
|---------------|------|--------|----|----------|---------|--------|-----|-----|------|
| MAX MANUAL    | 2400 | 40/-40 | 80 | -120/420 | 105/-85 | 65/-65 | 85  | 380 | 1020 |
| AUTOBRAKE MAX | 2390 | 40/-40 | 80 | -115/415 | 115/-90 | 65/-65 | 85  | 375 | 1010 |
| AUTOBRAKE 3   | 2635 | 40/-45 | 80 | -125/445 | 60/-45  | 75/-75 | 125 | 180 | 800  |

#### Poor Reported Braking Action

|               |      |        |     |          |          |        |     |     |      |
|---------------|------|--------|-----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 3005 | 60/-60 | 110 | -165/625 | 225/-155 | 85/-85 | 95  | 755 | 2370 |
| AUTOBRAKE MAX | 3010 | 60/-60 | 110 | -170/625 | 230/-160 | 85/-85 | 95  | 755 | 2375 |
| AUTOBRAKE 3   | 3055 | 60/-55 | 110 | -170/630 | 215/-135 | 85/-85 | 115 | 710 | 2330 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**HYD PRESS SYS L (Flaps 25)**

**VREF25**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |      |        |    |          |        |        |     |   |    |
|---------------|------|--------|----|----------|--------|--------|-----|---|----|
| MAX MANUAL    | 1115 | 25/-15 | 25 | -45/145  | 15/-15 | 25/-25 | 45  | 0 | 35 |
| AUTOBRAKE MAX | 1430 | 20/-20 | 35 | -60/195  | 0/0    | 35/-35 | 70  | 0 | 0  |
| AUTOBRAKE 2   | 2565 | 40/-45 | 75 | -120/410 | 0/0    | 75/-75 | 145 | 0 | 0  |

**Good Reported Braking Action**

|               |      |        |    |          |        |        |     |   |     |
|---------------|------|--------|----|----------|--------|--------|-----|---|-----|
| MAX MANUAL    | 1675 | 25/-25 | 45 | -80/270  | 55/-45 | 45/-45 | 70  | 0 | 165 |
| AUTOBRAKE MAX | 1710 | 25/-25 | 50 | -80/270  | 50/-40 | 45/-45 | 75  | 0 | 170 |
| AUTOBRAKE 2   | 2565 | 40/-45 | 75 | -120/410 | 0/0    | 75/-75 | 145 | 0 | 0   |

**Medium Reported Braking Action**

|               |      |        |    |          |          |        |     |   |     |
|---------------|------|--------|----|----------|----------|--------|-----|---|-----|
| MAX MANUAL    | 2410 | 40/-40 | 75 | -130/460 | 145/-110 | 70/-70 | 90  | 0 | 520 |
| AUTOBRAKE MAX | 2405 | 40/-40 | 80 | -130/460 | 145/-115 | 70/-70 | 90  | 0 | 520 |
| AUTOBRAKE 3   | 2485 | 40/-40 | 80 | -130/465 | 120/-65  | 70/-70 | 120 | 0 | 500 |

**Poor Reported Braking Action**

|               |      |        |     |          |          |        |     |   |      |
|---------------|------|--------|-----|----------|----------|--------|-----|---|------|
| MAX MANUAL    | 3295 | 60/-60 | 115 | -205/765 | 380/-230 | 95/-95 | 105 | 0 | 1330 |
| AUTOBRAKE MAX | 3305 | 60/-60 | 115 | -205/765 | 385/-235 | 95/-95 | 105 | 0 | 1330 |
| AUTOBRAKE 3   | 3305 | 60/-60 | 115 | -205/765 | 385/-225 | 95/-95 | 115 | 0 | 1330 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### HYD PRESS SYS L (Flaps 30)

#### VREF30

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV<br>NO<br>REV  |

#### Dry Runway

|               |      |        |    |          |        |        |     |   |    |
|---------------|------|--------|----|----------|--------|--------|-----|---|----|
| MAX MANUAL    | 1060 | 25/-15 | 25 | -40/145  | 15/-15 | 25/-25 | 45  | 0 | 30 |
| AUTOBRAKE MAX | 1330 | 25/-20 | 30 | -55/190  | 0/0    | 35/-35 | 65  | 0 | 0  |
| AUTOBRAKE 2   | 2355 | 50/-40 | 70 | -115/395 | 0/0    | 70/-70 | 135 | 0 | 0  |

#### Good Reported Braking Action

|               |      |        |    |          |        |        |     |   |     |
|---------------|------|--------|----|----------|--------|--------|-----|---|-----|
| MAX MANUAL    | 1580 | 30/-25 | 45 | -75/260  | 50/-45 | 40/-40 | 70  | 0 | 150 |
| AUTOBRAKE MAX | 1610 | 30/-25 | 45 | -75/265  | 45/-40 | 40/-40 | 75  | 0 | 155 |
| AUTOBRAKE 2   | 2355 | 50/-40 | 70 | -115/395 | 0/0    | 70/-70 | 135 | 0 | 0   |

#### Medium Reported Braking Action

|               |      |        |    |          |          |        |     |   |     |
|---------------|------|--------|----|----------|----------|--------|-----|---|-----|
| MAX MANUAL    | 2270 | 45/-35 | 70 | -125/450 | 140/-105 | 65/-65 | 90  | 0 | 470 |
| AUTOBRAKE MAX | 2270 | 45/-40 | 70 | -125/450 | 140/-110 | 65/-65 | 90  | 0 | 470 |
| AUTOBRAKE 3   | 2315 | 50/-40 | 75 | -125/450 | 130/-70  | 65/-65 | 115 | 0 | 475 |

#### Poor Reported Braking Action

|               |      |        |     |          |          |        |     |   |      |
|---------------|------|--------|-----|----------|----------|--------|-----|---|------|
| MAX MANUAL    | 3110 | 65/-55 | 110 | -195/750 | 365/-220 | 90/-90 | 105 | 0 | 1215 |
| AUTOBRAKE MAX | 3120 | 65/-55 | 110 | -200/750 | 370/-225 | 90/-90 | 105 | 0 | 1220 |
| AUTOBRAKE 3   | 3120 | 65/-55 | 110 | -200/750 | 370/-220 | 90/-90 | 110 | 0 | 1220 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**HYD PRESS SYS L+C (Flaps 20)**

**VREF30 + 20**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |      |        |    |          |        |        |     |   |    |
|---------------|------|--------|----|----------|--------|--------|-----|---|----|
| MAX MANUAL    | 1410 | 35/-15 | 35 | -50/175  | 25/-20 | 35/-35 | 65  | 0 | 60 |
| AUTOBRAKE MAX | 1600 | 25/-20 | 40 | -65/210  | 0/0    | 40/-40 | 75  | 0 | 0  |
| AUTOBRAKE 2   | 2920 | 55/-45 | 85 | -130/440 | 0/0    | 90/-90 | 155 | 0 | 0  |

**Good Reported Braking Action**

|               |      |        |    |          |        |        |     |   |     |
|---------------|------|--------|----|----------|--------|--------|-----|---|-----|
| MAX MANUAL    | 2100 | 35/-30 | 60 | -90/310  | 75/-60 | 55/-55 | 90  | 0 | 260 |
| AUTOBRAKE MAX | 2060 | 35/-30 | 60 | -90/305  | 80/-60 | 55/-55 | 95  | 0 | 250 |
| AUTOBRAKE 2   | 2920 | 55/-45 | 85 | -130/440 | 0/0    | 90/-90 | 155 | 0 | 0   |

**Medium Reported Braking Action**

|               |      |        |     |          |          |        |     |   |     |
|---------------|------|--------|-----|----------|----------|--------|-----|---|-----|
| MAX MANUAL    | 2980 | 55/-50 | 100 | -145/515 | 190/-145 | 85/-85 | 115 | 0 | 780 |
| AUTOBRAKE MAX | 2965 | 55/-50 | 100 | -145/515 | 200/-150 | 85/-85 | 115 | 0 | 775 |
| AUTOBRAKE 3   | 2975 | 60/-50 | 100 | -145/515 | 195/-130 | 85/-85 | 120 | 0 | 780 |

**Poor Reported Braking Action**

|               |      |        |     |          |          |          |     |   |      |
|---------------|------|--------|-----|----------|----------|----------|-----|---|------|
| MAX MANUAL    | 4020 | 80/-70 | 145 | -230/840 | 475/-290 | 120/-120 | 135 | 0 | 1940 |
| AUTOBRAKE MAX | 4030 | 85/-70 | 150 | -230/840 | 485/-300 | 120/-120 | 135 | 0 | 1940 |
| AUTOBRAKE 3   | 4030 | 85/-70 | 150 | -230/840 | 485/-300 | 120/-120 | 135 | 0 | 1940 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.



## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### HYD PRESS SYS L+R (Flaps 20)

#### VREF30 + 20

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV<br>NO<br>REV  |

#### Dry Runway

|               |                       |        |    |         |        |        |    |   |   |
|---------------|-----------------------|--------|----|---------|--------|--------|----|---|---|
| MAX MANUAL    | 1530                  | 35/-20 | 40 | -60/205 | 35/-30 | 40/-40 | 70 | 0 | 0 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |         |        |        |    |   |   |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |         |        |        |    |   |   |

#### Good Reported Braking Action

|               |                       |        |    |          |          |        |     |   |   |
|---------------|-----------------------|--------|----|----------|----------|--------|-----|---|---|
| MAX MANUAL    | 2525                  | 40/-35 | 75 | -115/395 | 135/-105 | 75/-75 | 110 | 0 | 0 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |          |          |        |     |   |   |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |          |          |        |     |   |   |

#### Medium Reported Braking Action

|               |                       |        |     |          |          |          |     |   |   |
|---------------|-----------------------|--------|-----|----------|----------|----------|-----|---|---|
| MAX MANUAL    | 4060                  | 65/-55 | 125 | -215/745 | 465/-305 | 125/-125 | 155 | 0 | 0 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |     |          |          |          |     |   |   |
| AUTOBRAKE 3   | Autobrake Inoperative |        |     |          |          |          |     |   |   |

#### Poor Reported Braking Action

|               |                       |         |     |           |           |          |     |   |   |
|---------------|-----------------------|---------|-----|-----------|-----------|----------|-----|---|---|
| MAX MANUAL    | 6470                  | 100/-75 | 210 | -400/1480 | 2270/-800 | 210/-210 | 190 | 0 | 0 |
| 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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**HYD PRESS SYS R (Flaps 25)**

**VREF25**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |                       |        |    |         |        |        |    |   |    |
|---------------|-----------------------|--------|----|---------|--------|--------|----|---|----|
| MAX MANUAL    | 1230                  | 20/-15 | 30 | -50/170 | 20/-20 | 30/-30 | 50 | 0 | 55 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |         |        |        |    |   |    |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |         |        |        |    |   |    |

**Good Reported Braking Action**

|               |                       |        |    |         |        |        |    |   |     |
|---------------|-----------------------|--------|----|---------|--------|--------|----|---|-----|
| MAX MANUAL    | 1835                  | 25/-30 | 55 | -90/310 | 70/-55 | 50/-50 | 75 | 0 | 225 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |         |        |        |    |   |     |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |         |        |        |    |   |     |

**Medium Reported Braking Action**

|               |                       |        |    |          |          |        |    |   |     |
|---------------|-----------------------|--------|----|----------|----------|--------|----|---|-----|
| MAX MANUAL    | 2595                  | 45/-45 | 85 | -145/520 | 180/-130 | 75/-75 | 95 | 0 | 650 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |          |          |        |    |   |     |
| AUTOBRAKE 3   | Autobrake Inoperative |        |    |          |          |        |    |   |     |

**Poor Reported Braking Action**

|               |                       |        |     |          |          |          |     |   |      |
|---------------|-----------------------|--------|-----|----------|----------|----------|-----|---|------|
| MAX MANUAL    | 3485                  | 65/-65 | 125 | -225/860 | 485/-265 | 100/-100 | 110 | 0 | 1590 |
| 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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### HYD PRESS SYS R (Flaps 30)

#### VREF30

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |                       |        |    |         |        |        |    |   |    |
|---------------|-----------------------|--------|----|---------|--------|--------|----|---|----|
| MAX MANUAL    | 1160                  | 20/-15 | 30 | -50/165 | 20/-20 | 25/-25 | 50 | 0 | 45 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |         |        |        |    |   |    |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |         |        |        |    |   |    |

#### Good Reported Braking Action

|               |                       |        |    |         |        |        |    |   |     |
|---------------|-----------------------|--------|----|---------|--------|--------|----|---|-----|
| MAX MANUAL    | 1715                  | 30/-25 | 50 | -85/295 | 65/-55 | 45/-45 | 70 | 0 | 195 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |         |        |        |    |   |     |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |         |        |        |    |   |     |

#### Medium Reported Braking Action

|               |                       |        |    |          |          |        |    |   |     |
|---------------|-----------------------|--------|----|----------|----------|--------|----|---|-----|
| MAX MANUAL    | 2400                  | 50/-40 | 75 | -135/500 | 165/-120 | 70/-70 | 90 | 0 | 560 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |          |          |        |    |   |     |
| AUTOBRAKE 3   | Autobrake Inoperative |        |    |          |          |        |    |   |     |

#### Poor Reported Braking Action

|               |                       |        |     |          |          |        |     |   |      |
|---------------|-----------------------|--------|-----|----------|----------|--------|-----|---|------|
| MAX MANUAL    | 3210                  | 65/-55 | 115 | -215/830 | 450/-245 | 95/-95 | 100 | 0 | 1360 |
| 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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**HYD PRESS SYS R+C (Flaps 20)**

**VREF30 + 20**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |                       |        |    |         |        |        |    |   |     |
|---------------|-----------------------|--------|----|---------|--------|--------|----|---|-----|
| MAX MANUAL    | 1740                  | 30/-25 | 45 | -70/235 | 45/-40 | 45/-45 | 80 | 0 | 135 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |         |        |        |    |   |     |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |         |        |        |    |   |     |

**Good Reported Braking Action**

|               |                       |        |    |          |          |        |     |   |     |
|---------------|-----------------------|--------|----|----------|----------|--------|-----|---|-----|
| MAX MANUAL    | 2560                  | 45/-40 | 80 | -120/405 | 125/-100 | 70/-70 | 110 | 0 | 490 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |    |          |          |        |     |   |     |
| AUTOBRAKE 2   | Autobrake Inoperative |        |    |          |          |        |     |   |     |

**Medium Reported Braking Action**

|               |                       |        |     |          |          |          |     |   |      |
|---------------|-----------------------|--------|-----|----------|----------|----------|-----|---|------|
| MAX MANUAL    | 3540                  | 70/-60 | 125 | -185/670 | 310/-215 | 105/-105 | 130 | 0 | 1310 |
| AUTOBRAKE MAX | Autobrake Inoperative |        |     |          |          |          |     |   |      |
| AUTOBRAKE 3   | Autobrake Inoperative |        |     |          |          |          |     |   |      |

**Poor Reported Braking Action**

|               |                       |        |     |           |          |          |     |   |      |
|---------------|-----------------------|--------|-----|-----------|----------|----------|-----|---|------|
| MAX MANUAL    | 4640                  | 95/-85 | 175 | -285/1090 | 860/-405 | 140/-140 | 145 | 0 | 3065 |
| 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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### NAV AIR DATA SYS (Flaps 20)

#### VREF20

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |      |        |    |          |        |        |     |    |    |
|---------------|------|--------|----|----------|--------|--------|-----|----|----|
| MAX MANUAL    | 1295 | 30/-15 | 30 | -45/160  | 20/-15 | 30/-30 | 50  | 40 | 90 |
| AUTOBRAKE MAX | 1585 | 20/-25 | 40 | -60/210  | 0/0    | 40/-40 | 75  | 0  | 0  |
| AUTOBRAKE 2   | 2855 | 45/-50 | 90 | -130/435 | 15/-40 | 85/-85 | 130 | 30 | 30 |

#### Good Reported Braking Action

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1835 | 30/-30 | 55 | -80/270  | 50/-45 | 45/-45 | 70  | 155 | 380 |
| AUTOBRAKE MAX | 1820 | 30/-30 | 55 | -80/270  | 50/-40 | 50/-50 | 75  | 155 | 375 |
| AUTOBRAKE 2   | 2855 | 45/-50 | 90 | -130/435 | 15/-40 | 85/-85 | 130 | 30  | 30  |

#### Medium Reported Braking Action

|               |      |        |    |          |         |        |     |     |      |
|---------------|------|--------|----|----------|---------|--------|-----|-----|------|
| MAX MANUAL    | 2450 | 45/-45 | 80 | -120/425 | 110/-90 | 65/-65 | 90  | 400 | 1095 |
| AUTOBRAKE MAX | 2440 | 45/-45 | 85 | -120/425 | 120/-95 | 65/-65 | 90  | 400 | 1090 |
| AUTOBRAKE 3   | 2645 | 45/-45 | 80 | -125/445 | 65/-40  | 75/-75 | 130 | 220 | 910  |

#### Poor Reported Braking Action

|               |      |        |     |          |          |        |     |     |      |
|---------------|------|--------|-----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 3075 | 60/-60 | 115 | -170/635 | 230/-160 | 85/-85 | 100 | 805 | 2575 |
| AUTOBRAKE MAX | 3080 | 60/-60 | 115 | -170/635 | 240/-170 | 85/-85 | 100 | 805 | 2580 |
| AUTOBRAKE 3   | 3110 | 60/-60 | 110 | -170/635 | 225/-145 | 90/-90 | 115 | 775 | 2550 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**PITCH DOWN AUTHORITY (Flaps 25)**

**VREF25**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |      |        |    |          |        |        |     |    |    |
|---------------|------|--------|----|----------|--------|--------|-----|----|----|
| MAX MANUAL    | 1195 | 25/-15 | 25 | -45/150  | 15/-15 | 25/-25 | 45  | 20 | 40 |
| AUTOBRAKE MAX | 1430 | 20/-20 | 35 | -60/195  | 0/0    | 35/-35 | 70  | 0  | 0  |
| AUTOBRAKE 2   | 2520 | 40/-45 | 75 | -120/405 | 20/-40 | 70/-75 | 110 | 45 | 45 |

**Good Reported Braking Action**

|               |      |        |    |          |        |        |     |    |     |
|---------------|------|--------|----|----------|--------|--------|-----|----|-----|
| MAX MANUAL    | 1635 | 20/-25 | 45 | -70/250  | 40/-35 | 40/-40 | 60  | 90 | 215 |
| AUTOBRAKE MAX | 1630 | 20/-25 | 45 | -70/250  | 45/-35 | 40/-40 | 65  | 90 | 210 |
| AUTOBRAKE 2   | 2520 | 40/-45 | 75 | -120/405 | 25/-40 | 70/-75 | 110 | 45 | 45  |

**Medium Reported Braking Action**

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 2150 | 35/-35 | 65 | -110/395 | 90/-70 | 55/-55 | 75  | 255 | 655 |
| AUTOBRAKE MAX | 2150 | 35/-35 | 65 | -110/395 | 95/-75 | 55/-55 | 75  | 255 | 655 |
| AUTOBRAKE 3   | 2385 | 35/-40 | 70 | -120/420 | 55/-40 | 65/-65 | 120 | 110 | 440 |

**Poor Reported Braking Action**

|               |      |        |    |          |          |        |     |     |      |
|---------------|------|--------|----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2685 | 50/-50 | 90 | -155/590 | 190/-130 | 70/-70 | 85  | 540 | 1600 |
| AUTOBRAKE MAX | 2700 | 50/-50 | 90 | -155/590 | 195/-140 | 70/-70 | 85  | 540 | 1600 |
| AUTOBRAKE 3   | 2760 | 50/-45 | 90 | -160/595 | 175/-115 | 75/-75 | 105 | 480 | 1545 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### PITCH DOWN AUTHORITY (Flaps 30)

#### VREF30

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |      |        |    |          |        |        |     |    |    |
|---------------|------|--------|----|----------|--------|--------|-----|----|----|
| MAX MANUAL    | 1135 | 25/-15 | 25 | -45/145  | 15/-15 | 25/-25 | 45  | 15 | 35 |
| AUTOBRAKE MAX | 1330 | 25/-20 | 30 | -55/190  | 5/0    | 35/-35 | 70  | 0  | 0  |
| AUTOBRAKE 2   | 2335 | 45/-40 | 70 | -115/390 | 10/-30 | 65/-65 | 110 | 20 | 20 |

#### Good Reported Braking Action

|               |      |        |    |          |        |        |     |    |     |
|---------------|------|--------|----|----------|--------|--------|-----|----|-----|
| MAX MANUAL    | 1545 | 25/-20 | 40 | -70/245  | 35/-35 | 35/-35 | 60  | 80 | 190 |
| AUTOBRAKE MAX | 1540 | 25/-20 | 40 | -70/245  | 40/-35 | 35/-35 | 65  | 80 | 185 |
| AUTOBRAKE 2   | 2335 | 45/-40 | 70 | -115/390 | 15/-30 | 65/-65 | 110 | 20 | 20  |

#### Medium Reported Braking Action

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 2025 | 35/-30 | 60 | -105/385 | 85/-70 | 50/-50 | 70  | 230 | 585 |
| AUTOBRAKE MAX | 2025 | 40/-30 | 60 | -105/385 | 90/-70 | 50/-50 | 75  | 225 | 580 |
| AUTOBRAKE 3   | 2205 | 40/-35 | 65 | -115/405 | 60/-40 | 60/-60 | 115 | 105 | 415 |

#### Poor Reported Braking Action

|               |      |        |    |          |          |        |     |     |      |
|---------------|------|--------|----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2525 | 50/-45 | 85 | -150/575 | 180/-125 | 65/-65 | 80  | 485 | 1430 |
| AUTOBRAKE MAX | 2535 | 50/-45 | 85 | -150/575 | 190/-130 | 65/-65 | 80  | 490 | 1430 |
| AUTOBRAKE 3   | 2570 | 50/-45 | 85 | -155/580 | 175/-110 | 70/-70 | 105 | 455 | 1400 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**PITCH UP AUTHORITY (Flaps ≤ 15)**

**VREF30 + 40**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |      |        |     |          |        |        |    |     |     |
|---------------|------|--------|-----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1275 | 45/-15 | 30  | -45/150  | 15/-15 | 30/-30 | 40 | 40  | 90  |
| AUTOBRAKE MAX | 1840 | 30/-25 | 50  | -70/225  | 0/0    | 50/-50 | 80 | 0   | 0   |
| AUTOBRAKE 2   | 3130 | 60/-55 | 105 | -135/450 | 70/-80 | 90/-90 | 95 | 280 | 285 |

**Good Reported Braking Action**

|               |      |        |     |          |        |        |    |     |     |
|---------------|------|--------|-----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1850 | 30/-25 | 55  | -75/260  | 45/-40 | 50/-50 | 55 | 160 | 380 |
| AUTOBRAKE MAX | 1930 | 30/-25 | 55  | -80/270  | 25/-20 | 50/-55 | 80 | 115 | 340 |
| AUTOBRAKE 2   | 3130 | 60/-55 | 105 | -135/450 | 70/-80 | 90/-90 | 95 | 280 | 285 |

**Medium Reported Braking Action**

|               |      |        |    |          |         |        |     |     |      |
|---------------|------|--------|----|----------|---------|--------|-----|-----|------|
| MAX MANUAL    | 2495 | 45/-40 | 85 | -115/415 | 100/-85 | 70/-70 | 70  | 400 | 1075 |
| AUTOBRAKE MAX | 2450 | 45/-40 | 80 | -115/410 | 100/-75 | 70/-70 | 75  | 390 | 1050 |
| AUTOBRAKE 3   | 2985 | 55/-50 | 95 | -135/470 | 65/-70  | 85/-85 | 100 | 195 | 650  |

**Poor Reported Braking Action**

|               |      |        |     |          |          |        |     |     |      |
|---------------|------|--------|-----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 3150 | 65/-55 | 115 | -165/625 | 210/-150 | 90/-90 | 85  | 800 | 2495 |
| AUTOBRAKE MAX | 3090 | 65/-55 | 115 | -165/620 | 215/-150 | 85/-90 | 80  | 780 | 2450 |
| AUTOBRAKE 3   | 3300 | 65/-60 | 115 | -170/640 | 180/-140 | 95/-95 | 100 | 630 | 2300 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.



## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### PITCH UP AUTHORITY (Flaps ≥ 20)

#### VREF30 + 20

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV<br>NO<br>REV  |

#### Dry Runway

|               |      |        |    |          |        |        |    |     |     |
|---------------|------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1140 | 35/-15 | 25 | -40/145  | 15/-15 | 25/-25 | 40 | 30  | 70  |
| AUTOBRAKE MAX | 1600 | 25/-20 | 40 | -65/210  | 0/0    | 40/-40 | 75 | 0   | 0   |
| AUTOBRAKE 2   | 2760 | 55/-50 | 90 | -125/425 | 50/-65 | 80/-80 | 95 | 150 | 150 |

#### Good Reported Braking Action

|               |      |        |    |          |        |        |    |     |     |
|---------------|------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1635 | 30/-25 | 45 | -70/250  | 40/-35 | 40/-40 | 55 | 125 | 295 |
| AUTOBRAKE MAX | 1705 | 30/-25 | 50 | -75/255  | 35/-20 | 45/-45 | 75 | 125 | 305 |
| AUTOBRAKE 2   | 2760 | 55/-50 | 90 | -125/425 | 50/-65 | 80/-80 | 95 | 150 | 150 |

#### Medium Reported Braking Action

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 2205 | 45/-35 | 70 | -110/395 | 95/-75 | 60/-60 | 70  | 325 | 845 |
| AUTOBRAKE MAX | 2205 | 45/-35 | 70 | -110/395 | 95/-70 | 60/-60 | 80  | 320 | 840 |
| AUTOBRAKE 3   | 2615 | 50/-45 | 80 | -125/440 | 50/-55 | 75/-75 | 105 | 140 | 535 |

#### Poor Reported Braking Action

|               |      |        |     |          |          |        |     |     |      |
|---------------|------|--------|-----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2795 | 60/-50 | 100 | -160/600 | 200/-140 | 80/-80 | 80  | 655 | 1970 |
| AUTOBRAKE MAX | 2800 | 60/-50 | 100 | -160/600 | 205/-145 | 80/-80 | 80  | 655 | 1975 |
| AUTOBRAKE 3   | 2940 | 60/-50 | 100 | -165/615 | 170/-125 | 85/-85 | 105 | 550 | 1880 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**PRI FLIGHT COMPUTERS (Flaps 20)**

**VREF20**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |      |        |    |          |        |        |     |    |    |
|---------------|------|--------|----|----------|--------|--------|-----|----|----|
| MAX MANUAL    | 1295 | 30/-15 | 30 | -45/160  | 20/-15 | 30/-30 | 50  | 40 | 90 |
| AUTOBRAKE MAX | 1585 | 20/-25 | 40 | -60/210  | 0/0    | 40/-40 | 75  | 0  | 0  |
| AUTOBRAKE 2   | 2855 | 45/-50 | 90 | -130/435 | 15/-40 | 85/-85 | 130 | 30 | 30 |

**Good Reported Braking Action**

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1835 | 30/-30 | 55 | -80/270  | 50/-45 | 45/-45 | 70  | 155 | 380 |
| AUTOBRAKE MAX | 1820 | 30/-30 | 55 | -80/270  | 50/-40 | 50/-50 | 75  | 155 | 375 |
| AUTOBRAKE 2   | 2855 | 45/-50 | 90 | -130/435 | 15/-40 | 85/-85 | 130 | 30  | 30  |

**Medium Reported Braking Action**

|               |      |        |    |          |         |        |     |     |      |
|---------------|------|--------|----|----------|---------|--------|-----|-----|------|
| MAX MANUAL    | 2450 | 45/-45 | 80 | -120/425 | 110/-90 | 65/-65 | 90  | 400 | 1095 |
| AUTOBRAKE MAX | 2440 | 45/-45 | 85 | -120/425 | 120/-95 | 65/-65 | 90  | 400 | 1090 |
| AUTOBRAKE 3   | 2645 | 45/-45 | 80 | -125/445 | 65/-40  | 75/-75 | 130 | 220 | 910  |

**Poor Reported Braking Action**

|               |      |        |     |          |          |        |     |     |      |
|---------------|------|--------|-----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 3075 | 60/-60 | 115 | -170/635 | 230/-160 | 85/-85 | 100 | 805 | 2575 |
| AUTOBRAKE MAX | 3080 | 60/-60 | 115 | -170/635 | 240/-170 | 85/-85 | 100 | 805 | 2580 |
| AUTOBRAKE 3   | 3110 | 60/-60 | 110 | -170/635 | 225/-145 | 90/-90 | 115 | 775 | 2550 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### SLATS DRIVE (Flaps 20)

#### VREF30 + 30

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |      |        |     |          |        |        |    |     |     |
|---------------|------|--------|-----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1220 | 40/-15 | 30  | -45/150  | 15/-15 | 30/-30 | 40 | 35  | 80  |
| AUTOBRAKE MAX | 1750 | 30/-25 | 45  | -65/220  | 0/0    | 45/-45 | 80 | 0   | 0   |
| AUTOBRAKE 2   | 2975 | 55/-50 | 100 | -130/440 | 65/-75 | 90/-90 | 95 | 225 | 225 |

#### Good Reported Braking Action

|               |      |        |     |          |        |        |    |     |     |
|---------------|------|--------|-----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1760 | 30/-25 | 50  | -75/260  | 45/-40 | 45/-45 | 60 | 140 | 330 |
| AUTOBRAKE MAX | 1855 | 30/-25 | 50  | -75/265  | 30/-20 | 50/-50 | 80 | 130 | 330 |
| AUTOBRAKE 2   | 2975 | 55/-50 | 100 | -130/440 | 65/-75 | 90/-90 | 95 | 225 | 225 |

#### Medium Reported Braking Action

|               |      |        |    |          |         |        |     |     |     |
|---------------|------|--------|----|----------|---------|--------|-----|-----|-----|
| MAX MANUAL    | 2370 | 45/-40 | 80 | -115/410 | 100/-80 | 65/-65 | 70  | 355 | 935 |
| AUTOBRAKE MAX | 2380 | 45/-40 | 80 | -115/410 | 100/-75 | 65/-65 | 80  | 355 | 930 |
| AUTOBRAKE 3   | 2850 | 50/-45 | 90 | -130/460 | 65/-70  | 80/-80 | 100 | 175 | 590 |

#### Poor Reported Braking Action

|               |      |        |     |          |          |        |    |     |      |
|---------------|------|--------|-----|----------|----------|--------|----|-----|------|
| MAX MANUAL    | 2990 | 60/-55 | 110 | -165/615 | 210/-150 | 85/-85 | 80 | 710 | 2145 |
| AUTOBRAKE MAX | 2995 | 60/-55 | 110 | -165/615 | 215/-150 | 85/-85 | 85 | 710 | 2145 |
| AUTOBRAKE 3   | 3175 | 65/-55 | 110 | -170/630 | 180/-140 | 90/-90 | 95 | 580 | 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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**SPOILERS (Flaps 25)**

**VREF25**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |      |        |    |          |        |        |     |    |    |
|---------------|------|--------|----|----------|--------|--------|-----|----|----|
| MAX MANUAL    | 1070 | 25/-15 | 25 | -40/140  | 15/-15 | 25/-25 | 40  | 30 | 60 |
| AUTOBRAKE MAX | 1430 | 20/-20 | 35 | -60/195  | 0/0    | 35/-35 | 70  | 0  | 0  |
| AUTOBRAKE 2   | 2505 | 40/-45 | 80 | -120/405 | 25/-50 | 70/-70 | 100 | 65 | 65 |

**Good Reported Braking Action**

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1530 | 25/-25 | 45 | -70/240  | 40/-35 | 40/-40 | 60  | 115 | 270 |
| AUTOBRAKE MAX | 1570 | 25/-25 | 45 | -70/245  | 35/-30 | 40/-40 | 65  | 120 | 285 |
| AUTOBRAKE 2   | 2505 | 40/-45 | 80 | -120/405 | 25/-50 | 70/-70 | 100 | 65  | 65  |

**Medium Reported Braking Action**

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 2055 | 35/-35 | 65 | -105/385 | 90/-75 | 55/-55 | 75  | 300 | 790 |
| AUTOBRAKE MAX | 2055 | 35/-35 | 65 | -105/385 | 95/-75 | 55/-55 | 75  | 300 | 785 |
| AUTOBRAKE 3   | 2335 | 35/-40 | 70 | -120/420 | 45/-35 | 65/-65 | 115 | 130 | 575 |

**Poor Reported Braking Action**

|               |      |        |    |          |          |        |     |     |      |
|---------------|------|--------|----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2605 | 50/-50 | 95 | -155/585 | 195/-135 | 70/-70 | 85  | 610 | 1855 |
| AUTOBRAKE MAX | 2610 | 50/-50 | 95 | -155/585 | 200/-140 | 70/-70 | 85  | 615 | 1855 |
| AUTOBRAKE 3   | 2665 | 50/-50 | 90 | -155/590 | 180/-105 | 75/-75 | 115 | 565 | 1815 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

## ADVISORY INFORMATION

### Non-Normal Configuration Landing Distance

#### SPOILERS (Flaps 30)

#### VREF30

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

#### Dry Runway

|               |      |        |    |          |        |        |     |    |    |
|---------------|------|--------|----|----------|--------|--------|-----|----|----|
| MAX MANUAL    | 1020 | 25/-15 | 25 | -40/135  | 15/-10 | 20/-20 | 40  | 25 | 55 |
| AUTOBRAKE MAX | 1330 | 20/-20 | 30 | -55/190  | 0/0    | 35/-35 | 65  | 0  | 0  |
| AUTOBRAKE 2   | 2320 | 45/-40 | 70 | -115/390 | 20/-45 | 65/-65 | 100 | 40 | 40 |

#### Good Reported Braking Action

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1445 | 25/-20 | 40 | -65/235  | 40/-35 | 35/-35 | 55  | 105 | 245 |
| AUTOBRAKE MAX | 1480 | 25/-25 | 40 | -70/240  | 35/-30 | 35/-35 | 65  | 105 | 250 |
| AUTOBRAKE 2   | 2320 | 45/-40 | 70 | -115/390 | 20/-45 | 65/-65 | 100 | 40  | 40  |

#### Medium Reported Braking Action

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 1935 | 40/-35 | 60 | -105/375 | 90/-70 | 50/-50 | 70  | 270 | 705 |
| AUTOBRAKE MAX | 1935 | 40/-35 | 60 | -105/375 | 90/-75 | 50/-50 | 70  | 270 | 700 |
| AUTOBRAKE 3   | 2160 | 40/-35 | 65 | -115/405 | 45/-30 | 60/-60 | 115 | 130 | 540 |

#### Poor Reported Braking Action

|               |      |        |    |          |          |        |     |     |      |
|---------------|------|--------|----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2445 | 55/-45 | 85 | -150/570 | 190/-130 | 65/-65 | 80  | 555 | 1655 |
| AUTOBRAKE MAX | 2450 | 55/-45 | 85 | -150/570 | 190/-130 | 65/-65 | 80  | 555 | 1655 |
| AUTOBRAKE 3   | 2485 | 55/-45 | 85 | -150/575 | 175/-100 | 70/-70 | 110 | 530 | 1635 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.

**ADVISORY INFORMATION**

**Non-Normal Configuration Landing Distance**

**STABILIZER (Flaps 20)**

**VREF30 + 20**

|                          | LANDING DISTANCE AND ADJUSTMENTS (M) |                                        |                                         |                                        |                               |                                   |                               |                          |           |
|--------------------------|--------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|-------------------------------|--------------------------|-----------|
|                          | REF<br>DIST                          | WT<br>ADJ                              | ALT<br>ADJ                              | WIND<br>ADJ                            | SLOPE<br>ADJ                  | TEMP<br>ADJ                       | APP<br>SPD<br>ADJ             | REVERSE<br>THRUST<br>ADJ |           |
| BRAKING<br>CONFIGURATION | 250000<br>KG<br>LANDING<br>WEIGHT    | PER<br>5000 KG<br>ABV/BLW<br>250000 KG | PER<br>1000 FT<br>ABOVE<br>SEA<br>LEVEL | PER<br>10 KTS<br>HEAD/<br>TAIL<br>WIND | PER 1%<br>DOWN/<br>UP<br>HILL | PER<br>10°C<br>ABV/<br>BLW<br>ISA | PER<br>5 KTS<br>ABOVE<br>VREF | ONE<br>REV               | NO<br>REV |

**Dry Runway**

|               |      |        |    |          |        |        |    |     |     |
|---------------|------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1140 | 35/-15 | 25 | -40/145  | 15/-15 | 25/-25 | 40 | 30  | 70  |
| AUTOBRAKE MAX | 1600 | 25/-20 | 40 | -65/210  | 0/0    | 40/-40 | 75 | 0   | 0   |
| AUTOBRAKE 2   | 2760 | 55/-50 | 90 | -125/425 | 50/-65 | 80/-80 | 95 | 150 | 150 |

**Good Reported Braking Action**

|               |      |        |    |          |        |        |    |     |     |
|---------------|------|--------|----|----------|--------|--------|----|-----|-----|
| MAX MANUAL    | 1635 | 30/-25 | 45 | -70/250  | 40/-35 | 40/-40 | 55 | 125 | 295 |
| AUTOBRAKE MAX | 1705 | 30/-25 | 50 | -75/255  | 35/-20 | 45/-45 | 75 | 125 | 305 |
| AUTOBRAKE 2   | 2760 | 55/-50 | 90 | -125/425 | 50/-65 | 80/-80 | 95 | 150 | 150 |

**Medium Reported Braking Action**

|               |      |        |    |          |        |        |     |     |     |
|---------------|------|--------|----|----------|--------|--------|-----|-----|-----|
| MAX MANUAL    | 2205 | 45/-35 | 70 | -110/395 | 95/-75 | 60/-60 | 70  | 325 | 845 |
| AUTOBRAKE MAX | 2205 | 45/-35 | 70 | -110/395 | 95/-70 | 60/-60 | 80  | 320 | 840 |
| AUTOBRAKE 3   | 2615 | 50/-45 | 80 | -125/440 | 50/-55 | 75/-75 | 105 | 140 | 535 |

**Poor Reported Braking Action**

|               |      |        |     |          |          |        |     |     |      |
|---------------|------|--------|-----|----------|----------|--------|-----|-----|------|
| MAX MANUAL    | 2795 | 60/-50 | 100 | -160/600 | 200/-140 | 80/-80 | 80  | 655 | 1970 |
| AUTOBRAKE MAX | 2800 | 60/-50 | 100 | -160/600 | 205/-145 | 80/-80 | 80  | 655 | 1975 |
| AUTOBRAKE 3   | 2940 | 60/-50 | 100 | -165/615 | 170/-125 | 85/-85 | 105 | 550 | 1880 |

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 305 m from threshold to touchdown.

Actual (unfactored) distances are shown.



## ADVISORY INFORMATION

## Recommended Brake Cooling Schedule

## Reference Brake Energy (Millions of Foot Pounds)

|                     |             | BRAKES ON SPEED (KIAS)      |      |      |      |      |      |      |      |      |      |      |      |      |      |       |       |       |       |
|---------------------|-------------|-----------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|
|                     |             | 80                          |      |      | 100  |      |      | 120  |      |      | 140  |      |      | 160  |      |       | 180   |       |       |
| WEIGHT<br>(1000 KG) | OAT<br>(°C) | PRESSURE ALTITUDE (1000 FT) |      |      |      |      |      |      |      |      |      |      |      |      |      |       |       |       |       |
|                     |             | 0                           | 4    | 8    | 0    | 4    | 8    | 0    | 4    | 8    | 0    | 4    | 8    | 0    | 4    | 8     | 0     | 4     | 8     |
| 360                 | 0           | 22.1                        | 24.1 | 26.5 | 32.9 | 36.3 | 40.3 | 46.1 | 51.3 | 57.3 | 60.4 | 67.5 | 75.8 | 75.7 | 84.9 | 95.4  | 91.6  | 102.6 | 115.1 |
|                     | 10          | 22.7                        | 24.8 | 27.2 | 33.9 | 37.4 | 41.5 | 47.5 | 52.9 | 59.1 | 62.3 | 69.7 | 78.2 | 78.1 | 87.6 | 98.4  | 94.4  | 105.7 | 118.4 |
|                     | 15          | 23.2                        | 25.3 | 27.8 | 34.5 | 38.1 | 42.3 | 48.4 | 53.9 | 60.2 | 63.4 | 70.9 | 79.6 | 79.5 | 89.1 | 100.0 | 96.0  | 107.5 | 120.3 |
|                     | 20          | 23.6                        | 25.7 | 28.2 | 35.1 | 38.8 | 43.0 | 49.3 | 54.8 | 61.2 | 64.5 | 72.1 | 80.9 | 80.8 | 90.6 | 101.7 | 97.6  | 109.2 | 122.2 |
|                     | 30          | 24.1                        | 26.3 | 28.9 | 36.0 | 39.8 | 44.1 | 50.5 | 56.3 | 62.9 | 66.3 | 74.1 | 83.2 | 83.1 | 93.1 | 104.4 | 100.3 | 112.1 | 125.4 |
|                     | 40          | 24.3                        | 26.5 | 29.2 | 36.4 | 40.3 | 44.7 | 51.3 | 57.2 | 64.0 | 67.4 | 75.5 | 84.8 | 84.7 | 94.9 | 106.5 | 102.3 | 114.3 | 127.7 |
| 340                 | 0           | 21.2                        | 23.1 | 25.3 | 31.4 | 34.7 | 38.4 | 43.9 | 48.8 | 54.5 | 57.5 | 64.2 | 72.0 | 72.1 | 80.8 | 90.8  | 87.3  | 97.9  | 109.9 |
|                     | 10          | 21.7                        | 23.7 | 26.0 | 32.4 | 35.7 | 39.5 | 45.3 | 50.4 | 56.2 | 59.3 | 66.3 | 74.3 | 74.4 | 83.4 | 93.7  | 90.0  | 100.9 | 113.1 |
|                     | 15          | 22.1                        | 24.1 | 26.5 | 33.0 | 36.3 | 40.3 | 46.1 | 51.3 | 57.3 | 60.4 | 67.5 | 75.7 | 75.7 | 84.8 | 95.3  | 91.6  | 102.6 | 115.0 |
|                     | 20          | 22.5                        | 24.6 | 26.9 | 33.6 | 37.0 | 41.0 | 46.9 | 52.2 | 58.3 | 61.4 | 68.6 | 77.0 | 77.0 | 86.3 | 96.8  | 93.1  | 104.2 | 116.8 |
|                     | 30          | 23.1                        | 25.1 | 27.6 | 34.4 | 37.9 | 42.0 | 48.2 | 53.6 | 59.8 | 63.1 | 70.5 | 79.1 | 79.1 | 88.7 | 99.5  | 95.7  | 107.1 | 119.9 |
|                     | 40          | 23.2                        | 25.3 | 27.8 | 34.8 | 38.4 | 42.6 | 48.9 | 54.4 | 60.8 | 64.2 | 71.8 | 80.6 | 80.6 | 90.4 | 101.5 | 97.6  | 109.2 | 122.2 |
| 320                 | 0           | 20.2                        | 22.0 | 24.1 | 30.0 | 33.0 | 36.5 | 41.8 | 46.4 | 51.7 | 54.6 | 60.9 | 68.3 | 68.4 | 76.7 | 86.1  | 82.9  | 93.0  | 104.4 |
|                     | 10          | 20.8                        | 22.6 | 24.8 | 30.8 | 33.9 | 37.6 | 43.1 | 47.8 | 53.3 | 56.3 | 62.9 | 70.4 | 70.6 | 79.1 | 88.9  | 85.5  | 95.9  | 107.6 |
|                     | 15          | 21.2                        | 23.0 | 25.2 | 31.4 | 34.6 | 38.3 | 43.8 | 48.7 | 54.3 | 57.3 | 64.0 | 71.7 | 71.9 | 80.5 | 90.4  | 87.0  | 97.5  | 109.4 |
|                     | 20          | 21.5                        | 23.4 | 25.7 | 32.0 | 35.2 | 38.9 | 44.6 | 49.5 | 55.3 | 58.3 | 65.1 | 72.9 | 73.1 | 81.9 | 91.9  | 88.5  | 99.1  | 111.1 |
|                     | 30          | 22.0                        | 24.0 | 26.3 | 32.7 | 36.1 | 39.9 | 45.8 | 50.9 | 56.7 | 59.9 | 66.9 | 74.9 | 75.1 | 84.1 | 94.4  | 90.9  | 101.8 | 114.1 |
|                     | 40          | 22.1                        | 24.1 | 26.5 | 33.1 | 36.5 | 40.4 | 46.4 | 51.6 | 57.7 | 60.9 | 68.1 | 76.3 | 76.5 | 85.8 | 96.3  | 92.7  | 103.9 | 116.3 |
| 300                 | 0           | 19.3                        | 20.9 | 22.9 | 28.5 | 31.3 | 34.6 | 39.6 | 43.9 | 48.9 | 51.6 | 57.6 | 64.5 | 64.7 | 72.5 | 81.4  | 78.4  | 88.0  | 98.8  |
|                     | 10          | 19.8                        | 21.5 | 23.5 | 29.3 | 32.2 | 35.6 | 40.8 | 45.3 | 50.4 | 53.2 | 59.4 | 66.5 | 66.8 | 74.8 | 84.0  | 80.9  | 90.7  | 101.9 |
|                     | 15          | 20.2                        | 21.9 | 24.0 | 29.8 | 32.8 | 36.3 | 41.6 | 46.1 | 51.4 | 54.2 | 60.5 | 67.7 | 68.0 | 76.1 | 85.4  | 82.3  | 92.3  | 103.6 |
|                     | 20          | 20.5                        | 22.3 | 24.4 | 30.4 | 33.4 | 36.9 | 42.3 | 46.9 | 52.3 | 55.1 | 61.5 | 68.9 | 69.1 | 77.4 | 86.9  | 83.7  | 93.8  | 105.3 |
|                     | 30          | 21.0                        | 22.8 | 25.0 | 31.1 | 34.2 | 37.8 | 43.4 | 48.1 | 53.6 | 56.6 | 63.2 | 70.8 | 71.0 | 79.5 | 89.3  | 86.1  | 96.4  | 108.1 |
|                     | 40          | 21.1                        | 22.9 | 25.1 | 31.4 | 34.6 | 38.3 | 44.0 | 48.8 | 54.5 | 57.5 | 64.3 | 72.1 | 72.3 | 81.1 | 91.0  | 87.7  | 98.3  | 110.3 |
| 260                 | 0           | 17.4                        | 18.9 | 20.6 | 25.5 | 28.0 | 30.8 | 35.3 | 39.0 | 43.3 | 45.7 | 50.8 | 56.8 | 57.1 | 63.8 | 71.6  | 69.2  | 77.5  | 87.1  |
|                     | 10          | 17.9                        | 19.4 | 21.2 | 26.3 | 28.8 | 31.7 | 36.3 | 40.1 | 44.6 | 47.1 | 52.4 | 58.6 | 58.9 | 65.8 | 73.8  | 71.4  | 80.0  | 89.8  |
|                     | 15          | 18.2                        | 19.8 | 21.6 | 26.7 | 29.3 | 32.3 | 37.0 | 40.9 | 45.4 | 48.0 | 53.4 | 59.6 | 60.0 | 67.0 | 75.2  | 72.6  | 81.4  | 91.4  |
|                     | 20          | 18.6                        | 20.1 | 21.9 | 27.2 | 29.8 | 32.9 | 37.6 | 41.6 | 46.2 | 48.8 | 54.3 | 60.7 | 61.0 | 68.2 | 76.4  | 73.9  | 82.7  | 92.9  |
|                     | 30          | 19.0                        | 20.6 | 22.4 | 27.9 | 30.5 | 33.7 | 38.6 | 42.7 | 47.4 | 50.1 | 55.7 | 62.3 | 62.7 | 70.1 | 78.6  | 75.9  | 85.0  | 95.4  |
|                     | 40          | 19.0                        | 20.7 | 22.6 | 28.1 | 30.8 | 34.0 | 39.0 | 43.2 | 48.1 | 50.8 | 56.6 | 63.4 | 63.7 | 71.3 | 80.0  | 77.3  | 86.7  | 97.3  |
| 220                 | 0           | 15.7                        | 16.9 | 18.4 | 22.6 | 24.7 | 27.1 | 30.9 | 34.0 | 37.6 | 39.7 | 44.0 | 49.0 | 49.3 | 54.9 | 61.4  | 59.4  | 66.5  | 74.6  |
|                     | 10          | 16.1                        | 17.4 | 18.9 | 23.2 | 25.4 | 27.9 | 31.8 | 35.0 | 38.8 | 40.9 | 45.3 | 50.5 | 50.8 | 56.6 | 63.4  | 61.3  | 68.6  | 77.0  |
|                     | 15          | 16.4                        | 17.7 | 19.2 | 23.7 | 25.8 | 28.4 | 32.4 | 35.6 | 39.5 | 41.6 | 46.2 | 51.4 | 51.7 | 57.6 | 64.5  | 62.4  | 69.8  | 78.3  |
|                     | 20          | 16.7                        | 18.0 | 19.6 | 24.1 | 26.3 | 28.9 | 32.9 | 36.3 | 40.2 | 42.3 | 47.0 | 52.3 | 52.6 | 58.6 | 65.6  | 63.5  | 71.0  | 79.7  |
|                     | 30          | 17.0                        | 18.4 | 20.0 | 24.6 | 26.9 | 29.6 | 33.7 | 37.2 | 41.2 | 43.4 | 48.2 | 53.7 | 54.0 | 60.2 | 67.4  | 65.2  | 73.0  | 81.9  |
|                     | 40          | 17.1                        | 18.4 | 20.1 | 24.8 | 27.1 | 29.9 | 34.1 | 37.6 | 41.7 | 44.0 | 48.9 | 54.6 | 54.9 | 61.2 | 68.6  | 66.4  | 74.3  | 83.4  |
| 180                 | 0           | 13.9                        | 15.0 | 16.2 | 19.7 | 21.4 | 23.4 | 26.5 | 29.0 | 32.0 | 33.6 | 37.0 | 41.1 | 41.2 | 45.7 | 50.9  | 49.3  | 54.9  | 61.5  |
|                     | 10          | 14.3                        | 15.4 | 16.6 | 20.2 | 22.0 | 24.1 | 27.2 | 29.9 | 32.9 | 34.5 | 38.1 | 42.3 | 42.4 | 47.1 | 52.5  | 50.8  | 56.7  | 63.4  |
|                     | 15          | 14.6                        | 15.7 | 16.9 | 20.6 | 22.4 | 24.5 | 27.7 | 30.4 | 33.6 | 35.2 | 38.8 | 43.1 | 43.2 | 48.0 | 53.5  | 51.8  | 57.7  | 64.5  |
|                     | 20          | 14.8                        | 15.9 | 17.2 | 21.0 | 22.8 | 25.0 | 28.2 | 30.9 | 34.1 | 35.8 | 39.5 | 43.9 | 44.0 | 48.8 | 54.4  | 52.7  | 58.7  | 65.7  |
|                     | 30          | 15.1                        | 16.3 | 17.6 | 21.5 | 23.3 | 25.5 | 28.9 | 31.7 | 35.0 | 36.7 | 40.5 | 45.0 | 45.1 | 50.1 | 55.9  | 54.1  | 60.3  | 67.5  |
|                     | 40          | 15.1                        | 16.3 | 17.7 | 21.6 | 23.5 | 25.7 | 29.1 | 32.0 | 35.4 | 37.1 | 41.1 | 45.6 | 45.7 | 50.9 | 56.8  | 54.9  | 61.3  | 68.7  |

To correct for wind, enter table with the brakes on speed minus one half the headwind or plus 1.5 times the tailwind.

If ground speed is used for brakes on speed, ignore wind and enter table with sea level, 15°C.

**ADVISORY INFORMATION**

**Recommended Brake Cooling Schedule**  
**Event Adjusted Brake Energy (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   | 100  | 110  | 120   |
| LANDING | RTO MAX MAN | 10                                                         | 20   | 30   | 40   | 50   | 60   | 70   | 80   | 90   | 100  | 110  | 120   |
|         | MAX MAN     | 4.4                                                        | 14.1 | 23.7 | 33.2 | 42.6 | 51.9 | 61.2 | 70.5 | 79.9 | 89.3 | 98.9 | 108.7 |
|         | MAX AUTO    | 4.4                                                        | 13.1 | 21.7 | 30.2 | 38.7 | 47.3 | 56.0 | 65.0 | 74.3 | 83.9 | 94.0 | 104.6 |
|         | AUTOBRAKE 4 | 4.3                                                        | 12.5 | 20.4 | 28.1 | 35.7 | 43.4 | 51.2 | 59.3 | 67.7 | 76.6 | 86.1 | 96.4  |
|         | AUTOBRAKE 3 | 4.2                                                        | 11.9 | 19.2 | 26.3 | 33.3 | 40.3 | 47.4 | 54.8 | 62.6 | 70.8 | 79.7 | 89.3  |
|         | AUTOBRAKE 2 | 4.1                                                        | 11.2 | 17.9 | 24.4 | 30.8 | 37.2 | 43.7 | 50.5 | 57.6 | 65.1 | 73.2 | 81.9  |
|         | AUTOBRAKE 1 | 4.0                                                        | 10.3 | 16.3 | 22.1 | 27.8 | 33.4 | 39.1 | 45.1 | 51.3 | 58.0 | 65.1 | 72.9  |

**2 Engine Reverse Thrust**

|         |             | REFERENCE BRAKE ENERGY PER BRAKE (MILLIONS OF FOOT POUNDS) |      |      |      |      |      |      |      |      |      |      |      |
|---------|-------------|------------------------------------------------------------|------|------|------|------|------|------|------|------|------|------|------|
| EVENT   |             | 10                                                         | 20   | 30   | 40   | 50   | 60   | 70   | 80   | 90   | 100  | 110  | 120  |
| LANDING | RTO MAX MAN | 10                                                         | 20   | 30   | 40   | 50   | 60   | 70   | 80   | 90   | 100  | 110  | 120  |
|         | MAX MAN     | 3.3                                                        | 12.0 | 21.0 | 30.0 | 38.9 | 47.5 | 56.1 | 64.5 | 72.8 | 81.0 | 89.2 | 97.5 |
|         | MAX AUTO    | 2.0                                                        | 8.7  | 15.5 | 22.3 | 29.3 | 36.4 | 43.8 | 51.5 | 59.6 | 68.3 | 77.5 | 87.4 |
|         | AUTOBRAKE 4 | 1.4                                                        | 5.6  | 10.4 | 15.6 | 20.9 | 26.4 | 32.2 | 38.3 | 44.8 | 51.9 | 59.6 | 68.0 |
|         | AUTOBRAKE 3 | 0.9                                                        | 3.2  | 6.4  | 10.3 | 14.3 | 18.5 | 23.0 | 27.9 | 33.2 | 39.0 | 45.4 | 52.4 |
|         | AUTOBRAKE 2 | 0.3                                                        | 1.8  | 4.0  | 6.5  | 9.3  | 12.3 | 15.6 | 19.2 | 23.3 | 27.9 | 33.0 | 38.7 |
|         | AUTOBRAKE 1 | 0.2                                                        | 1.2  | 2.6  | 4.3  | 6.1  | 8.1  | 10.3 | 12.8 | 15.6 | 18.8 | 22.3 | 26.4 |

**Cooling Time (Minutes)**

|           |            | EVENT ADJUSTED BRAKE ENERGY (MILLIONS OF FOOT POUNDS) |     |     |     |     |     |     |     |            |                     |
|-----------|------------|-------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|------------|---------------------|
|           |            | 16 & BELOW                                            | 17  | 18  | 20  | 24  | 28  | 32  | 35  | 36 TO 44   | 45 & ABOVE          |
| GEAR DOWN | NO SPECIAL | PROCEDURE REQUIRED                                    | 1   | 2   | 3   | 4   | 6   | 7   | 7   | CAUTION    | FUSE PLUG MELT ZONE |
| INFLIGHT  |            |                                                       |     |     |     |     |     |     |     |            |                     |
| GROUND    |            |                                                       | 11  | 18  | 26  | 42  | 55  | 66  | 73  |            |                     |
| BTMS      | UP TO 2.4  |                                                       | 2.4 | 2.6 | 2.9 | 3.4 | 4.0 | 4.5 | 4.9 | 5.0 TO 6.3 | 6.3 & ABOVE         |

Observe maximum quick turnaround limit.

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

Add 1.0 million foot pounds for each taxi mile.

For one brake deactivated, increase brake energy by 10 percent.

For two brakes deactivated, increase brake energy by 20 percent.

When in caution zone, wheel fuse plugs may melt. Delay takeoff and inspect after one hour. If overheat occurs after takeoff, extend gear soon for at least 8 minutes.

When in fuse plug melt zone, clear runway immediately. Unless required, do not set parking brake. Do not 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 EICAS may be used 10 to 15 minutes after airplane has come to a complete stop, or inflight with gear retracted, to determine recommended cooling schedule. (When inflight with gear extended, the BTMS indications may vary between individual brakes, due to airstream effects.)



## ADVISORY INFORMATION

## Approach or Landing Climb Limited Weight

Valid for approach with flaps 20 and landing with flaps 30

| AIRPORT OAT |     | APPROACH OR LANDING CLIMB LIMITED WEIGHT (1000 KG) |       |       |       |       |       |
|-------------|-----|----------------------------------------------------|-------|-------|-------|-------|-------|
|             |     | AIRPORT PRESSURE ALTITUDE (FT)                     |       |       |       |       |       |
| °C          | °F  | -2000                                              | 0     | 2000  | 4000  | 6000  | 8000  |
| 54          | 129 | 304.9                                              | 284.8 |       |       |       |       |
| 52          | 126 | 313.0                                              | 291.7 |       |       |       |       |
| 50          | 122 | 321.0                                              | 299.0 | 274.7 |       |       |       |
| 48          | 118 | 329.1                                              | 307.4 | 281.2 |       |       |       |
| 46          | 115 | 337.3                                              | 315.9 | 288.2 | 265.3 |       |       |
| 44          | 111 | 345.2                                              | 323.9 | 295.9 | 272.2 |       |       |
| 42          | 108 | 352.5                                              | 332.1 | 304.6 | 278.8 | 255.6 |       |
| 40          | 104 | 359.7                                              | 340.5 | 312.9 | 285.6 | 261.5 |       |
| 38          | 100 | 366.9                                              | 349.0 | 320.7 | 292.2 | 267.2 | 237.5 |
| 36          | 97  | 373.4                                              | 356.3 | 327.9 | 298.5 | 272.1 | 242.3 |
| 34          | 93  | 378.7                                              | 363.3 | 335.4 | 304.7 | 276.5 | 247.0 |
| 32          | 90  | 378.7                                              | 370.4 | 341.7 | 310.6 | 280.5 | 251.3 |
| 30          | 86  | 378.7                                              | 376.6 | 347.1 | 317.1 | 284.8 | 255.1 |
| 28          | 82  | 378.7                                              | 376.7 | 351.7 | 322.0 | 289.4 | 258.9 |
| 26          | 79  | 378.7                                              | 376.8 | 357.1 | 325.9 | 294.0 | 262.5 |
| 24          | 75  | 378.7                                              | 376.9 | 357.2 | 329.0 | 298.9 | 266.5 |
| 22          | 72  | 378.7                                              | 377.0 | 357.3 | 332.2 | 302.2 | 270.7 |
| 20          | 68  | 378.7                                              | 377.1 | 357.3 | 332.3 | 304.3 | 274.3 |
| 18          | 64  | 378.7                                              | 377.2 | 357.4 | 332.4 | 306.4 | 276.8 |
| 16          | 61  | 378.7                                              | 377.3 | 357.5 | 332.4 | 306.4 | 278.6 |
| 14          | 57  | 378.7                                              | 377.3 | 357.6 | 332.5 | 306.5 | 280.1 |
| 12          | 54  | 378.7                                              | 377.4 | 357.7 | 332.6 | 306.5 | 280.2 |
| 10          | 50  | 378.7                                              | 377.4 | 357.7 | 332.7 | 306.6 | 280.3 |
| 8           | 46  | 378.7                                              | 377.5 | 357.8 | 332.7 | 306.6 | 280.3 |
| 6           | 43  | 378.7                                              | 377.5 | 357.8 | 332.8 | 306.6 | 280.2 |
| 4           | 40  | 378.7                                              | 377.5 | 354.6 | 320.5 | 293.0 | 258.9 |
| 2           | 36  | 378.7                                              | 377.6 | 354.6 | 320.5 | 293.0 | 258.9 |
| 0           | 32  | 378.7                                              | 377.6 | 354.7 | 320.6 | 293.0 | 259.0 |
| -40         | -40 | 378.7                                              | 377.7 | 354.6 | 320.6 | 293.0 | 259.0 |

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

With engine bleed for packs off, increase weight by 1350 kg.

With engine and wing anti-ice on, decrease weight by 2200 kg.

When operating in icing conditions during any part of the flight with forecast landing temperature below 10°C, decrease weight by 21950 kg.

**ADVISORY INFORMATION**

**Approach or Landing Climb Limited Weight**

**Valid for approach with flaps 20 and landing with flaps 25**

| AIRPORT OAT |     | APPROACH OR LANDING CLIMB LIMITED WEIGHT (1000 KG) |       |       |       |       |       |
|-------------|-----|----------------------------------------------------|-------|-------|-------|-------|-------|
|             |     | AIRPORT PRESSURE ALTITUDE (FT)                     |       |       |       |       |       |
| °C          | °F  | -2000                                              | 0     | 2000  | 4000  | 6000  | 8000  |
| 54          | 129 | 308.4                                              | 289.3 |       |       |       |       |
| 52          | 126 | 315.6                                              | 296.4 |       |       |       |       |
| 50          | 122 | 323.1                                              | 303.4 | 279.2 |       |       |       |
| 48          | 118 | 330.8                                              | 310.6 | 285.8 |       |       |       |
| 46          | 115 | 338.7                                              | 318.2 | 292.8 | 269.5 |       |       |
| 44          | 111 | 346.3                                              | 325.7 | 300.4 | 276.4 |       |       |
| 42          | 108 | 353.7                                              | 333.6 | 308.1 | 283.2 | 259.8 |       |
| 40          | 104 | 360.8                                              | 341.6 | 315.5 | 290.1 | 265.8 |       |
| 38          | 100 | 368.1                                              | 350.1 | 322.9 | 297.3 | 271.8 | 241.8 |
| 36          | 97  | 374.8                                              | 357.4 | 329.8 | 303.3 | 277.2 | 246.6 |
| 34          | 93  | 378.7                                              | 364.4 | 337.1 | 309.0 | 281.6 | 251.3 |
| 32          | 90  | 378.7                                              | 371.7 | 343.0 | 314.0 | 285.9 | 256.0 |
| 30          | 86  | 378.7                                              | 377.9 | 348.2 | 319.8 | 290.2 | 259.9 |
| 28          | 82  | 378.7                                              | 378.0 | 352.9 | 324.4 | 295.0 | 263.8 |
| 26          | 79  | 378.7                                              | 378.2 | 358.5 | 328.1 | 299.6 | 267.5 |
| 24          | 75  | 378.7                                              | 378.3 | 358.5 | 331.1 | 304.0 | 271.5 |
| 22          | 72  | 378.7                                              | 378.4 | 358.6 | 334.1 | 307.0 | 275.9 |
| 20          | 68  | 378.7                                              | 378.5 | 358.7 | 334.2 | 308.7 | 279.6 |
| 18          | 64  | 378.7                                              | 378.5 | 358.8 | 334.3 | 310.5 | 282.2 |
| 16          | 61  | 378.7                                              | 378.6 | 358.8 | 334.4 | 310.5 | 284.1 |
| 14          | 57  | 378.7                                              | 378.7 | 358.9 | 334.4 | 310.6 | 285.7 |
| 12          | 54  | 378.7                                              | 378.7 | 359.0 | 334.5 | 310.7 | 285.7 |
| 10          | 50  | 378.7                                              | 378.7 | 359.1 | 334.6 | 310.7 | 285.8 |
| 8           | 46  | 378.7                                              | 378.7 | 359.1 | 334.7 | 310.7 | 285.8 |
| 6           | 43  | 378.7                                              | 378.7 | 359.2 | 334.7 | 310.8 | 285.8 |
| 4           | 40  | 378.7                                              | 378.7 | 359.2 | 334.8 | 310.8 | 280.7 |
| 2           | 36  | 378.7                                              | 378.7 | 359.3 | 334.8 | 310.8 | 280.7 |
| 0           | 32  | 378.7                                              | 378.7 | 359.3 | 334.8 | 310.9 | 280.7 |
| -40         | -40 | 378.7                                              | 378.7 | 359.4 | 334.9 | 311.0 | 280.9 |

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

With engine bleed for packs off, increase weight by 1450 kg.

With engine and wing anti-ice on, decrease weight by 1800 kg.

When operating in icing conditions during any part of the flight with forecast landing temperature below 10°C, decrease weight by 22250 kg.



## Performance Inflight - QRH

## Chapter PI-QRH

## Engine Inoperative

## Section 42

## ENGINE INOP

## Initial Max Continuous %N1

Based on .84M, engine bleed for one pack on and anti-ice off

| TAT<br>(°C) | PRESSURE ALTITUDE (1000 FT) |       |       |       |       |       |       |       |       |
|-------------|-----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
|             | 27                          | 29    | 31    | 33    | 35    | 37    | 39    | 41    | 43    |
| 20          | 97.4                        | 97.0  | 96.7  | 96.3  | 95.9  | 95.9  | 95.6  | 95.3  | 95.0  |
| 15          | 98.2                        | 97.8  | 97.3  | 97.0  | 96.6  | 96.3  | 96.0  | 95.7  | 95.4  |
| 10          | 99.2                        | 98.9  | 98.3  | 97.7  | 97.2  | 97.0  | 96.6  | 96.3  | 96.0  |
| 5           | 100.2                       | 100.1 | 99.7  | 98.8  | 98.1  | 97.8  | 97.4  | 97.1  | 96.8  |
| 0           | 99.3                        | 100.9 | 101.0 | 99.9  | 99.3  | 98.8  | 98.3  | 97.9  | 97.6  |
| -5          | 98.4                        | 99.9  | 101.2 | 101.3 | 100.5 | 100.2 | 99.7  | 99.3  | 98.8  |
| -10         | 97.4                        | 99.0  | 100.3 | 101.6 | 101.3 | 101.3 | 100.7 | 100.3 | 100.0 |
| -15         | 96.5                        | 98.1  | 99.3  | 100.6 | 101.0 | 102.0 | 101.1 | 100.8 | 100.5 |
| -20         | 95.6                        | 97.1  | 98.3  | 99.6  | 100.1 | 101.0 | 100.1 | 99.8  | 99.5  |
| -25         | 94.6                        | 96.1  | 97.4  | 98.6  | 99.1  | 100.0 | 99.1  | 98.8  | 98.5  |
| -30         | 93.7                        | 95.2  | 96.4  | 97.6  | 98.1  | 99.0  | 98.1  | 97.8  | 97.5  |
| -35         | 92.7                        | 94.2  | 95.4  | 96.6  | 97.0  | 97.9  | 97.1  | 96.8  | 96.5  |
| -40         | 91.7                        | 93.2  | 94.4  | 95.6  | 96.0  | 96.9  | 96.1  | 95.8  | 95.5  |

## ENGINE INOP

### Max Continuous %N1

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

#### 37000 FT to 27000 FT Pressure Altitudes

| 37000 FT PRESS ALT |      |      |      |       |       |       |       |       |       |       |       |       | TAT (°C) |
|--------------------|------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|
| KIAS               | M    | -50  | -45  | -40   | -35   | -30   | -25   | -20   | -15   | -10   | -5    | 0     | 5        |
| 280                | 0.86 | 94.3 | 95.4 | 96.4  | 97.4  | 98.4  | 99.5  | 100.5 | 101.4 | 101.2 | 100.2 | 98.9  | 97.7     |
| 240                | 0.74 | 96.1 | 97.2 | 98.3  | 99.3  | 100.4 | 101.4 | 102.1 | 101.9 | 100.9 | 99.5  | 98.1  | 97.1     |
| 200                | 0.63 | 95.7 | 96.7 | 97.8  | 98.8  | 99.9  | 100.8 | 101.4 | 100.9 | 100.0 | 98.5  | 97.0  | 96.3     |
| 35000 FT PRESS ALT |      |      |      |       |       |       |       |       |       |       |       |       | TAT (°C) |
| KIAS               | M    | -50  | -45  | -40   | -35   | -30   | -25   | -20   | -15   | -10   | -5    | 0     | 5        |
| 280                | 0.82 | 94.6 | 95.6 | 96.6  | 97.7  | 98.7  | 99.7  | 100.7 | 101.7 | 101.4 | 100.4 | 99.2  | 98.1     |
| 240                | 0.71 | 95.1 | 96.2 | 97.2  | 98.3  | 99.3  | 100.3 | 101.3 | 101.8 | 100.9 | 99.8  | 98.3  | 97.2     |
| 200                | 0.60 | 94.8 | 95.8 | 96.9  | 97.9  | 98.9  | 99.9  | 100.9 | 101.0 | 100.2 | 98.8  | 97.1  | 96.1     |
| 33000 FT PRESS ALT |      |      |      |       |       |       |       |       |       |       |       |       | TAT (°C) |
| KIAS               | M    | -50  | -45  | -40   | -35   | -30   | -25   | -20   | -15   | -10   | -5    | 0     | 5        |
| 320                | 0.89 | 91.4 | 92.4 | 93.4  | 94.4  | 95.4  | 96.4  | 97.4  | 98.3  | 99.3  | 100.2 | 99.8  | 98.8     |
| 280                | 0.79 | 95.0 | 96.0 | 97.1  | 98.1  | 99.2  | 100.2 | 101.2 | 102.2 | 102.4 | 101.0 | 100.0 | 98.7     |
| 240                | 0.68 | 95.6 | 96.7 | 97.8  | 98.8  | 99.8  | 100.9 | 101.9 | 102.4 | 101.8 | 100.2 | 98.9  | 97.5     |
| 200                | 0.58 | 95.9 | 97.0 | 98.0  | 99.1  | 100.1 | 101.1 | 101.6 | 101.6 | 101.0 | 99.3  | 97.9  | 96.4     |
| 31000 FT PRESS ALT |      |      |      |       |       |       |       |       |       |       |       |       | TAT (°C) |
| KIAS               | M    | -45  | -40  | -35   | -30   | -25   | -20   | -15   | -10   | -5    | 0     | 5     | 10       |
| 320                | 0.85 | 92.7 | 93.8 | 94.8  | 95.7  | 96.7  | 97.7  | 98.7  | 99.6  | 100.5 | 100.8 | 99.7  | 98.4     |
| 280                | 0.76 | 96.3 | 97.4 | 98.4  | 99.5  | 100.5 | 101.5 | 102.5 | 103.5 | 102.0 | 100.6 | 99.1  | 98.0     |
| 240                | 0.66 | 97.4 | 98.4 | 99.5  | 100.5 | 101.5 | 102.6 | 103.3 | 103.0 | 101.0 | 99.5  | 98.1  | 96.9     |
| 200                | 0.55 | 97.6 | 98.7 | 99.7  | 100.8 | 101.8 | 102.6 | 102.8 | 102.0 | 100.7 | 98.7  | 97.2  | 96.1     |
| 29000 FT PRESS ALT |      |      |      |       |       |       |       |       |       |       |       |       | TAT (°C) |
| KIAS               | M    | -40  | -35  | -30   | -25   | -20   | -15   | -10   | -5    | 0     | 5     | 10    | 15       |
| 320                | 0.82 | 93.8 | 94.8 | 95.8  | 96.8  | 97.8  | 98.7  | 99.7  | 100.6 | 101.6 | 100.1 | 98.9  | 97.8     |
| 280                | 0.73 | 96.6 | 97.6 | 98.6  | 99.6  | 100.6 | 101.6 | 102.6 | 102.5 | 101.0 | 99.5  | 98.1  | 97.1     |
| 240                | 0.63 | 98.1 | 99.2 | 100.2 | 101.3 | 102.3 | 103.3 | 103.1 | 101.6 | 99.8  | 98.4  | 97.1  | 96.0     |
| 200                | 0.53 | 98.6 | 99.7 | 100.7 | 101.7 | 102.7 | 103.2 | 102.7 | 101.2 | 99.4  | 97.7  | 96.3  | 96.2     |
| 27000 FT PRESS ALT |      |      |      |       |       |       |       |       |       |       |       |       | TAT (°C) |
| KIAS               | M    | -40  | -35  | -30   | -25   | -20   | -15   | -10   | -5    | 0     | 5     | 10    | 15       |
| 360                | 0.88 | 90.2 | 91.2 | 92.1  | 93.0  | 94.0  | 94.9  | 95.8  | 96.7  | 97.6  | 98.5  | 99.2  | 98.1     |
| 320                | 0.79 | 93.4 | 94.4 | 95.3  | 96.3  | 97.3  | 98.2  | 99.2  | 100.1 | 101.1 | 100.6 | 99.2  | 98.1     |
| 280                | 0.70 | 95.4 | 96.4 | 97.4  | 98.4  | 99.4  | 100.4 | 101.3 | 102.3 | 101.3 | 99.7  | 98.2  | 97.1     |
| 240                | 0.60 | 97.2 | 98.2 | 99.2  | 100.3 | 101.3 | 102.3 | 103.0 | 102.0 | 99.9  | 98.5  | 97.2  | 96.2     |
| 200                | 0.51 | 98.4 | 99.4 | 100.4 | 101.5 | 102.5 | 103.2 | 102.7 | 101.8 | 99.9  | 98.1  | 96.5  | 95.6     |

### %N1 Adjustments for Engine Bleed

| BLEED CONFIGURATION     | PRESSURE ALTITUDE (1000 FT) |      |      |      |      |      |
|-------------------------|-----------------------------|------|------|------|------|------|
|                         | 37                          | 35   | 33   | 31   | 29   | 27   |
| ENGINE A/T ON           | -0.2                        | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 |
| WING A/T ON - PACKS ON  | -0.4                        | -0.4 | -0.4 | -0.3 | -0.3 | -0.3 |
| WING A/T ON - PACKS OFF | -0.6                        | -0.5 | -0.5 | -0.5 | -0.5 | -0.4 |

# ENGINE INOP

## Max Continuous %N1

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

### 25000 FT to 18000 FT Pressure Altitudes

| 25000 FT PRESS ALT |      |      |       |       |       |       |       |       |       |       |       | TAT (°C) |       |  |  |
|--------------------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|-------|--|--|
| KIAS               | M    | -35  | -30   | -25   | -20   | -15   | -10   | -5    | 0     | 5     | 10    | 15       | 20    |  |  |
| 360                | 0.85 | 91.2 | 92.2  | 93.1  | 94.1  | 95.0  | 95.9  | 96.8  | 97.7  | 98.6  | 99.5  | 98.9     | 98.1  |  |  |
| 320                | 0.76 | 93.9 | 94.8  | 95.8  | 96.8  | 97.7  | 98.7  | 99.6  | 100.5 | 101.1 | 99.6  | 98.5     | 97.6  |  |  |
| 280                | 0.67 | 95.5 | 96.5  | 97.5  | 98.5  | 99.4  | 100.4 | 101.3 | 101.5 | 100.4 | 98.8  | 97.5     | 96.7  |  |  |
| 240                | 0.58 | 97.4 | 98.5  | 99.5  | 100.5 | 101.5 | 102.4 | 102.3 | 100.9 | 99.3  | 97.8  | 96.7     | 95.9  |  |  |
| 200                | 0.49 | 99.3 | 100.3 | 101.4 | 102.4 | 103.4 | 103.1 | 102.0 | 100.6 | 98.5  | 97.1  | 96.1     | 95.9  |  |  |
| 24000 FT PRESS ALT |      |      |       |       |       |       |       |       |       |       |       | TAT (°C) |       |  |  |
| KIAS               | M    | -35  | -30   | -25   | -20   | -15   | -10   | -5    | 0     | 5     | 10    | 15       | 20    |  |  |
| 360                | 0.83 | 91.3 | 92.3  | 93.2  | 94.2  | 95.1  | 96.0  | 96.9  | 97.8  | 98.7  | 99.6  | 99.4     | 98.4  |  |  |
| 320                | 0.75 | 93.6 | 94.6  | 95.6  | 96.5  | 97.5  | 98.4  | 99.4  | 100.3 | 101.2 | 100.0 | 98.8     | 97.8  |  |  |
| 280                | 0.66 | 95.4 | 96.4  | 97.4  | 98.3  | 99.3  | 100.3 | 101.2 | 101.8 | 100.7 | 99.1  | 97.8     | 96.9  |  |  |
| 240                | 0.57 | 97.3 | 98.3  | 99.3  | 100.3 | 101.3 | 102.2 | 102.6 | 101.4 | 99.8  | 98.3  | 97.1     | 96.2  |  |  |
| 200                | 0.48 | 98.8 | 99.9  | 100.9 | 101.9 | 102.9 | 103.4 | 102.3 | 101.0 | 98.9  | 97.4  | 96.3     | 95.6  |  |  |
| 22000 FT PRESS ALT |      |      |       |       |       |       |       |       |       |       |       | TAT (°C) |       |  |  |
| KIAS               | M    | -30  | -25   | -20   | -15   | -10   | -5    | 0     | 5     | 10    | 15    | 20       | 25    |  |  |
| 360                | 0.80 | 92.1 | 93.0  | 94.0  | 94.9  | 95.8  | 96.7  | 97.6  | 98.5  | 99.4  | 100.0 | 99.0     | 98.3  |  |  |
| 320                | 0.72 | 94.3 | 95.3  | 96.3  | 97.2  | 98.1  | 99.1  | 100.0 | 100.9 | 100.7 | 99.3  | 98.2     | 97.5  |  |  |
| 280                | 0.63 | 96.1 | 97.1  | 98.1  | 99.0  | 100.0 | 100.9 | 101.9 | 101.3 | 99.8  | 98.4  | 97.3     | 96.6  |  |  |
| 240                | 0.55 | 97.7 | 98.7  | 99.7  | 100.7 | 101.7 | 102.7 | 102.3 | 100.9 | 99.3  | 97.7  | 96.8     | 96.1  |  |  |
| 200                | 0.46 | 99.5 | 100.5 | 101.5 | 102.5 | 103.5 | 103.0 | 101.5 | 99.9  | 97.9  | 96.8  | 95.9     | 95.8  |  |  |
| 20000 FT PRESS ALT |      |      |       |       |       |       |       |       |       |       |       | TAT (°C) |       |  |  |
| KIAS               | M    | -30  | -25   | -20   | -15   | -10   | -5    | 0     | 5     | 10    | 15    | 20       | 25    |  |  |
| 360                | 0.77 | 93.7 | 94.6  | 95.6  | 96.5  | 97.4  | 98.4  | 99.3  | 100.2 | 101.1 | 102.0 | 101.3    | 100.1 |  |  |
| 320                | 0.69 | 95.9 | 96.9  | 97.8  | 98.8  | 99.7  | 100.7 | 101.6 | 102.6 | 103.5 | 101.8 | 100.4    | 99.1  |  |  |
| 280                | 0.61 | 97.7 | 98.7  | 99.6  | 100.6 | 101.6 | 102.6 | 103.5 | 104.3 | 102.8 | 100.9 | 99.4     | 98.3  |  |  |
| 240                | 0.53 | 98.5 | 99.5  | 100.5 | 101.5 | 102.4 | 103.4 | 104.3 | 104.1 | 102.4 | 100.7 | 98.7     | 97.2  |  |  |
| 200                | 0.44 | 98.0 | 99.0  | 99.9  | 100.9 | 101.9 | 102.9 | 103.8 | 102.6 | 100.5 | 98.0  | 96.2     | 95.3  |  |  |
| 18000 FT PRESS ALT |      |      |       |       |       |       |       |       |       |       |       | TAT (°C) |       |  |  |
| KIAS               | M    | -25  | -20   | -15   | -10   | -5    | 0     | 5     | 10    | 15    | 20    | 25       | 30    |  |  |
| 360                | 0.75 | 94.4 | 95.4  | 96.3  | 97.2  | 98.2  | 99.1  | 100.0 | 100.9 | 101.8 | 102.0 | 100.6    | 99.4  |  |  |
| 320                | 0.67 | 96.7 | 97.7  | 98.6  | 99.6  | 100.5 | 101.4 | 102.4 | 103.3 | 102.9 | 101.2 | 99.7     | 98.6  |  |  |
| 280                | 0.59 | 98.5 | 99.5  | 100.5 | 101.5 | 102.4 | 103.4 | 104.3 | 104.0 | 102.3 | 100.4 | 98.9     | 97.8  |  |  |
| 240                | 0.51 | 99.6 | 100.6 | 101.6 | 102.6 | 103.6 | 104.5 | 104.9 | 103.9 | 101.9 | 100.0 | 98.4     | 97.2  |  |  |
| 200                | 0.42 | 97.2 | 98.2  | 99.2  | 100.1 | 101.1 | 101.9 | 102.0 | 100.8 | 98.8  | 97.3  | 95.8     | 94.4  |  |  |

## %N1 Adjustments for Engine Bleed

| BLEED CONFIGURATION     | PRESSURE ALTITUDE (1000 FT) |      |      |      |      |
|-------------------------|-----------------------------|------|------|------|------|
|                         | 25                          | 24   | 22   | 20   | 18   |
| ENGINE A/I ON           | -0.2                        | -0.2 | -0.2 | -0.2 | -0.2 |
| WING A/I ON - PACKS ON  | -0.3                        | -0.3 | -0.3 | -0.2 | -0.3 |
| WING A/I ON - PACKS OFF | -0.4                        | -0.4 | -0.4 | -0.3 | -0.5 |

## ENGINE INOP

### Max Continuous %N1

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

#### 16000 FT to 5000 FT Pressure Altitudes

| 16000 FT PRESS ALT |      |      |       |       |       |       |       |       |       |       |       |       | TAT (°C) |  |
|--------------------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|--|
| KIAS               | M    | -25  | -20   | -15   | -10   | -5    | 0     | 5     | 10    | 15    | 20    | 25    | 30       |  |
| 360                | 0.72 | 94.8 | 95.8  | 96.7  | 97.6  | 98.6  | 99.5  | 100.4 | 101.3 | 102.2 | 103.1 | 101.7 | 100.2    |  |
| 320                | 0.64 | 96.9 | 97.9  | 98.8  | 99.8  | 100.7 | 101.7 | 102.6 | 103.5 | 104.4 | 102.7 | 100.9 | 99.4     |  |
| 280                | 0.57 | 98.7 | 99.7  | 100.7 | 101.6 | 102.6 | 103.5 | 104.5 | 105.4 | 104.1 | 102.2 | 100.3 | 98.8     |  |
| 240                | 0.49 | 99.1 | 100.1 | 101.1 | 102.0 | 103.0 | 104.0 | 104.9 | 104.5 | 103.0 | 100.9 | 99.2  | 97.9     |  |
| 200                | 0.41 | 96.2 | 97.2  | 98.1  | 99.1  | 100.0 | 100.9 | 101.5 | 101.3 | 99.8  | 98.3  | 97.0  | 95.4     |  |
| 14000 FT PRESS ALT |      |      |       |       |       |       |       |       |       |       |       |       | TAT (°C) |  |
| KIAS               | M    | -20  | -15   | -10   | -5    | 0     | 5     | 10    | 15    | 20    | 25    | 30    | 35       |  |
| 360                | 0.69 | 94.9 | 95.9  | 96.8  | 97.7  | 98.6  | 99.5  | 100.4 | 101.3 | 102.2 | 102.2 | 100.8 | 99.5     |  |
| 320                | 0.62 | 97.1 | 98.1  | 99.0  | 99.9  | 100.9 | 101.8 | 102.7 | 103.6 | 103.4 | 101.5 | 100.0 | 98.9     |  |
| 280                | 0.54 | 99.2 | 100.1 | 101.1 | 102.1 | 103.0 | 103.9 | 104.9 | 104.9 | 103.0 | 101.0 | 99.5  | 98.4     |  |
| 240                | 0.47 | 97.3 | 98.2  | 99.2  | 100.1 | 101.1 | 102.0 | 102.8 | 102.5 | 100.6 | 99.0  | 97.8  | 96.7     |  |
| 200                | 0.39 | 96.1 | 97.0  | 98.0  | 98.9  | 99.8  | 100.7 | 101.4 | 100.7 | 99.0  | 97.6  | 96.5  | 95.6     |  |
| 12000 FT PRESS ALT |      |      |       |       |       |       |       |       |       |       |       |       | TAT (°C) |  |
| KIAS               | M    | -15  | -10   | -5    | 0     | 5     | 10    | 15    | 20    | 25    | 30    | 35    | 40       |  |
| 360                | 0.67 | 95.4 | 96.3  | 97.2  | 98.1  | 99.0  | 99.9  | 100.8 | 101.6 | 102.5 | 101.3 | 100.0 | 99.0     |  |
| 320                | 0.60 | 97.3 | 98.2  | 99.2  | 100.1 | 101.0 | 101.9 | 102.8 | 103.7 | 102.3 | 100.6 | 99.4  | 98.4     |  |
| 280                | 0.52 | 99.7 | 100.6 | 101.6 | 102.5 | 103.5 | 104.4 | 105.3 | 104.0 | 102.0 | 100.2 | 99.1  | 98.1     |  |
| 240                | 0.45 | 96.5 | 97.4  | 98.3  | 99.3  | 100.2 | 101.1 | 101.4 | 100.6 | 99.2  | 98.0  | 96.9  | 96.0     |  |
| 200                | 0.38 | 96.7 | 97.7  | 98.6  | 99.5  | 100.4 | 101.2 | 101.3 | 100.2 | 98.7  | 97.4  | 96.4  | 95.8     |  |
| 10000 FT PRESS ALT |      |      |       |       |       |       |       |       |       |       |       |       | TAT (°C) |  |
| KIAS               | M    | -15  | -10   | -5    | 0     | 5     | 10    | 15    | 20    | 25    | 30    | 35    | 40       |  |
| 360                | 0.65 | 94.2 | 95.2  | 96.1  | 96.9  | 97.8  | 98.7  | 99.6  | 100.4 | 101.3 | 101.5 | 100.2 | 99.1     |  |
| 320                | 0.58 | 96.1 | 97.1  | 98.0  | 98.9  | 99.8  | 100.7 | 101.6 | 102.4 | 102.6 | 101.0 | 99.7  | 98.6     |  |
| 280                | 0.51 | 98.5 | 99.4  | 100.4 | 101.3 | 102.2 | 103.1 | 104.0 | 104.6 | 102.3 | 100.5 | 99.4  | 98.4     |  |
| 240                | 0.43 | 95.6 | 96.6  | 97.5  | 98.4  | 99.3  | 100.2 | 101.0 | 101.1 | 100.3 | 99.1  | 97.8  | 96.9     |  |
| 200                | 0.36 | 96.6 | 97.5  | 98.4  | 99.3  | 100.2 | 101.1 | 101.6 | 101.2 | 100.1 | 98.5  | 97.5  | 96.6     |  |
| 5000 FT PRESS ALT  |      |      |       |       |       |       |       |       |       |       |       |       | TAT (°C) |  |
| KIAS               | M    | -10  | -5    | 0     | 5     | 10    | 15    | 20    | 25    | 30    | 35    | 40    | 45       |  |
| 360                | 0.59 | 92.6 | 93.5  | 94.3  | 95.2  | 96.0  | 96.9  | 97.7  | 98.5  | 99.4  | 100.2 | 99.3  | 98.5     |  |
| 320                | 0.53 | 94.0 | 94.9  | 95.8  | 96.7  | 97.5  | 98.4  | 99.2  | 100.1 | 100.9 | 100.1 | 99.1  | 98.2     |  |
| 280                | 0.46 | 95.0 | 95.9  | 96.8  | 97.6  | 98.5  | 99.4  | 100.2 | 101.1 | 100.9 | 99.8  | 98.8  | 97.8     |  |
| 240                | 0.40 | 95.7 | 96.6  | 97.5  | 98.4  | 99.3  | 100.2 | 101.0 | 101.6 | 100.5 | 99.4  | 98.3  | 97.4     |  |
| 200                | 0.33 | 97.0 | 97.9  | 98.8  | 99.7  | 100.6 | 101.5 | 102.4 | 101.7 | 100.3 | 99.1  | 98.1  | 97.3     |  |

### %N1 Adjustments for Engine Bleed

| BLEED CONFIGURATION     | PRESSURE ALTITUDE (1000 FT) |      |      |      |      |
|-------------------------|-----------------------------|------|------|------|------|
|                         | 16                          | 14   | 12   | 10   | 5    |
| ENGINE A/I ON           | -0.3                        | -0.2 | -0.4 | -0.5 | -0.5 |
| WING A/I ON - PACKS ON  | -0.4                        | -0.5 | -0.6 | -0.7 | -0.8 |
| WING A/I ON - PACKS OFF | -0.6                        | -0.7 | -0.8 | -0.9 | -1.1 |



**ENGINE INOP**

**MAX CONTINUOUS THRUST**

**Driftdown Speed/Level Off Altitude**

**100 ft/min residual rate of climb**

**Includes APU fuel burn**

| WEIGHT (1000 KG)       |              | OPTIMUM<br>DRIFTDOWN<br>SPEED<br>(KIAS) | LEVEL OFF PRESSURE ALTITUDE (FT) |            |            |
|------------------------|--------------|-----------------------------------------|----------------------------------|------------|------------|
| START<br>DRIFT<br>DOWN | LEVEL<br>OFF |                                         | ISA + 10°C<br>& BELOW            | ISA + 15°C | ISA + 20°C |
| 360                    | 350          | 300                                     | 17500                            | 16300      | 15100      |
| 340                    | 330          | 292                                     | 19000                            | 17800      | 16600      |
| 320                    | 311          | 284                                     | 20400                            | 19400      | 18300      |
| 300                    | 292          | 275                                     | 21600                            | 20800      | 19900      |
| 280                    | 272          | 266                                     | 23300                            | 22300      | 21300      |
| 260                    | 252          | 257                                     | 25300                            | 24400      | 23100      |
| 240                    | 232          | 247                                     | 27500                            | 26700      | 25300      |
| 220                    | 214          | 237                                     | 29900                            | 29200      | 27900      |
| 200                    | 194          | 226                                     | 31700                            | 31300      | 30500      |
| 180                    | 175          | 215                                     | 33600                            | 33400      | 33000      |
| 160                    | 155          | 203                                     | 35800                            | 35700      | 35600      |

## ENGINE INOP

### MAX CONTINUOUS THRUST

#### Driftdown/LRC Cruise Range Capability Ground to Air Miles Conversion

| AIR DISTANCE (NM)        |      |      |      |      | GROUND<br>DISTANCE<br>(NM) | AIR DISTANCE (NM)        |      |      |      |      |
|--------------------------|------|------|------|------|----------------------------|--------------------------|------|------|------|------|
| HEADWIND COMPONENT (KTS) |      |      |      |      |                            | TAILWIND COMPONENT (KTS) |      |      |      |      |
| 100                      | 80   | 60   | 40   | 20   |                            | 20                       | 40   | 60   | 80   | 100  |
| 134                      | 126  | 118  | 111  | 105  | 100                        | 95                       | 90   | 86   | 82   | 79   |
| 269                      | 251  | 236  | 222  | 210  | 200                        | 190                      | 181  | 173  | 165  | 159  |
| 403                      | 377  | 354  | 334  | 316  | 300                        | 285                      | 272  | 260  | 248  | 238  |
| 536                      | 502  | 472  | 445  | 421  | 400                        | 380                      | 362  | 346  | 332  | 318  |
| 670                      | 627  | 589  | 556  | 526  | 500                        | 475                      | 453  | 433  | 415  | 398  |
| 803                      | 752  | 707  | 667  | 632  | 600                        | 571                      | 544  | 520  | 498  | 478  |
| 936                      | 877  | 824  | 778  | 737  | 700                        | 666                      | 635  | 607  | 582  | 558  |
| 1068                     | 1001 | 942  | 889  | 842  | 800                        | 761                      | 726  | 695  | 665  | 639  |
| 1201                     | 1126 | 1059 | 1000 | 947  | 900                        | 856                      | 817  | 782  | 749  | 719  |
| 1333                     | 1250 | 1176 | 1111 | 1052 | 1000                       | 952                      | 908  | 869  | 833  | 799  |
| 1466                     | 1374 | 1293 | 1222 | 1157 | 1100                       | 1047                     | 1000 | 956  | 916  | 880  |
| 1598                     | 1499 | 1411 | 1332 | 1262 | 1200                       | 1142                     | 1091 | 1043 | 1000 | 960  |
| 1731                     | 1623 | 1528 | 1443 | 1368 | 1300                       | 1238                     | 1182 | 1131 | 1084 | 1040 |
| 1863                     | 1747 | 1645 | 1554 | 1473 | 1400                       | 1333                     | 1273 | 1218 | 1167 | 1121 |
| 1996                     | 1872 | 1762 | 1665 | 1578 | 1500                       | 1428                     | 1364 | 1305 | 1251 | 1201 |
| 2129                     | 1997 | 1880 | 1776 | 1683 | 1600                       | 1524                     | 1455 | 1392 | 1334 | 1281 |
| 2262                     | 2121 | 1997 | 1887 | 1788 | 1700                       | 1619                     | 1546 | 1479 | 1418 | 1361 |
| 2395                     | 2246 | 2115 | 1998 | 1894 | 1800                       | 1714                     | 1637 | 1566 | 1501 | 1441 |

#### Driftdown/Cruise Fuel and Time

| AIR<br>DIST<br>(NM) | FUEL REQUIRED (1000 KG)                |      |      |      |      |      |      |      |      |      |      | TIME<br>(HR:MIN) |
|---------------------|----------------------------------------|------|------|------|------|------|------|------|------|------|------|------------------|
|                     | WEIGHT AT START OF DRIFTDOWN (1000 KG) |      |      |      |      |      |      |      |      |      |      |                  |
|                     | 160                                    | 180  | 200  | 220  | 240  | 260  | 280  | 300  | 320  | 340  | 360  |                  |
| 100                 | 1.1                                    | 1.1  | 1.2  | 1.3  | 1.5  | 1.6  | 1.7  | 1.8  | 1.8  | 1.9  | 2.0  | 0:16             |
| 200                 | 2.4                                    | 2.5  | 2.8  | 3.1  | 3.3  | 3.5  | 3.7  | 3.9  | 4.1  | 4.3  | 4.6  | 0:31             |
| 300                 | 3.7                                    | 4.1  | 4.5  | 4.9  | 5.3  | 5.6  | 6.0  | 6.3  | 6.6  | 7.0  | 7.4  | 0:46             |
| 400                 | 5.1                                    | 5.6  | 6.2  | 6.8  | 7.3  | 7.8  | 8.2  | 8.7  | 9.2  | 9.7  | 10.3 | 1:01             |
| 500                 | 6.4                                    | 7.0  | 7.8  | 8.5  | 9.2  | 9.8  | 10.4 | 11.0 | 11.6 | 12.3 | 13.0 | 1:16             |
| 600                 | 7.7                                    | 8.4  | 9.3  | 10.1 | 11.0 | 11.7 | 12.5 | 13.2 | 13.9 | 14.8 | 15.6 | 1:31             |
| 700                 | 8.9                                    | 9.8  | 10.8 | 11.8 | 12.8 | 13.7 | 14.5 | 15.4 | 16.2 | 17.2 | 18.2 | 1:46             |
| 800                 | 10.1                                   | 11.2 | 12.3 | 13.4 | 14.5 | 15.6 | 16.5 | 17.5 | 18.5 | 19.6 | 20.8 | 2:01             |
| 900                 | 11.3                                   | 12.5 | 13.8 | 15.1 | 16.3 | 17.4 | 18.5 | 19.6 | 20.7 | 22.0 | 23.3 | 2:15             |
| 1000                | 12.6                                   | 13.9 | 15.3 | 16.7 | 18.0 | 19.3 | 20.5 | 21.8 | 23.0 | 24.4 | 25.9 | 2:30             |
| 1100                | 13.8                                   | 15.2 | 16.8 | 18.3 | 19.8 | 21.2 | 22.5 | 23.9 | 25.2 | 26.8 | 28.4 | 2:45             |
| 1200                | 14.9                                   | 16.6 | 18.2 | 19.9 | 21.5 | 23.0 | 24.5 | 26.0 | 27.4 | 29.2 | 30.9 | 2:59             |
| 1300                | 16.1                                   | 17.9 | 19.7 | 21.5 | 23.2 | 24.8 | 26.4 | 28.0 | 29.7 | 31.5 | 33.4 | 3:14             |
| 1400                | 17.3                                   | 19.2 | 21.1 | 23.0 | 24.9 | 26.6 | 28.4 | 30.1 | 31.8 | 33.8 | 35.8 | 3:29             |
| 1500                | 18.5                                   | 20.5 | 22.5 | 24.6 | 26.5 | 28.4 | 30.3 | 32.2 | 34.0 | 36.1 | 38.3 | 3:43             |
| 1600                | 19.6                                   | 21.7 | 23.9 | 26.1 | 28.2 | 30.2 | 32.2 | 34.2 | 36.2 | 38.4 | 40.7 | 3:58             |
| 1700                | 20.8                                   | 23.0 | 25.3 | 27.6 | 29.8 | 32.0 | 34.1 | 36.2 | 38.3 | 40.7 | 43.1 | 4:13             |
| 1800                | 21.9                                   | 24.3 | 26.7 | 29.1 | 31.5 | 33.8 | 36.0 | 38.2 | 40.5 | 43.0 | 45.5 | 4:28             |

Includes APU fuel burn.

Driftdown at optimum driftdown speed and cruise at LRC speed.





**ENGINE INOP**

**MAX CONTINUOUS THRUST**

**Long Range Cruise Altitude Capability**

**100 ft/min residual rate of climb**

| WEIGHT<br>(1000 KG) | PRESSURE ALTITUDE (FT) |            |            |
|---------------------|------------------------|------------|------------|
|                     | ISA + 10°C<br>& BELOW  | ISA + 15°C | ISA + 20°C |
| 360                 | 15000                  | 13600      | 12000      |
| 350                 | 15500                  | 14200      | 12600      |
| 340                 | 16400                  | 14900      | 13100      |
| 330                 | 17200                  | 15700      | 13900      |
| 320                 | 18100                  | 16600      | 14900      |
| 310                 | 19000                  | 17500      | 15800      |
| 300                 | 19900                  | 18400      | 16700      |
| 290                 | 20600                  | 19400      | 17800      |
| 280                 | 21200                  | 20200      | 18800      |
| 270                 | 21900                  | 20900      | 19900      |
| 260                 | 22800                  | 21600      | 20600      |
| 250                 | 23800                  | 22500      | 21400      |
| 240                 | 24900                  | 23700      | 22100      |
| 230                 | 26200                  | 24900      | 23400      |
| 220                 | 27600                  | 26300      | 24600      |
| 210                 | 29100                  | 27700      | 26000      |
| 200                 | 30400                  | 29100      | 27600      |
| 190                 | 31400                  | 30500      | 29100      |
| 180                 | 32400                  | 31700      | 30600      |
| 170                 | 33400                  | 33000      | 32000      |
| 160                 | 34600                  | 34400      | 33500      |

**With engine anti-ice on, no altitude capability adjustment is required.**

**With engine and wing anti-ice on, decrease altitude capability by 300 ft.**

**ENGINE INOP**

**MAX CONTINUOUS THRUST**

**Long Range Cruise Control**

| WEIGHT<br>(1000 KG) |        | PRESSURE ALTITUDE (1000 FT) |       |       |       |      |      |      |      |      |      |
|---------------------|--------|-----------------------------|-------|-------|-------|------|------|------|------|------|------|
|                     |        | 10                          | 15    | 17    | 19    | 21   | 23   | 25   | 27   | 29   | 31   |
| 360                 | %N1    | 91.6                        | 97.3  |       |       |      |      |      |      |      |      |
|                     | MACH   | .602                        | .664  |       |       |      |      |      |      |      |      |
|                     | KIAS   | 334                         | 337   |       |       |      |      |      |      |      |      |
|                     | FF/ENG | 10335                       | 11118 |       |       |      |      |      |      |      |      |
| 340                 | %N1    | 90.6                        | 95.5  | 98.6  |       |      |      |      |      |      |      |
|                     | MACH   | .602                        | .662  | .681  |       |      |      |      |      |      |      |
|                     | KIAS   | 334                         | 337   | 333   |       |      |      |      |      |      |      |
|                     | FF/ENG | 9977                        | 10586 | 10771 |       |      |      |      |      |      |      |
| 320                 | %N1    | 89.7                        | 93.7  | 95.9  | 99.2  |      |      |      |      |      |      |
|                     | MACH   | .602                        | .650  | .667  | .686  |      |      |      |      |      |      |
|                     | KIAS   | 334                         | 330   | 326   | 323   |      |      |      |      |      |      |
|                     | FF/ENG | 9633                        | 9884  | 9949  | 10098 |      |      |      |      |      |      |
| 300                 | %N1    | 87.7                        | 92.0  | 93.7  | 96.1  |      |      |      |      |      |      |
|                     | MACH   | .584                        | .637  | .653  | .671  |      |      |      |      |      |      |
|                     | KIAS   | 324                         | 323   | 319   | 316   |      |      |      |      |      |      |
|                     | FF/ENG | 8949                        | 9222  | 9239  | 9287  |      |      |      |      |      |      |
| 280                 | %N1    | 85.7                        | 90.1  | 91.8  | 93.5  | 96.3 |      |      |      |      |      |
|                     | MACH   | .566                        | .619  | .640  | .656  | .674 |      |      |      |      |      |
|                     | KIAS   | 314                         | 314   | 312   | 308   | 305  |      |      |      |      |      |
|                     | FF/ENG | 8313                        | 8533  | 8592  | 8583  | 8659 |      |      |      |      |      |
| 260                 | %N1    | 83.8                        | 88.1  | 89.8  | 91.5  | 93.2 | 96.3 |      |      |      |      |
|                     | MACH   | .548                        | .599  | .621  | .642  | .658 | .677 |      |      |      |      |
|                     | KIAS   | 304                         | 303   | 303   | 301   | 297  | 294  |      |      |      |      |
|                     | FF/ENG | 7698                        | 7830  | 7916  | 7948  | 7953 | 8065 |      |      |      |      |
| 240                 | %N1    | 81.5                        | 85.7  | 87.6  | 89.3  | 91.0 | 92.9 | 96.0 |      |      |      |
|                     | MACH   | .529                        | .577  | .599  | .622  | .643 | .659 | .678 |      |      |      |
|                     | KIAS   | 293                         | 292   | 292   | 292   | 290  | 286  | 283  |      |      |      |
|                     | FF/ENG | 7105                        | 7147  | 7227  | 7288  | 7324 | 7345 | 7467 |      |      |      |
| 220                 | %N1    | 79.3                        | 83.3  | 85.1  | 86.9  | 88.7 | 90.4 | 92.3 | 95.4 | 99.4 |      |
|                     | MACH   | .510                        | .555  | .576  | .598  | .621 | .642 | .659 | .679 | .701 |      |
|                     | KIAS   | 282                         | 280   | 280   | 280   | 280  | 278  | 274  | 271  | 269  |      |
|                     | FF/ENG | 6519                        | 6489  | 6557  | 6617  | 6672 | 6717 | 6737 | 6844 | 7112 |      |
| 200                 | %N1    | 76.7                        | 80.6  | 82.5  | 84.2  | 86.1 | 87.8 | 89.6 | 91.5 | 94.5 | 98.6 |
|                     | MACH   | .490                        | .532  | .552  | .572  | .594 | .618 | .640 | .658 | .677 | .700 |
|                     | KIAS   | 271                         | 269   | 268   | 267   | 267  | 267  | 266  | 262  | 259  | 257  |
|                     | FF/ENG | 5935                        | 5852  | 5910  | 5967  | 6007 | 6064 | 6109 | 6120 | 6208 | 6468 |
| 180                 | %N1    | 74.1                        | 77.8  | 79.6  | 81.5  | 83.1 | 85.0 | 86.7 | 88.5 | 90.3 | 93.3 |
|                     | MACH   | .470                        | .509  | .527  | .546  | .567 | .589 | .613 | .636 | .654 | .674 |
|                     | KIAS   | 260                         | 256   | 255   | 255   | 254  | 254  | 254  | 253  | 250  | 247  |
|                     | FF/ENG | 5363                        | 5237  | 5285  | 5340  | 5374 | 5402 | 5453 | 5494 | 5502 | 5567 |
| 160                 | %N1    | 71.2                        | 74.8  | 76.6  | 78.3  | 80.1 | 81.7 | 83.6 | 85.3 | 87.1 | 88.9 |
|                     | MACH   | .449                        | .485  | .501  | .519  | .538 | .559 | .581 | .605 | .629 | .649 |
|                     | KIAS   | 248                         | 244   | 243   | 242   | 241  | 241  | 240  | 240  | 240  | 237  |
|                     | FF/ENG | 4809                        | 4648  | 4682  | 4735  | 4758 | 4774 | 4797 | 4837 | 4878 | 4892 |

# ENGINE INOP

## MAX CONTINUOUS THRUST

### Long Range Cruise Diversion Fuel and Time

#### Ground to Air Miles Conversion

| AIR DISTANCE (NM)        |      |      |      |      | GROUND<br>DISTANCE<br>(NM) | AIR DISTANCE (NM)        |      |      |      |      |
|--------------------------|------|------|------|------|----------------------------|--------------------------|------|------|------|------|
| HEADWIND COMPONENT (KTS) |      |      |      |      |                            | TAILWIND COMPONENT (KTS) |      |      |      |      |
| 100                      | 80   | 60   | 40   | 20   |                            | 20                       | 40   | 60   | 80   | 100  |
| 286                      | 264  | 244  | 227  | 213  | 200                        | 190                      | 181  | 173  | 166  | 159  |
| 569                      | 525  | 487  | 454  | 425  | 400                        | 381                      | 364  | 348  | 333  | 320  |
| 853                      | 788  | 730  | 681  | 638  | 600                        | 572                      | 546  | 522  | 501  | 482  |
| 1138                     | 1051 | 974  | 908  | 851  | 800                        | 763                      | 729  | 698  | 669  | 643  |
| 1424                     | 1316 | 1219 | 1136 | 1064 | 1000                       | 954                      | 911  | 872  | 836  | 803  |
| 1711                     | 1580 | 1464 | 1364 | 1278 | 1200                       | 1144                     | 1093 | 1046 | 1003 | 964  |
| 1999                     | 1846 | 1709 | 1592 | 1491 | 1400                       | 1335                     | 1275 | 1220 | 1170 | 1124 |
| 2288                     | 2111 | 1954 | 1820 | 1704 | 1600                       | 1526                     | 1457 | 1394 | 1337 | 1285 |
| 2578                     | 2378 | 2201 | 2049 | 1918 | 1800                       | 1717                     | 1639 | 1568 | 1504 | 1445 |
| 2869                     | 2646 | 2447 | 2278 | 2132 | 2000                       | 1907                     | 1821 | 1742 | 1670 | 1605 |

### Reference Fuel and Time Required at Check Point

| AIR<br>DIST<br>(NM) | PRESSURE ALTITUDE (1000 FT) |                  |                   |                  |                   |                  |                   |                  |                   |                  |
|---------------------|-----------------------------|------------------|-------------------|------------------|-------------------|------------------|-------------------|------------------|-------------------|------------------|
|                     | 10                          |                  | 14                |                  | 18                |                  | 22                |                  | 26                |                  |
|                     | FUEL<br>(1000 KG)           | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) |
| 200                 | 4.0                         | 0:39             | 3.5               | 0:38             | 3.2               | 0:36             | 2.8               | 0:36             | 2.6               | 0:35             |
| 400                 | 8.4                         | 1:15             | 7.6               | 1:11             | 7.1               | 1:08             | 6.7               | 1:06             | 6.4               | 1:03             |
| 600                 | 12.7                        | 1:50             | 11.7              | 1:45             | 11.1              | 1:40             | 10.4              | 1:36             | 10.2              | 1:32             |
| 800                 | 16.9                        | 2:26             | 15.7              | 2:19             | 14.9              | 2:11             | 14.2              | 2:06             | 13.9              | 2:02             |
| 1000                | 21.1                        | 3:02             | 19.7              | 2:53             | 18.8              | 2:44             | 17.9              | 2:37             | 17.6              | 2:31             |
| 1200                | 25.3                        | 3:38             | 23.7              | 3:27             | 22.6              | 3:16             | 21.5              | 3:07             | 21.2              | 3:00             |
| 1400                | 29.4                        | 4:15             | 27.6              | 4:02             | 26.3              | 3:49             | 25.1              | 3:38             | 24.7              | 3:30             |
| 1600                | 33.5                        | 4:52             | 31.4              | 4:37             | 30.1              | 4:21             | 28.7              | 4:09             | 28.2              | 4:00             |
| 1800                | 37.6                        | 5:29             | 35.2              | 5:12             | 33.8              | 4:55             | 32.3              | 4:40             | 31.6              | 4:29             |
| 2000                | 41.6                        | 6:07             | 39.0              | 5:47             | 37.4              | 5:28             | 35.8              | 5:11             | 35.0              | 5:00             |

### Fuel Required Adjustment (1000 KG)

| REFERENCE FUEL REQUIRED<br>(1000 KG) | WEIGHT AT CHECK POINT (1000 KG) |      |      |      |     |     |     |      |      |      |
|--------------------------------------|---------------------------------|------|------|------|-----|-----|-----|------|------|------|
|                                      | 170                             | 190  | 210  | 230  | 250 | 270 | 290 | 310  | 330  | 350  |
| 5                                    | -0.8                            | -0.6 | -0.4 | -0.2 | 0.0 | 0.3 | 0.7 | 1.2  | 1.7  | 2.3  |
| 10                                   | -1.8                            | -1.3 | -0.9 | -0.4 | 0.0 | 0.8 | 1.6 | 2.6  | 3.7  | 4.9  |
| 15                                   | -2.7                            | -2.0 | -1.3 | -0.7 | 0.0 | 1.2 | 2.5 | 4.0  | 5.6  | 7.4  |
| 20                                   | -3.7                            | -2.7 | -1.8 | -0.9 | 0.0 | 1.6 | 3.3 | 5.3  | 7.5  | 9.8  |
| 25                                   | -4.6                            | -3.4 | -2.3 | -1.1 | 0.0 | 2.0 | 4.2 | 6.6  | 9.3  | 12.2 |
| 30                                   | -5.6                            | -4.2 | -2.7 | -1.4 | 0.0 | 2.3 | 4.9 | 7.8  | 11.0 | 14.4 |
| 35                                   | -6.5                            | -4.9 | -3.2 | -1.6 | 0.0 | 2.7 | 5.7 | 9.0  | 12.6 | 16.6 |
| 40                                   | -7.5                            | -5.6 | -3.7 | -1.8 | 0.0 | 3.1 | 6.4 | 10.2 | 14.2 | 18.6 |
| 45                                   | -8.5                            | -6.3 | -4.2 | -2.1 | 0.0 | 3.4 | 7.1 | 11.3 | 15.8 | 20.6 |

Includes APU fuel burn.

**ENGINE INOP**

**MAX CONTINUOUS THRUST**

**Holding  
Flaps Up**

| WEIGHT<br>(1000 KG) |        | PRESSURE ALTITUDE (FT) |      |       |       |       |       |       |
|---------------------|--------|------------------------|------|-------|-------|-------|-------|-------|
|                     |        | 1500                   | 5000 | 10000 | 15000 | 20000 | 25000 | 30000 |
| 360                 | %N1    | 81.1                   | 84.5 | 89.2  | 94.5  |       |       |       |
|                     | KIAS   | 272                    | 273  | 275   | 298   |       |       |       |
|                     | FF/ENG | 9270                   | 9350 | 9640  | 10310 |       |       |       |
| 340                 | %N1    | 79.3                   | 82.6 | 87.4  | 92.2  |       |       |       |
|                     | KIAS   | 264                    | 266  | 267   | 282   |       |       |       |
|                     | FF/ENG | 8720                   | 8760 | 8990  | 9410  |       |       |       |
| 320                 | %N1    | 77.6                   | 80.6 | 85.4  | 90.1  | 98.4  |       |       |
|                     | KIAS   | 257                    | 257  | 259   | 265   | 294   |       |       |
|                     | FF/ENG | 8170                   | 8190 | 8350  | 8590  | 9780  |       |       |
| 300                 | %N1    | 75.6                   | 78.6 | 83.4  | 88.1  | 94.5  |       |       |
|                     | KIAS   | 249                    | 249  | 251   | 252   | 277   |       |       |
|                     | FF/ENG | 7640                   | 7640 | 7740  | 7890  | 8730  |       |       |
| 280                 | %N1    | 73.7                   | 76.6 | 81.1  | 86.0  | 91.3  |       |       |
|                     | KIAS   | 240                    | 241  | 242   | 243   | 258   |       |       |
|                     | FF/ENG | 7120                   | 7090 | 7150  | 7250  | 7830  |       |       |
| 260                 | %N1    | 71.6                   | 74.5 | 78.8  | 83.7  | 88.8  | 97.3  |       |
|                     | KIAS   | 232                    | 232  | 233   | 234   | 240   | 266   |       |
|                     | FF/ENG | 6600                   | 6570 | 6570  | 6640  | 7030  | 7980  |       |
| 240                 | %N1    | 69.3                   | 72.3 | 76.5  | 81.3  | 86.3  | 92.6  |       |
|                     | KIAS   | 226                    | 226  | 226   | 226   | 226   | 248   |       |
|                     | FF/ENG | 6090                   | 6060 | 6040  | 6080  | 6360  | 6920  |       |
| 220                 | %N1    | 67.0                   | 69.9 | 74.1  | 78.6  | 83.8  | 88.8  | 99.1  |
|                     | KIAS   | 220                    | 220  | 220   | 220   | 220   | 226   | 246   |
|                     | FF/ENG | 5600                   | 5570 | 5530  | 5540  | 5750  | 6060  | 7020  |
| 200                 | %N1    | 64.7                   | 67.4 | 71.6  | 76.0  | 80.9  | 85.8  | 93.5  |
|                     | KIAS   | 213                    | 213  | 213   | 213   | 213   | 213   | 233   |
|                     | FF/ENG | 5130                   | 5090 | 5030  | 5040  | 5180  | 5360  | 5950  |
| 180                 | %N1    | 62.2                   | 64.8 | 68.9  | 73.2  | 77.9  | 83.0  | 88.0  |
|                     | KIAS   | 206                    | 206  | 206   | 206   | 206   | 206   | 208   |
|                     | FF/ENG | 4670                   | 4620 | 4560  | 4560  | 4640  | 4780  | 5000  |
| 160                 | %N1    | 59.5                   | 62.1 | 65.9  | 70.3  | 74.7  | 79.8  | 84.5  |
|                     | KIAS   | 199                    | 199  | 199   | 199   | 199   | 199   | 199   |
|                     | FF/ENG | 4230                   | 4170 | 4110  | 4100  | 4150  | 4230  | 4360  |

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

# ENGINE INOP

## ADVISORY INFORMATION

### Gear Down Landing Rate of Climb Available

#### Flaps 20

| TAT<br>(°C) | RATE OF CLIMB (FT/MIN) |     |      |      |      |      |
|-------------|------------------------|-----|------|------|------|------|
|             | PRESSURE ALTITUDE (FT) |     |      |      |      |      |
|             | -2000                  | 0   | 2000 | 4000 | 6000 | 8000 |
| 52          | 450                    | 340 |      |      |      |      |
| 50          | 500                    | 390 | 230  |      |      |      |
| 48          | 550                    | 440 | 290  |      |      |      |
| 46          | 590                    | 490 | 340  | 180  |      |      |
| 44          | 640                    | 550 | 390  | 230  |      |      |
| 42          | 690                    | 590 | 430  | 270  | 110  |      |
| 40          | 730                    | 640 | 480  | 310  | 140  |      |
| 38          | 760                    | 690 | 530  | 350  | 170  |      |
| 36          | 760                    | 730 | 560  | 390  | 200  | -10  |
| 34          | 760                    | 780 | 600  | 420  | 230  | 20   |
| 32          | 770                    | 780 | 630  | 460  | 260  | 50   |
| 30          | 770                    | 790 | 660  | 480  | 300  | 70   |
| 20          | 790                    | 800 | 670  | 530  | 370  | 190  |
| 10          | 810                    | 820 | 620  | 440  | 280  | 140  |
| 0           | 830                    | 830 | 610  | 380  | 150  | -90  |
| -20         | 860                    | 870 | 630  | 390  | 150  | -90  |
| -40         | 900                    | 900 | 660  | 410  | 160  | -100 |

Rate of climb capability shown is valid for 225000 kg, gear down at VREF20 + 5.

Decrease rate of climb 40 ft/min per 5000 kg greater than 225000 kg.

Increase rate of climb 50 ft/min per 5000 kg less than 225000 kg.

#### Flaps 25

| TAT<br>(°C) | RATE OF CLIMB (FT/MIN) |     |      |      |      |      |
|-------------|------------------------|-----|------|------|------|------|
|             | PRESSURE ALTITUDE (FT) |     |      |      |      |      |
|             | -2000                  | 0   | 2000 | 4000 | 6000 | 8000 |
| 52          | 100                    | -10 |      |      |      |      |
| 50          | 150                    | 40  | -120 |      |      |      |
| 48          | 190                    | 80  | -70  |      |      |      |
| 46          | 230                    | 130 | -20  | -170 |      |      |
| 44          | 280                    | 180 | 30   | -130 |      |      |
| 42          | 320                    | 230 | 70   | -90  | -250 |      |
| 40          | 360                    | 270 | 110  | -50  | -220 |      |
| 38          | 390                    | 320 | 150  | -20  | -200 | -400 |
| 36          | 390                    | 360 | 190  | 10   | -170 | -370 |
| 34          | 390                    | 390 | 220  | 50   | -140 | -340 |
| 32          | 400                    | 410 | 250  | 80   | -110 | -320 |
| 30          | 400                    | 410 | 280  | 100  | -80  | -300 |
| 20          | 410                    | 420 | 290  | 140  | -10  | -190 |
| 10          | 420                    | 430 | 280  | 0    | -180 | -340 |
| 0           | 430                    | 440 | 220  | -10  | -230 | -470 |
| -20         | 450                    | 450 | 230  | -10  | -240 | -480 |
| -40         | 470                    | 470 | 230  | -10  | -250 | -500 |

Rate of climb capability shown is valid for 225000 kg, gear down at VREF25 + 5.

Decrease rate of climb 40 ft/min per 5000 kg greater than 225000 kg.

Increase rate of climb 50 ft/min per 5000 kg less than 225000 kg.



ENGINE INOP

ADVISORY INFORMATION

Gear Down Landing Rate of Climb Available  
Flaps 30

| TAT<br>(°C) | RATE OF CLIMB (FT/MIN) |      |      |      |      |      |
|-------------|------------------------|------|------|------|------|------|
|             | PRESSURE ALTITUDE (FT) |      |      |      |      |      |
|             | -2000                  | 0    | 2000 | 4000 | 6000 | 8000 |
| 52          | -120                   | -230 |      |      |      |      |
| 50          | -80                    | -190 | -340 |      |      |      |
| 48          | -40                    | -140 | -300 |      |      |      |
| 46          | 10                     | -100 | -250 | -400 |      |      |
| 44          | 50                     | -50  | -200 | -360 |      |      |
| 42          | 90                     | -10  | -160 | -320 | -480 |      |
| 40          | 120                    | 40   | -130 | -290 | -450 |      |
| 38          | 160                    | 80   | -90  | -260 | -430 |      |
| 36          | 160                    | 120  | -50  | -230 | -400 | -600 |
| 34          | 160                    | 150  | -20  | -190 | -380 | -580 |
| 32          | 160                    | 170  | 10   | -160 | -350 | -560 |
| 30          | 160                    | 170  | 30   | -140 | -320 | -530 |
| 20          | 170                    | 170  | 40   | -100 | -250 | -440 |
| 10          | 180                    | 180  | 20   | -130 | -280 | -640 |
| 0           | 180                    | 180  | -30  | -250 | -480 | -710 |
| -20         | 190                    | 190  | -40  | -260 | -490 | -730 |
| -40         | 200                    | 190  | -40  | -280 | -510 | -760 |

Rate of climb capability shown is valid for 225000 kg, gear down at VREF30 + 5.  
Decrease rate of climb 40 ft/min per 5000 kg greater than 225000 kg.  
Increase rate of climb 50 ft/min per 5000 kg less than 225000 kg.

**Performance Inflight - QRH****Chapter PI-QRH****Gear Down****Section 43****GEAR DOWN****220 KIAS Max Climb %N1**

| TAT<br>(°C) | PRESSURE ALTITUDE (1000 FT) |      |      |      |      |       |       |       |       |       |       |       |       |       |       |
|-------------|-----------------------------|------|------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|             | 0                           | 5    | 10   | 12   | 14   | 16    | 18    | 20    | 22    | 24    | 26    | 28    | 30    | 32    | 34    |
| 55          | 88.2                        | 88.3 | 91.4 | 91.1 | 92.1 | 91.3  | 94.0  | 95.2  | 95.4  | 98.1  | 99.9  | 101.1 | 102.4 | 102.9 | 103.4 |
| 50          | 89.5                        | 88.8 | 90.7 | 90.4 | 91.4 | 92.1  | 93.3  | 94.5  | 94.7  | 97.3  | 99.2  | 100.3 | 101.6 | 102.1 | 102.6 |
| 45          | 90.5                        | 90.1 | 90.0 | 89.7 | 90.7 | 91.4  | 92.6  | 93.8  | 93.9  | 96.6  | 98.4  | 99.6  | 100.8 | 101.3 | 101.8 |
| 40          | 91.6                        | 91.2 | 91.2 | 89.7 | 89.9 | 90.7  | 91.9  | 93.0  | 93.2  | 95.8  | 97.6  | 98.8  | 100.0 | 100.5 | 101.0 |
| 35          | 92.6                        | 92.3 | 92.2 | 92.1 | 90.6 | 89.9  | 91.1  | 92.3  | 92.5  | 95.0  | 96.8  | 98.0  | 99.2  | 99.7  | 100.2 |
| 30          | 93.0                        | 93.2 | 93.2 | 93.0 | 92.2 | 91.2  | 90.9  | 91.5  | 91.7  | 94.3  | 96.0  | 97.2  | 98.4  | 98.9  | 99.4  |
| 25          | 92.2                        | 94.2 | 94.1 | 94.0 | 93.7 | 92.8  | 92.1  | 92.0  | 91.1  | 93.5  | 95.2  | 96.4  | 97.6  | 98.0  | 98.5  |
| 20          | 91.4                        | 94.2 | 95.1 | 95.0 | 94.9 | 94.4  | 93.4  | 93.0  | 92.8  | 93.6  | 94.4  | 95.6  | 96.8  | 97.2  | 97.7  |
| 15          | 90.7                        | 93.4 | 96.7 | 96.4 | 96.3 | 96.1  | 94.8  | 94.1  | 94.5  | 94.8  | 95.2  | 95.3  | 96.0  | 96.4  | 96.9  |
| 10          | 89.9                        | 92.6 | 96.3 | 97.9 | 98.1 | 98.1  | 96.8  | 95.5  | 96.5  | 96.2  | 96.4  | 96.4  | 96.6  | 96.1  | 96.0  |
| 5           | 89.1                        | 91.7 | 95.4 | 97.1 | 98.9 | 100.3 | 99.0  | 97.9  | 98.2  | 97.8  | 97.8  | 97.9  | 97.9  | 97.3  | 96.8  |
| 0           | 88.3                        | 90.9 | 94.6 | 96.2 | 98.0 | 100.1 | 100.8 | 100.3 | 100.1 | 99.7  | 99.4  | 99.4  | 99.5  | 98.6  | 98.1  |
| -5          | 87.4                        | 90.1 | 93.7 | 95.3 | 97.1 | 99.1  | 99.9  | 100.8 | 101.9 | 101.5 | 101.1 | 101.1 | 101.1 | 100.2 | 99.6  |
| -10         | 86.6                        | 89.2 | 92.8 | 94.4 | 96.1 | 98.2  | 98.9  | 99.8  | 101.4 | 102.8 | 102.6 | 102.6 | 103.0 | 101.6 | 100.8 |
| -15         | 85.8                        | 88.4 | 91.9 | 93.5 | 95.2 | 97.3  | 98.0  | 98.9  | 100.4 | 101.8 | 102.5 | 103.2 | 103.8 | 102.5 | 101.4 |
| -20         | 85.0                        | 87.5 | 91.1 | 92.6 | 94.3 | 96.3  | 97.0  | 97.9  | 99.4  | 100.8 | 101.5 | 102.2 | 103.3 | 102.4 | 101.3 |

**%N1 Adjustments for Engine Bleed**

| BLEED CONFIGURATION              | PRESSURE ALTITUDE (1000 FT) |      |      |      |      |      |      |      |
|----------------------------------|-----------------------------|------|------|------|------|------|------|------|
|                                  | 0                           | 5    | 10   | 15   | 20   | 25   | 30   | 35   |
| 2 PACKS ON - 1 BLEED SOURCE      | -0.4                        | -0.5 | -0.4 | -0.3 | -0.2 | -0.3 | -0.3 | -0.4 |
| 1 PACK ON - 1 OR 2 BLEED SOURCES | -0.4                        | -0.5 | -0.4 | -0.3 | -0.2 | -0.3 | -0.3 | -0.4 |
| ENGINE ANTI-ICE ON               | -0.3                        | -0.5 | -0.4 | -0.3 | -0.1 | -0.2 | -0.2 | -0.2 |
| ENGINE & WING ANTI-ICE ON*       | -0.6                        | -0.8 | -0.7 | -0.5 | -0.2 | -0.3 | -0.3 | -0.4 |
| ENGINE & WING ANTI-ICE ON**      | -1.1                        | -0.9 | -0.9 | -0.6 | -0.3 | -0.4 | -0.5 | -0.5 |

\*Packs on or off with 2 bleed sources.

\*\*Packs off with 1 bleed source.

## GEAR DOWN

### Long Range Cruise Altitude Capability

Max Climb Thrust, 300 ft/min residual rate of climb

| WEIGHT<br>(1000 KG) | PRESSURE ALTITUDE (FT) |            |            |
|---------------------|------------------------|------------|------------|
|                     | ISA + 10°C<br>& BELOW  | ISA + 15°C | ISA + 20°C |
| 360                 | 18200                  | 16100      | 13700      |
| 350                 | 18800                  | 16900      | 14400      |
| 340                 | 19400                  | 17600      | 15100      |
| 330                 | 20000                  | 18200      | 15800      |
| 320                 | 20700                  | 19100      | 16800      |
| 310                 | 21800                  | 20300      | 18000      |
| 300                 | 22800                  | 21400      | 19300      |
| 290                 | 24000                  | 22500      | 20600      |
| 280                 | 25100                  | 23700      | 22000      |
| 270                 | 26200                  | 24800      | 23300      |
| 260                 | 27300                  | 26100      | 24600      |
| 250                 | 28500                  | 27500      | 26000      |
| 240                 | 29700                  | 28900      | 27400      |
| 230                 | 30600                  | 30200      | 28900      |
| 220                 | 31400                  | 31100      | 30300      |
| 210                 | 32300                  | 32000      | 31400      |
| 200                 | 33200                  | 33000      | 32500      |
| 190                 | 34100                  | 34000      | 33700      |
| 180                 | 35000                  | 34900      | 34800      |
| 170                 | 36000                  | 36000      | 35800      |
| 160                 | 37000                  | 37000      | 36800      |



# GEAR DOWN

## Long Range Cruise Control

| WEIGHT<br>(1000 KG) |        | PRESSURE ALTITUDE (1000 FT) |      |      |      |      |      |      |      |      |      |
|---------------------|--------|-----------------------------|------|------|------|------|------|------|------|------|------|
|                     |        | 10                          | 15   | 17   | 19   | 21   | 23   | 25   | 27   | 29   | 31   |
| 360                 | %N1    | 84.7                        | 89.1 | 91.1 | 93.6 |      |      |      |      |      |      |
|                     | MACH   | .488                        | .535 | .556 | .578 |      |      |      |      |      |      |
|                     | KIAS   | 270                         | 270  | 270  | 270  |      |      |      |      |      |      |
|                     | FF/ENG | 7616                        | 7771 | 7912 | 8126 |      |      |      |      |      |      |
| 340                 | %N1    | 83.8                        | 88.1 | 90.0 | 92.2 |      |      |      |      |      |      |
|                     | MACH   | .488                        | .535 | .556 | .578 |      |      |      |      |      |      |
|                     | KIAS   | 270                         | 270  | 270  | 270  |      |      |      |      |      |      |
|                     | FF/ENG | 7360                        | 7485 | 7589 | 7762 |      |      |      |      |      |      |
| 320                 | %N1    | 82.6                        | 86.9 | 88.8 | 90.8 | 93.3 |      |      |      |      |      |
|                     | MACH   | .483                        | .531 | .552 | .574 | .597 |      |      |      |      |      |
|                     | KIAS   | 267                         | 268  | 268  | 268  | 269  |      |      |      |      |      |
|                     | FF/ENG | 7053                        | 7156 | 7240 | 7378 | 7571 |      |      |      |      |      |
| 300                 | %N1    | 80.5                        | 84.9 | 87.0 | 88.8 | 90.8 | 93.8 |      |      |      |      |
|                     | MACH   | .468                        | .514 | .535 | .556 | .579 | .603 |      |      |      |      |
|                     | KIAS   | 259                         | 259  | 259  | 260  | 260  | 260  |      |      |      |      |
|                     | FF/ENG | 6575                        | 6634 | 6706 | 6789 | 6934 | 7132 |      |      |      |      |
| 280                 | %N1    | 78.4                        | 82.9 | 85.0 | 86.8 | 88.6 | 90.7 | 94.0 |      |      |      |
|                     | MACH   | .453                        | .498 | .517 | .538 | .560 | .584 | .609 |      |      |      |
|                     | KIAS   | 250                         | 251  | 251  | 251  | 251  | 252  | 252  |      |      |      |
|                     | FF/ENG | 6101                        | 6136 | 6179 | 6258 | 6335 | 6478 | 6688 |      |      |      |
| 260                 | %N1    | 76.2                        | 80.7 | 82.7 | 84.7 | 86.4 | 88.3 | 90.4 | 94.0 |      |      |
|                     | MACH   | .437                        | .481 | .500 | .520 | .541 | .563 | .587 | .613 |      |      |
|                     | KIAS   | 242                         | 242  | 242  | 242  | 242  | 242  | 243  | 243  |      |      |
|                     | FF/ENG | 5630                        | 5659 | 5680 | 5728 | 5802 | 5878 | 6014 | 6228 |      |      |
| 240                 | %N1    | 73.8                        | 78.3 | 80.3 | 82.3 | 84.2 | 85.9 | 87.8 | 90.0 | 93.8 |      |
|                     | MACH   | .421                        | .463 | .481 | .500 | .520 | .542 | .565 | .589 | .615 |      |
|                     | KIAS   | 233                         | 232  | 233  | 233  | 233  | 233  | 233  | 234  | 234  |      |
|                     | FF/ENG | 5171                        | 5184 | 5206 | 5227 | 5275 | 5340 | 5416 | 5541 | 5751 |      |
| 220                 | %N1    | 71.4                        | 75.8 | 77.7 | 79.7 | 81.6 | 83.5 | 85.3 | 87.1 | 89.4 | 93.4 |
|                     | MACH   | .404                        | .444 | .461 | .480 | .499 | .520 | .542 | .565 | .590 | .617 |
|                     | KIAS   | 223                         | 223  | 223  | 223  | 223  | 223  | 223  | 224  | 224  | 225  |
|                     | FF/ENG | 4720                        | 4715 | 4736 | 4756 | 4775 | 4819 | 4878 | 4949 | 5062 | 5264 |
| 200                 | %N1    | 68.7                        | 73.1 | 75.0 | 76.9 | 78.9 | 80.8 | 82.7 | 84.4 | 86.3 | 88.6 |
|                     | MACH   | .387                        | .425 | .442 | .460 | .479 | .498 | .519 | .541 | .564 | .589 |
|                     | KIAS   | 213                         | 213  | 213  | 213  | 213  | 213  | 213  | 213  | 213  | 214  |
|                     | FF/ENG | 4284                        | 4281 | 4290 | 4310 | 4323 | 4339 | 4375 | 4426 | 4480 | 4578 |
| 180                 | %N1    | 66.3                        | 70.8 | 72.6 | 74.5 | 76.5 | 78.5 | 80.2 | 82.2 | 83.9 | 85.7 |
|                     | MACH   | .374                        | .412 | .428 | .445 | .463 | .482 | .503 | .524 | .546 | .570 |
|                     | KIAS   | 206                         | 206  | 206  | 206  | 206  | 206  | 206  | 206  | 206  | 206  |
|                     | FF/ENG | 3937                        | 3935 | 3933 | 3945 | 3959 | 3969 | 3984 | 4021 | 4066 | 4112 |
| 160                 | %N1    | 64.0                        | 68.2 | 70.1 | 71.9 | 74.0 | 75.9 | 77.7 | 79.5 | 81.4 | 83.1 |
|                     | MACH   | .361                        | .397 | .413 | .429 | .447 | .465 | .485 | .505 | .527 | .550 |
|                     | KIAS   | 199                         | 199  | 199  | 199  | 199  | 199  | 199  | 199  | 199  | 199  |
|                     | FF/ENG | 3592                        | 3585 | 3584 | 3585 | 3591 | 3602 | 3612 | 3628 | 3663 | 3702 |

**GEAR DOWN**

**Long Range Cruise Enroute Fuel and Time  
Ground to Air Miles Conversion**

| AIR DISTANCE (NM)        |      |      |      |      | GROUND<br>DISTANCE<br>(NM) | AIR DISTANCE (NM)        |      |      |      |      |
|--------------------------|------|------|------|------|----------------------------|--------------------------|------|------|------|------|
| HEADWIND COMPONENT (KTS) |      |      |      |      |                            | TAILWIND COMPONENT (KTS) |      |      |      |      |
| 100                      | 80   | 60   | 40   | 20   |                            | 20                       | 40   | 60   | 80   | 100  |
| 316                      | 284  | 257  | 235  | 216  | 200                        | 189                      | 180  | 171  | 162  | 155  |
| 634                      | 570  | 515  | 470  | 433  | 400                        | 379                      | 359  | 341  | 326  | 312  |
| 956                      | 859  | 774  | 706  | 650  | 600                        | 568                      | 539  | 512  | 489  | 468  |
| 1282                     | 1149 | 1035 | 943  | 867  | 800                        | 757                      | 718  | 683  | 651  | 623  |
| 1610                     | 1442 | 1297 | 1180 | 1084 | 1000                       | 947                      | 898  | 853  | 813  | 778  |
| 1942                     | 1737 | 1560 | 1419 | 1302 | 1200                       | 1136                     | 1077 | 1024 | 976  | 933  |
| 2276                     | 2034 | 1825 | 1658 | 1520 | 1400                       | 1325                     | 1256 | 1193 | 1137 | 1087 |
| 2614                     | 2333 | 2091 | 1898 | 1739 | 1600                       | 1514                     | 1434 | 1362 | 1298 | 1241 |
| 2954                     | 2634 | 2358 | 2138 | 1958 | 1800                       | 1702                     | 1613 | 1531 | 1459 | 1394 |
| 3297                     | 2936 | 2626 | 2379 | 2176 | 2000                       | 1891                     | 1791 | 1701 | 1619 | 1547 |
| 3642                     | 3240 | 2894 | 2620 | 2396 | 2200                       | 2080                     | 1969 | 1869 | 1780 | 1700 |
| 3991                     | 3546 | 3164 | 2862 | 2615 | 2400                       | 2268                     | 2147 | 2037 | 1939 | 1852 |
| 4342                     | 3853 | 3435 | 3104 | 2835 | 2600                       | 2456                     | 2324 | 2205 | 2098 | 2004 |
| 4697                     | 4164 | 3707 | 3347 | 3055 | 2800                       | 2644                     | 2502 | 2373 | 2258 | 2156 |
| 5054                     | 4476 | 3981 | 3591 | 3275 | 3000                       | 2832                     | 2679 | 2541 | 2416 | 2307 |
| 5414                     | 4789 | 4255 | 3836 | 3495 | 3200                       | 3020                     | 2856 | 2708 | 2575 | 2458 |
| 5778                     | 5105 | 4531 | 4081 | 3716 | 3400                       | 3208                     | 3033 | 2875 | 2734 | 2609 |
| 6146                     | 5424 | 4808 | 4326 | 3937 | 3600                       | 3396                     | 3210 | 3041 | 2891 | 2759 |
| 6516                     | 5744 | 5086 | 4572 | 4159 | 3800                       | 3584                     | 3386 | 3208 | 3049 | 2909 |
| 6889                     | 6066 | 5365 | 4819 | 4380 | 4000                       | 3772                     | 3564 | 3375 | 3207 | 3059 |

**Reference Fuel and Time Required at Check Point**

| AIR<br>DIST<br>(NM) | PRESSURE ALTITUDE (1000 FT) |                  |                   |                  |                   |                  |                   |                  |                   |                  |
|---------------------|-----------------------------|------------------|-------------------|------------------|-------------------|------------------|-------------------|------------------|-------------------|------------------|
|                     | 10                          |                  | 14                |                  | 20                |                  | 24                |                  | 28                |                  |
|                     | FUEL<br>(1000 KG)           | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) |
| 200                 | 7.4                         | 0:47             | 6.7               | 0:45             | 5.9               | 0:42             | 5.5               | 0:40             | 5.2               | 0:39             |
| 400                 | 15.0                        | 1:32             | 13.9              | 1:27             | 12.6              | 1:21             | 11.9              | 1:16             | 11.5              | 1:12             |
| 600                 | 22.6                        | 2:17             | 21.1              | 2:10             | 19.3              | 1:59             | 18.3              | 1:52             | 17.7              | 1:46             |
| 800                 | 29.9                        | 3:04             | 28.1              | 2:53             | 25.7              | 2:39             | 24.5              | 2:29             | 23.7              | 2:20             |
| 1000                | 37.3                        | 3:50             | 35.0              | 3:37             | 32.1              | 3:18             | 30.6              | 3:06             | 29.7              | 2:55             |
| 1200                | 44.3                        | 4:38             | 41.7              | 4:22             | 38.3              | 3:59             | 36.6              | 3:44             | 35.4              | 3:30             |
| 1400                | 51.4                        | 5:27             | 48.4              | 5:07             | 44.5              | 4:40             | 42.5              | 4:22             | 41.2              | 4:06             |
| 1600                | 58.2                        | 6:16             | 54.8              | 5:53             | 50.5              | 5:21             | 48.2              | 5:01             | 46.7              | 4:42             |
| 1800                | 65.0                        | 7:05             | 61.3              | 6:39             | 56.5              | 6:03             | 53.9              | 5:40             | 52.2              | 5:19             |
| 2000                | 71.6                        | 7:55             | 67.5              | 7:26             | 62.3              | 6:46             | 59.5              | 6:20             | 57.5              | 5:56             |
| 2200                | 78.1                        | 8:46             | 73.8              | 8:14             | 68.1              | 7:28             | 65.0              | 7:00             | 62.8              | 6:33             |
| 2400                | 84.5                        | 9:37             | 79.8              | 9:02             | 73.8              | 8:11             | 70.3              | 7:40             | 68.0              | 7:10             |
| 2600                | 90.8                        | 10:29            | 85.9              | 9:50             | 79.4              | 8:55             | 75.7              | 8:20             | 73.1              | 7:48             |
| 2800                | 97.0                        | 11:22            | 91.7              | 10:39            | 84.8              | 9:39             | 80.9              | 9:02             | 78.1              | 8:26             |
| 3000                | 103.1                       | 12:15            | 97.5              | 11:28            | 90.2              | 10:23            | 86.1              | 9:43             | 83.0              | 9:05             |
| 3200                | 109.0                       | 13:09            | 103.2             | 12:18            | 95.5              | 11:08            | 91.1              | 10:25            | 87.8              | 9:44             |
| 3400                | 114.9                       | 14:03            | 108.8             | 13:09            | 100.8             | 11:53            | 96.1              | 11:07            | 92.7              | 10:23            |
| 3600                | 120.6                       | 14:58            | 114.3             | 14:00            | 105.9             | 12:39            | 101.0             | 11:49            | 97.3              | 11:02            |
| 3800                | 126.4                       | 15:53            | 119.7             | 14:51            | 111.0             | 13:25            | 105.8             | 12:32            | 102.0             | 11:42            |
| 4000                | 132.0                       | 16:50            | 125.0             | 15:44            | 115.9             | 14:12            | 110.6             | 13:15            | 106.5             | 12:22            |

## GEAR DOWN

### Long Range Cruise Enroute Fuel and Time

#### Fuel Required Adjustment (1000 KG)

| REFERENCE FUEL REQUIRED<br>(1000 KG) | WEIGHT AT CHECK POINT (1000 KG) |       |       |      |     |     |      |      |      |      |
|--------------------------------------|---------------------------------|-------|-------|------|-----|-----|------|------|------|------|
|                                      | 170                             | 190   | 210   | 230  | 250 | 270 | 290  | 310  | 330  | 350  |
| 10                                   | -1.7                            | -1.3  | -0.9  | -0.4 | 0.0 | 1.0 | 2.0  | 3.1  | 4.2  | 5.5  |
| 20                                   | -3.6                            | -2.7  | -1.8  | -0.9 | 0.0 | 1.7 | 3.7  | 5.8  | 8.1  | 10.7 |
| 30                                   | -5.5                            | -4.1  | -2.8  | -1.4 | 0.0 | 2.5 | 5.3  | 8.4  | 11.8 | 15.5 |
| 40                                   | -7.3                            | -5.5  | -3.7  | -1.8 | 0.0 | 3.2 | 6.7  | 10.7 | 15.1 | 19.9 |
| 50                                   | -9.1                            | -6.9  | -4.6  | -2.3 | 0.0 | 3.8 | 8.1  | 12.9 | 18.2 | 24.0 |
| 60                                   | -10.8                           | -8.2  | -5.5  | -2.8 | 0.0 | 4.4 | 9.4  | 14.9 | 21.0 | 27.6 |
| 70                                   | -12.5                           | -9.5  | -6.4  | -3.2 | 0.0 | 5.0 | 10.5 | 16.7 | 23.5 | 30.9 |
| 80                                   | -14.2                           | -10.8 | -7.3  | -3.7 | 0.0 | 5.5 | 11.6 | 18.3 | 25.7 | 33.7 |
| 90                                   | -15.9                           | -12.1 | -8.1  | -4.1 | 0.0 | 5.9 | 12.5 | 19.7 | 27.6 | 36.2 |
| 100                                  | -17.5                           | -13.3 | -9.0  | -4.5 | 0.0 | 6.3 | 13.3 | 21.0 | 29.3 | 38.3 |
| 110                                  | -19.1                           | -14.6 | -9.8  | -4.9 | 0.0 | 6.7 | 14.0 | 22.0 | 30.7 | 40.0 |
| 120                                  | -20.6                           | -15.8 | -10.7 | -5.4 | 0.0 | 7.0 | 14.6 | 22.9 | 31.8 | 41.4 |
| 130                                  | -22.1                           | -16.9 | -11.5 | -5.8 | 0.0 | 7.2 | 15.1 | 23.5 | 32.6 | 42.3 |
| 140                                  | -23.5                           | -18.1 | -12.3 | -6.2 | 0.0 | 7.4 | 15.5 | 24.0 | 33.2 | 42.9 |

Based on Long Range Cruise and VREF30+80 descent.

#### Descent at VREF30+80

| PRESSURE ALTITUDE<br>(1000 FT) | 17 | 19 | 21 | 23 | 25 | 27 | 29 | 31 | 33 | 35 |
|--------------------------------|----|----|----|----|----|----|----|----|----|----|
| DISTANCE (NM)                  | 35 | 39 | 43 | 48 | 52 | 56 | 60 | 64 | 69 | 73 |
| TIME (MINUTES)                 | 11 | 12 | 12 | 13 | 14 | 15 | 15 | 16 | 17 | 17 |

**GEAR DOWN**

**Holding  
Flaps Up**

| WEIGHT<br>(1000 KG) |        | PRESSURE ALTITUDE (FT) |      |       |       |       |       |       |
|---------------------|--------|------------------------|------|-------|-------|-------|-------|-------|
|                     |        | 1500                   | 5000 | 10000 | 15000 | 20000 | 25000 | 30000 |
| 360                 | %N1    | 76.2                   |      |       |       |       |       |       |
|                     | KIAS   | 262                    |      |       |       |       |       |       |
|                     | FF/ENG | 7790                   |      |       |       |       |       |       |
| 340                 | %N1    | 75.0                   | 78.1 |       |       |       |       |       |
|                     | KIAS   | 260                    | 260  |       |       |       |       |       |
|                     | FF/ENG | 7470                   | 7470 |       |       |       |       |       |
| 320                 | %N1    | 73.3                   | 76.3 |       |       |       |       |       |
|                     | KIAS   | 253                    | 253  |       |       |       |       |       |
|                     | FF/ENG | 7010                   | 7000 |       |       |       |       |       |
| 300                 | %N1    | 71.2                   | 74.3 | 78.7  |       |       |       |       |
|                     | KIAS   | 244                    | 244  | 244   |       |       |       |       |
|                     | FF/ENG | 6510                   | 6490 | 6470  |       |       |       |       |
| 280                 | %N1    | 69.2                   | 72.5 | 76.8  |       |       |       |       |
|                     | KIAS   | 238                    | 238  | 238   |       |       |       |       |
|                     | FF/ENG | 6080                   | 6070 | 6040  |       |       |       |       |
| 260                 | %N1    | 67.4                   | 70.5 | 74.9  | 79.5  |       |       |       |
|                     | KIAS   | 232                    | 232  | 232   | 232   |       |       |       |
|                     | FF/ENG | 5680                   | 5680 | 5640  | 5670  |       |       |       |
| 240                 | %N1    | 65.6                   | 68.5 | 72.9  | 77.5  | 82.4  |       |       |
|                     | KIAS   | 226                    | 226  | 226   | 226   | 226   |       |       |
|                     | FF/ENG | 5300                   | 5290 | 5250  | 5270  | 5320  |       |       |
| 220                 | %N1    | 63.8                   | 66.5 | 71.0  | 75.4  | 80.3  |       |       |
|                     | KIAS   | 220                    | 220  | 220   | 220   | 220   |       |       |
|                     | FF/ENG | 4940                   | 4920 | 4880  | 4880  | 4930  |       |       |
| 200                 | %N1    | 61.8                   | 64.5 | 68.7  | 73.1  | 77.9  | 82.7  |       |
|                     | KIAS   | 213                    | 213  | 213   | 213   | 213   | 213   |       |
|                     | FF/ENG | 4580                   | 4540 | 4500  | 4500  | 4530  | 4590  |       |
| 180                 | %N1    | 59.6                   | 62.4 | 66.3  | 70.8  | 75.4  | 80.2  | 84.8  |
|                     | KIAS   | 206                    | 206  | 206   | 206   | 206   | 206   | 206   |
|                     | FF/ENG | 4230                   | 4190 | 4130  | 4130  | 4150  | 4180  | 4290  |
| 160                 | %N1    | 57.3                   | 60.0 | 64.0  | 68.2  | 72.8  | 77.7  | 82.3  |
|                     | KIAS   | 199                    | 199  | 199   | 199   | 199   | 199   | 199   |
|                     | FF/ENG | 3880                   | 3830 | 3770  | 3760  | 3770  | 3790  | 3870  |

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

# GEAR DOWN

## Holding

### Flaps 1

| WEIGHT<br>(1000 KG) |        | PRESSURE ALTITUDE (FT) |      |       |       |       |
|---------------------|--------|------------------------|------|-------|-------|-------|
|                     |        | 1500                   | 5000 | 10000 | 15000 | 20000 |
| 360                 | %N1    | 75.9                   | 78.9 | 83.8  | 88.3  | 94.3  |
|                     | KIAS   | 242                    | 242  | 242   | 242   | 242   |
|                     | FF/ENG | 7650                   | 7690 | 7680  | 7800  | 8180  |
| 340                 | %N1    | 74.5                   | 77.6 | 82.2  | 86.9  | 92.0  |
|                     | KIAS   | 240                    | 240  | 240   | 240   | 240   |
|                     | FF/ENG | 7290                   | 7310 | 7300  | 7400  | 7690  |
| 320                 | %N1    | 72.7                   | 75.7 | 80.2  | 85.1  | 89.9  |
|                     | KIAS   | 233                    | 233  | 233   | 233   | 233   |
|                     | FF/ENG | 6820                   | 6820 | 6820  | 6880  | 7100  |
| 300                 | %N1    | 70.5                   | 73.6 | 78.0  | 83.0  | 87.8  |
|                     | KIAS   | 224                    | 224  | 224   | 224   | 224   |
|                     | FF/ENG | 6310                   | 6310 | 6300  | 6360  | 6490  |
| 280                 | %N1    | 68.4                   | 71.6 | 76.0  | 80.8  | 85.7  |
|                     | KIAS   | 218                    | 218  | 218   | 218   | 218   |
|                     | FF/ENG | 5870                   | 5870 | 5850  | 5910  | 6010  |
| 260                 | %N1    | 66.4                   | 69.5 | 73.9  | 78.6  | 83.7  |
|                     | KIAS   | 212                    | 212  | 212   | 212   | 212   |
|                     | FF/ENG | 5470                   | 5460 | 5430  | 5480  | 5550  |
| 240                 | %N1    | 64.5                   | 67.3 | 71.8  | 76.3  | 81.4  |
|                     | KIAS   | 206                    | 206  | 206   | 206   | 206   |
|                     | FF/ENG | 5070                   | 5050 | 5020  | 5060  | 5110  |
| 220                 | %N1    | 62.5                   | 65.2 | 69.6  | 74.0  | 79.0  |
|                     | KIAS   | 200                    | 200  | 200   | 200   | 200   |
|                     | FF/ENG | 4690                   | 4660 | 4620  | 4640  | 4690  |
| 200                 | %N1    | 60.2                   | 62.9 | 67.0  | 71.5  | 76.2  |
|                     | KIAS   | 193                    | 193  | 193   | 193   | 193   |
|                     | FF/ENG | 4310                   | 4260 | 4220  | 4230  | 4270  |
| 180                 | %N1    | 57.7                   | 60.5 | 64.4  | 68.9  | 73.5  |
|                     | KIAS   | 186                    | 186  | 186   | 186   | 186   |
|                     | FF/ENG | 3940                   | 3890 | 3830  | 3830  | 3860  |
| 160                 | %N1    | 55.2                   | 57.8 | 61.8  | 65.9  | 70.5  |
|                     | KIAS   | 179                    | 179  | 179   | 179   | 179   |
|                     | FF/ENG | 3580                   | 3520 | 3460  | 3430  | 3460  |

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

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Performance Inflight - QRH

Chapter PI-QRH

Gear Down, Engine INOP

Section 44

GEAR DOWN

ENGINE INOP

MAX CONTINUOUS THRUST

Driftdown Speed/Level Off Altitude

100 ft/min residual rate of climb

Includes APU fuel burn

| WEIGHT (1000 KG)       |              | VREF30 + 80<br>DRIFTDOWN<br>SPEED<br>(KIAS) | LEVEL OFF ALTITUDE (FT) |            |            |
|------------------------|--------------|---------------------------------------------|-------------------------|------------|------------|
| START<br>DRIFT<br>DOWN | LEVEL<br>OFF |                                             | ISA + 10°C<br>& BELOW   | ISA + 15°C | ISA + 20°C |
| 320                    | 308          | 254                                         | 5000                    | 3700       | 1300       |
| 300                    | 288          | 246                                         | 7100                    | 6100       | 4500       |
| 280                    | 269          | 238                                         | 9200                    | 8500       | 7400       |
| 260                    | 249          | 231                                         | 11200                   | 10500      | 9400       |
| 240                    | 230          | 225                                         | 13200                   | 12600      | 11500      |
| 220                    | 211          | 219                                         | 15200                   | 14800      | 13700      |
| 200                    | 192          | 213                                         | 17500                   | 16900      | 15900      |
| 180                    | 173          | 206                                         | 19900                   | 19700      | 18600      |
| 160                    | 154          | 198                                         | 22300                   | 21700      | 20900      |

## GEAR DOWN

# ENGINE INOP

## MAX CONTINUOUS THRUST

## Long Range Cruise Altitude Capability

**100 ft/min residual rate of climb**

| WEIGHT<br>(1000 KG) | PRESSURE ALTITUDE (FT) |            |            |
|---------------------|------------------------|------------|------------|
|                     | ISA + 10°C<br>& BELOW  | ISA + 15°C | ISA + 20°C |
| 340                 | 200                    |            |            |
| 330                 | 1700                   |            |            |
| 320                 | 3200                   | 600        |            |
| 310                 | 4500                   | 2400       |            |
| 300                 | 5500                   | 4200       | 1300       |
| 290                 | 6600                   | 5500       | 3200       |
| 280                 | 7800                   | 6800       | 5000       |
| 270                 | 8900                   | 8200       | 6700       |
| 260                 | 10100                  | 9400       | 8300       |
| 250                 | 11200                  | 10500      | 9400       |
| 240                 | 12300                  | 11600      | 10400      |
| 230                 | 13200                  | 12700      | 11500      |
| 220                 | 14300                  | 13800      | 12600      |
| 210                 | 15400                  | 14900      | 13800      |
| 200                 | 16500                  | 16000      | 15100      |
| 190                 | 17800                  | 17100      | 16200      |
| 180                 | 19000                  | 18700      | 17400      |
| 170                 | 20300                  | 20100      | 19000      |
| 160                 | 21600                  | 21100      | 20400      |



**GEAR DOWN****ENGINE INOP****MAX CONTINUOUS THRUST****Long Range Cruise Control**

| WEIGHT<br>(1000 KG) |        | PRESSURE ALTITUDE (1000 FT) |       |       |       |       |       |      |      |
|---------------------|--------|-----------------------------|-------|-------|-------|-------|-------|------|------|
|                     |        | 5                           | 7     | 9     | 11    | 13    | 15    | 17   | 19   |
| 300                 | %N1    | 96.0                        | 99.0  |       |       |       |       |      |      |
|                     | MACH   | .413                        | .427  |       |       |       |       |      |      |
|                     | KIAS   | 250                         | 249   |       |       |       |       |      |      |
|                     | FF/ENG | 12977                       | 13257 |       |       |       |       |      |      |
| 280                 | %N1    | 93.5                        | 95.6  | 98.8  |       |       |       |      |      |
|                     | MACH   | .400                        | .414  | .429  |       |       |       |      |      |
|                     | KIAS   | 242                         | 242   | 241   |       |       |       |      |      |
|                     | FF/ENG | 12015                       | 12091 | 12444 |       |       |       |      |      |
| 260                 | %N1    | 91.2                        | 92.9  | 95.0  | 98.4  |       |       |      |      |
|                     | MACH   | .387                        | .400  | .414  | .429  |       |       |      |      |
|                     | KIAS   | 234                         | 234   | 233   | 233   |       |       |      |      |
|                     | FF/ENG | 11137                       | 11108 | 11216 | 11560 |       |       |      |      |
| 240                 | %N1    | 88.9                        | 90.6  | 92.3  | 94.7  | 98.4  |       |      |      |
|                     | MACH   | .374                        | .388  | .402  | .418  | .434  |       |      |      |
|                     | KIAS   | 226                         | 226   | 226   | 226   | 226   |       |      |      |
|                     | FF/ENG | 10249                       | 10257 | 10303 | 10449 | 10806 |       |      |      |
| 220                 | %N1    | 86.7                        | 88.4  | 90.1  | 91.9  | 94.4  | 98.4  |      |      |
|                     | MACH   | .364                        | .378  | .392  | .407  | .422  | .439  |      |      |
|                     | KIAS   | 220                         | 220   | 220   | 220   | 220   | 220   |      |      |
|                     | FF/ENG | 9466                        | 9490  | 9517  | 9591  | 9723  | 10067 |      |      |
| 200                 | %N1    | 84.1                        | 86.0  | 87.7  | 89.5  | 91.4  | 93.9  | 98.1 |      |
|                     | MACH   | .353                        | .366  | .380  | .394  | .409  | .425  | .442 |      |
|                     | KIAS   | 213                         | 213   | 213   | 213   | 213   | 213   | 213  |      |
|                     | FF/ENG | 8676                        | 8685  | 8711  | 8768  | 8843  | 8965  | 9313 |      |
| 180                 | %N1    | 81.3                        | 83.3  | 85.1  | 87.0  | 88.8  | 90.6  | 93.2 | 97.4 |
|                     | MACH   | .341                        | .354  | .367  | .381  | .396  | .412  | .428 | .445 |
|                     | KIAS   | 206                         | 206   | 206   | 206   | 206   | 206   | 206  | 206  |
|                     | FF/ENG | 7917                        | 7917  | 7918  | 7967  | 8039  | 8106  | 8230 | 8570 |
| 160                 | %N1    | 78.4                        | 80.3  | 82.2  | 84.1  | 86.1  | 87.8  | 89.7 | 92.2 |
|                     | MACH   | .329                        | .341  | .354  | .368  | .382  | .397  | .413 | .429 |
|                     | KIAS   | 199                         | 199   | 199   | 199   | 199   | 199   | 199  | 199  |
|                     | FF/ENG | 7154                        | 7160  | 7151  | 7167  | 7230  | 7299  | 7359 | 7481 |

**GEAR DOWN**

**ENGINE INOP**

**MAX CONTINUOUS THRUST**

**Long Range Cruise Diversion Fuel and Time  
Ground to Air Miles Conversion**

| AIR DISTANCE (NM)        |      |      |      |      | GROUND<br>DISTANCE<br>(NM) | AIR DISTANCE (NM)        |     |     |     |     |
|--------------------------|------|------|------|------|----------------------------|--------------------------|-----|-----|-----|-----|
| HEADWIND COMPONENT (KTS) |      |      |      |      |                            | TAILWIND COMPONENT (KTS) |     |     |     |     |
| 100                      | 80   | 60   | 40   | 20   |                            | 20                       | 40  | 60  | 80  | 100 |
| 165                      | 145  | 129  | 117  | 108  | 100                        | 93                       | 87  | 81  | 77  | 73  |
| 332                      | 295  | 263  | 238  | 218  | 200                        | 187                      | 175 | 165 | 156 | 148 |
| 500                      | 444  | 396  | 358  | 327  | 300                        | 281                      | 263 | 247 | 234 | 222 |
| 669                      | 593  | 528  | 477  | 436  | 400                        | 374                      | 350 | 329 | 311 | 295 |
| 839                      | 743  | 662  | 597  | 545  | 500                        | 467                      | 438 | 411 | 388 | 368 |
| 1009                     | 894  | 795  | 718  | 655  | 600                        | 561                      | 525 | 494 | 466 | 442 |
| 1180                     | 1044 | 928  | 838  | 764  | 700                        | 654                      | 612 | 575 | 543 | 515 |
| 1351                     | 1196 | 1063 | 958  | 874  | 800                        | 747                      | 700 | 657 | 620 | 588 |
| 1523                     | 1347 | 1197 | 1079 | 983  | 900                        | 840                      | 787 | 739 | 697 | 661 |
| 1696                     | 1499 | 1331 | 1199 | 1093 | 1000                       | 933                      | 874 | 820 | 773 | 733 |

**Reference Fuel and Time Required at Check Point**

| AIR<br>DIST<br>(NM) | PRESSURE ALTITUDE (1000 FT) |                  |                   |                  |                   |                  |                   |                  |                   |                  |
|---------------------|-----------------------------|------------------|-------------------|------------------|-------------------|------------------|-------------------|------------------|-------------------|------------------|
|                     | 6                           |                  | 8                 |                  | 10                |                  | 12                |                  | 14                |                  |
|                     | FUEL<br>(1000 KG)           | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) | FUEL<br>(1000 KG) | TIME<br>(HR:MIN) |
| 100                 | 4.1                         | 0:27             | 3.9               | 0:26             | 3.7               | 0:25             | 3.5               | 0:25             | 3.5               | 0:24             |
| 200                 | 8.3                         | 0:51             | 8.0               | 0:50             | 7.7               | 0:48             | 7.5               | 0:47             | 7.5               | 0:46             |
| 300                 | 12.5                        | 1:15             | 12.1              | 1:13             | 11.7              | 1:11             | 11.5              | 1:09             | 11.6              | 1:08             |
| 400                 | 16.7                        | 1:40             | 16.1              | 1:37             | 15.7              | 1:34             | 15.4              | 1:32             | 15.5              | 1:29             |
| 500                 | 20.9                        | 2:04             | 20.2              | 2:01             | 19.6              | 1:58             | 19.3              | 1:54             | 19.4              | 1:51             |
| 600                 | 24.9                        | 2:29             | 24.1              | 2:25             | 23.5              | 2:21             | 23.2              | 2:17             | 23.3              | 2:13             |
| 700                 | 29.0                        | 2:54             | 28.1              | 2:49             | 27.4              | 2:44             | 27.0              | 2:40             | 27.1              | 2:35             |
| 800                 | 33.0                        | 3:19             | 32.0              | 3:13             | 31.2              | 3:08             | 30.7              | 3:02             | 30.8              | 2:57             |
| 900                 | 37.0                        | 3:44             | 35.9              | 3:38             | 35.0              | 3:31             | 34.4              | 3:25             | 34.4              | 3:20             |
| 1000                | 40.9                        | 4:09             | 39.7              | 4:02             | 38.7              | 3:55             | 38.1              | 3:48             | 38.0              | 3:42             |

**Fuel Required Adjustment (1000 KG)**

| REFERENCE FUEL REQUIRED<br>(1000 KG) | WEIGHT AT CHECK POINT (1000 KG) |      |      |      |     |     |     |      |      |      |
|--------------------------------------|---------------------------------|------|------|------|-----|-----|-----|------|------|------|
|                                      | 170                             | 190  | 210  | 230  | 250 | 270 | 290 | 310  | 330  | 350  |
| 5                                    | -0.9                            | -0.7 | -0.4 | -0.2 | 0.0 | 0.5 | 1.0 | 1.5  | 1.9  | 2.4  |
| 10                                   | -1.9                            | -1.4 | -0.9 | -0.5 | 0.0 | 1.1 | 2.1 | 3.2  | 4.2  | 5.2  |
| 15                                   | -2.9                            | -2.1 | -1.4 | -0.7 | 0.0 | 1.6 | 3.2 | 4.8  | 6.3  | 7.9  |
| 20                                   | -3.8                            | -2.9 | -1.9 | -1.0 | 0.0 | 2.1 | 4.2 | 6.3  | 8.4  | 10.5 |
| 25                                   | -4.8                            | -3.6 | -2.4 | -1.2 | 0.0 | 2.6 | 5.1 | 7.8  | 10.4 | 13.1 |
| 30                                   | -5.8                            | -4.3 | -2.9 | -1.4 | 0.0 | 3.0 | 6.0 | 9.2  | 12.4 | 15.6 |
| 35                                   | -6.8                            | -5.1 | -3.4 | -1.7 | 0.0 | 3.4 | 6.8 | 10.5 | 14.2 | 18.1 |
| 40                                   | -7.8                            | -5.8 | -3.9 | -1.9 | 0.0 | 3.7 | 7.6 | 11.7 | 16.0 | 20.5 |
| 45                                   | -8.8                            | -6.6 | -4.4 | -2.2 | 0.0 | 4.0 | 8.3 | 12.9 | 17.7 | 22.8 |

Based on Long Range Cruise and VREF30+80 descent. Includes APU fuel burn.

**GEAR DOWN****ENGINE INOP****MAX CONTINUOUS THRUST****Holding  
Flaps Up**

| WEIGHT<br>(1000 KG) |        | PRESSURE ALTITUDE (FT) |       |       |       |
|---------------------|--------|------------------------|-------|-------|-------|
|                     |        | 1500                   | 5000  | 10000 | 15000 |
| 340                 | %N1    | 96.1                   |       |       |       |
|                     | KIAS   | 260                    |       |       |       |
|                     | FF/ENG | 15250                  |       |       |       |
| 320                 | %N1    | 94.0                   | 98.2  |       |       |
|                     | KIAS   | 253                    | 253   |       |       |
|                     | FF/ENG | 14280                  | 14490 |       |       |
| 300                 | %N1    | 91.8                   | 95.1  |       |       |
|                     | KIAS   | 244                    | 244   |       |       |
|                     | FF/ENG | 13280                  | 13280 |       |       |
| 280                 | %N1    | 89.9                   | 92.9  |       |       |
|                     | KIAS   | 238                    | 238   |       |       |
|                     | FF/ENG | 12380                  | 12370 |       |       |
| 260                 | %N1    | 87.9                   | 90.9  | 96.3  |       |
|                     | KIAS   | 232                    | 232   | 232   |       |
|                     | FF/ENG | 11520                  | 11580 | 11870 |       |
| 240                 | %N1    | 85.6                   | 88.9  | 93.4  |       |
|                     | KIAS   | 226                    | 226   | 226   |       |
|                     | FF/ENG | 10680                  | 10760 | 10880 |       |
| 220                 | %N1    | 83.3                   | 86.7  | 91.0  | 98.4  |
|                     | KIAS   | 220                    | 220   | 220   | 220   |
|                     | FF/ENG | 9870                   | 9940  | 10020 | 10570 |
| 200                 | %N1    | 80.8                   | 84.1  | 88.6  | 93.9  |
|                     | KIAS   | 213                    | 213   | 213   | 213   |
|                     | FF/ENG | 9060                   | 9110  | 9170  | 9410  |
| 180                 | %N1    | 78.2                   | 81.3  | 86.1  | 90.6  |
|                     | KIAS   | 206                    | 206   | 206   | 206   |
|                     | FF/ENG | 8270                   | 8310  | 8330  | 8510  |
| 160                 | %N1    | 75.5                   | 78.4  | 83.1  | 87.8  |
|                     | KIAS   | 199                    | 199   | 199   | 199   |
|                     | FF/ENG | 7490                   | 7510  | 7510  | 7660  |

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

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# Performance Inflight - QRH

# Chapter PI-QRH

## Text

## Section 45

### Introduction

This chapter contains information to supplement performance data from the Flight Management Computer. 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 Flight Manual, the Flight Manual shall always take precedence.

### General

#### Flight With Unreliable Airspeed / Turbulent Air Penetration

Body 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 may also cause unreliable airspeed/Mach indications. Climb, cruise and descent information is based on the recommended turbulent air penetration speed schedule: 270 knots below 25,000 feet, 280 knots or 0.82 Mach whichever is lower at 25,000 feet and above; maintain a minimum speed of 15 knots above the minimum maneuvering speed when below 0.82 Mach. This schedule provides ample protection from stall and high speed buffet, while also providing protection from exceeding structural limits. The Climb, Cruise and Descent tables in this section may also be used for turbulent air penetration. The Flight with Unreliable Airspeed - FINAL APPROACH table includes a 10 knot margin for landing.

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

#### Max Climb %N1

This table shows Max Climb %N1 for a 310/.84 climb speed schedule, normal engine bleed for packs on and anti-ice off. Enter the table with airport pressure altitude and TAT and read %N1. %N1 adjustments are shown for anti-ice operation.

#### Go-Around %N1

To find Go-Around %N1 based on normal engine bleed for packs on and anti-ice off, enter the Go-Around %N1 table with airport pressure altitude and reported OAT or TAT and read %N1. %N1 adjustments are shown for engine bleeds for various conditions.

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## VREF Speeds

This table contains flaps 30, 25 and 20 reference speeds for a given weight.

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## Advisory Information

### Normal Configuration Landing Distance

Tables are provided as advisory information for normal configuration landing distances on dry runways and slippery runways with good, medium, and poor reported braking action. All landing distances (reference distances plus adjustments) are 115% of the actual landing distance.

To use these tables, determine the reference landing distance for the selected braking configuration. Then adjust the reference distance for landing weight, altitude, wind, slope, temperature, approach speed, and the number of operative thrust reversers to obtain the actual landing distance.

When landing on slippery runways or runways contaminated with ice, snow, slush, or standing water, the reported braking action must be considered. If the surface is affected by water, snow, or ice and the braking action is reported as "good", conditions should not be expected to be as good as on clean, dry runways. The value "good" is comparative and is intended to mean that airplanes should not experience braking or directional control difficulties when landing. The performance level used to calculate the "good" data is consistent with wet runway testing done on early Boeing jets. The performance level used to calculate "poor" data reflects runways covered with wet ice.

Use of the autobrake system commands the airplane to a constant deceleration rate. In some conditions, such as a runway with "poor" braking action, the airplane may not be able to achieve these deceleration rates. In these cases, runway slope and inoperative reversers influence the stopping distance. Since it cannot be determined quickly when this becomes a factor, it is conservative to add the effects of slope and inoperative reversers when using the autobrake system.

### Non-normal Configuration Landing Distance

Advisory information is provided to support non-normal configurations that affect the landing performance of the airplane. Landing distances and adjustments are provided for dry runways and runways with good, medium, and poor reported braking action.

Enter the table with the applicable non-normal configuration and read the normal approach speed. The reference landing distance is a reference distance from 50 ft above the threshold to stop based on a reference landing weight and speed at sea level, zero wind, and zero slope. Subsequent columns provide adjustments for off-reference landing weight, altitude, wind, slope, and speed conditions. Each adjustment is independently added to the reference landing distance. Landing distance includes the effects of max manual braking and reverse thrust.

For an engine inoperative landing, check the rate of climb capability shown in Gear Down Landing Rate of Climb Available tables to ensure adequate climb performance.

## Recommended Brake Cooling Schedule

Advisory information is provided to assist in avoiding problems associated with hot brakes. For normal operation, most landings are at weights below the AFM quick turnaround limit weight.

Use of the recommended cooling schedule will help avoid brake overheat and fuse plug problems that could result from repeated landings at short time intervals or a rejected takeoff.

Enter the Recommended Brake Cooling Schedule table with the airplane weight and brakes on speed, adjusted for wind, at the appropriate temperature and altitude condition. Instructions for applying wind adjustments are included below the table. Linear interpolation may be used to obtain intermediate values. The resulting number is the reference brake energy per brake in millions of foot-pounds, and represents the amount of energy absorbed by each brake during a rejected takeoff.

To determine the energy per brake absorbed during landing, enter the appropriate Event Adjusted Brake Energy Table (No Reverse Thrust or 2 Engine Reverse) with the reference brake energy per brake and the type of braking used during landing (Max Manual, Max Auto, or Autobrake). The resulting number is the adjusted brake energy per brake and represents the energy absorbed in each brake during the landing. The recommended cooling time is found in the final table by entering with the adjusted brake energy per brake. Times are provided for ground cooling and inflight gear down cooling.

Brake Temperature Monitor System (BTMS) indications are also shown. If brake cooling is determined from the BTMS, the hottest brake indication 10 to 15 minutes after the airplane has come to a complete stop, or inflight with gear retracted, may be used to determine recommended cooling schedule by entering at the bottom of the chart. An EICAS advisory message, BRAKE TEMP, will appear when any brake registers 5.0 or higher on the EICAS indication and disappear as the hottest brake cools with an EICAS indication of 3.5. Note that even without an EICAS advisory message, brake cooling is recommended.

## Approach or Landing Climb Limited Weight

In the event an overweight landing is necessary and the fuel dump system is unavailable, approach or landing climb limits should be checked if a Flaps 25 or 30 landing is planned. Enter the table with airport OAT and pressure altitude to read approach or landing climb limited weight. Apply the noted adjustments as required. At weights exceeding those shown, plan a Flaps 20 landing.

The table "Approach or Landing Climb Limited Weight" presents the data which are the more limiting of Approach Climb Limit Weight and Landing Climb Limit Weight.

---

## 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 Mach number of .84 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 engine bleed for packs on or off and all anti-ice bleeds off. Enter the table with pressure altitude and IAS or Mach to read %N1.

It is desirable to maintain engine thrust level within the limits of the Max Cruise thrust rating. However, where thrust level in excess of Max Cruise rating is required, such as for meeting terrain clearance, ATC altitude assignments, or to attain maximum range capability, it is permissible to use the thrust needed up to the Max Continuous thrust rating. The Max Continuous thrust rating is intended primarily for emergency use at the discretion of the pilot and is the maximum thrust that may be used continuously.

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## 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/Cruise 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 correct 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 Diversion Fuel and Time table.

## Long Range Cruise Altitude Capability

Table show the maximum altitude that can be maintained at a given weight and air temperature (ISA deviation), based on LRC speed, Max Continuous thrust, and 100 ft/min residual rate of climb.

## Long Range Cruise Control

The table provides target %N1, engine inoperative Long Range Cruise Mach number, IAS and fuel flow for the airplane weight and pressure altitude. The fuel flow values in this table reflect single engine fuel burn.

## Long Range Cruise Diversion Fuel and Time

Tables are provided for crews to determine the fuel and time required to proceed to an alternate airfield with one engine inoperative. The data is based on single engine Long Range Cruise speed and .84/310/250 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 corrections table with the fuel required for the reference weight and the actual weight at checkpoint. Read fuel and time required for the actual weight.

---

## Holding

Single engine holding data is provided in the same format as the all engine holding data and is based on the same assumptions.

## Gear Down Landing Rate of Climb Available

Rate of climb data is provided as guidance information in the event an engine inoperative landing is planned. The tables show gear down rate of climb available for Flaps 20, Flaps 25 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 for all phases of flight. The data is based on engine bleeds for normal air conditioning.

Note: The Flight Management Computer System (FMCS) does not contain special provisions for operation with landing gear extended. As a result, the FMCS will generate inaccurate enroute speed schedules, display non-conservative predictions of fuel burn, estimated time of arrival (ETA), maximum altitude, and compute overly shallow descent path. To obtain accurate ETA predictions, gear down cruise speed and altitude should be entered on the CLB and CRZ pages. Gear down cruise speed should also be entered on the DES page and a STEP SIZE of zero should be entered on the PERF INIT or CRZ page. Use of VNAV during descent under these circumstances is not recommended.

Tables for gear down performance in this section are identical in format and used in the same manner as tables for the gear up configuration previously described.

**Maneuvers****Table of Contents****Chapter Man****Section TOC**

|                                                    |               |
|----------------------------------------------------|---------------|
| <b>Introduction</b>                                | <b>MAN.05</b> |
| General                                            | MAN.05.1      |
| Non-Normal Maneuvers                               | MAN.05.1      |
| Flight Patterns                                    | MAN.05.1      |
| <b>Non Normal Maneuvers</b>                        | <b>MAN.1</b>  |
| Approach to Stall or Stall Recovery                | MAN.1.1       |
| Ground Proximity Warning System (GPWS) Response    | MAN.1.2       |
| GPWS Caution                                       | MAN.1.2       |
| GPWS Warning                                       | MAN.1.2       |
| Rejected Takeoff                                   | MAN.1.4       |
| Traffic Avoidance                                  | MAN.1.6       |
| Upset Recovery                                     | MAN.1.8       |
| Nose High Recovery                                 | MAN.1.9       |
| Nose Low Recovery                                  | MAN.1.10      |
| Windshear                                          | MAN.1.10      |
| Windshear Caution                                  | MAN.1.10      |
| Windshear Warning                                  | MAN.1.10      |
| Windshear Escape Maneuver                          | MAN.1.12      |
| <b>Flight Patterns</b>                             | <b>MAN.2</b>  |
| Takeoff                                            | MAN.2.1       |
| ILS Approach                                       | MAN.2.2       |
| Instrument Approach Using VNAV                     | MAN.2.3       |
| Instrument Approach Using V/S or FPA               | MAN.2.4       |
| Instrument Approach Flight Pattern - RNAV (RNP) AR | MAN.2.5       |
| Circling Approach                                  | MAN.2.6       |
| Visual Traffic Pattern                             | MAN.2.7       |
| Go-Around and Missed Approach                      | MAN.2.8       |



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## Maneuvers

### Introduction

## Chapter MAN

### Section 05

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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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**Maneuvers****Chapter MAN****Non Normal Maneuvers****Section 1****Approach to Stall or Stall Recovery**

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

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

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

**Note:** If autopilot response is not acceptable, it should be disengaged.

**Note:** If autothrottle response is not acceptable, it should be disconnected.

| Pilot Flying                                                                                                                                                                                                                                                                                                                                                                                                      | Pilot Monitoring                                                                                                                                                                                                                                     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"><li>Initiate the recovery:<ul style="list-style-type: none"><li>Smoothly apply nose down elevator to reduce the angle of attack until buffet or stick shaker stops</li></ul></li></ul>                                                                                                                                                                                          | <ul style="list-style-type: none"><li>Monitor altitude and airspeed</li><li>Verify all required actions have been done and call out any omissions</li><li>Call out any trend toward terrain contact</li></ul>                                        |
| <ul style="list-style-type: none"><li>Continue the recovery:<ul style="list-style-type: none"><li>Roll in the shortest direction to wings level if needed*</li><li>Advance thrust levers as needed</li><li>Retract the speedbrakes</li><li>Do not change gear or flap configuration, except:<ul style="list-style-type: none"><li>During liftoff, if flaps are up, call for flaps 1</li></ul></li></ul></li></ul> | <ul style="list-style-type: none"><li>Monitor altitude and airspeed</li><li>Verify all required actions have been done and call out any omissions</li><li>Call out any trend toward terrain contact</li><li>Set the FLAP lever as directed</li></ul> |
| <ul style="list-style-type: none"><li>Complete the recovery:<ul style="list-style-type: none"><li>Check airspeed and adjust thrust as needed</li><li>Establish pitch attitude</li><li>Return to desired flight path</li></ul></li><li>Re-engage the autopilot and autothrottle, if desired</li></ul>                                                                                                              | <ul style="list-style-type: none"><li>Monitor altitude and airspeed</li><li>Verify all required actions have been done and call out any omissions</li><li>Call out any trend toward terrain contact</li></ul>                                        |

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

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Ground Proximity Warning System (GPWS) Response

GPWS Caution

Accomplish the following maneuver for any of these aural alerts\*:

- AP-BGJ - AP-BID, AP-BMS
- CAUTION OBSTACLE
- CAUTION TERRAIN
- SINK RATE
- TERRAIN
- DON'T SINK
- TOO LOW FLAPS
- TOO LOW GEAR
- TOO LOW TERRAIN
- GLIDESLOPE
- BANK ANGLE

| Pilot Flying                                           | Pilot Monitoring |
|--------------------------------------------------------|------------------|
| Correct the flight path or the airplane configuration. |                  |

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

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

**Note:** If 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:** \*As installed, some repeat.

GPWS Warning

Accomplish the following maneuver for any of these conditions:

- AP-BGJ - AP-BID, AP-BMS
- Activation of the “PULL UP”, “OBSTACLE OBSTACLE PULL UP”, or “TERRAIN TERRAIN PULL UP” warning
- AP-BMG, AP-BMH
- Activation of the “PULL UP”, or “TERRAIN TERRAIN PULL UP” warning
- Other situations resulting in unacceptable flight toward terrain



**777 Flight Crew Operations Manual**

| Pilot Flying                                                                                                                                                                                                                                                                                                                                                                                                     | Pilot Monitoring                                                                                                                                                                                                                        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• Disengage autopilot</li> <li>• Disconnect autothrottle(s)</li> <li>• Aggressively apply maximum* thrust</li> <li>• Simultaneously roll wings level and rotate to an initial pitch attitude of 20°</li> <li>• Retract speedbrakes</li> <li>• If terrain remains a threat, continue rotation up to the pitch limit indicator or stick shaker or initial buffet</li> </ul> | <ul style="list-style-type: none"> <li>• Assure maximum* thrust</li> <li>• Verify all required actions have been completed and call out any omissions</li> </ul>                                                                        |
| <ul style="list-style-type: none"> <li>• Do not change gear or flap configuration until terrain separation is assured</li> <li>• Monitor radio altimeter for sustained or increasing terrain separation</li> <li>• When clear of the terrain, slowly decrease pitch attitude and accelerate</li> </ul>                                                                                                           | <ul style="list-style-type: none"> <li>• Monitor vertical speed and altitude (radio altitude for terrain clearance and barometric altitude for a minimum safe altitude)</li> <li>• Call out any trend toward terrain contact</li> </ul> |

**Note:** Aft control column force increases as the airspeed decreases. In all cases, the pitch attitude that results in intermittent stick shaker or initial buffet is the upper pitch attitude limit. Flight at intermittent stick shaker may be required to obtain positive terrain separation. Smooth, steady control avoids 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 (as installed) warning, the alert may be regarded as cautionary and the approach may be continued. A look-ahead terrain warning that occurs in climb, cruise, or descent that can be immediately verified as above the minimum safe altitude can be considered unreliable.

---

## Rejected Takeoff

The Captain has the sole responsibility for the decision to reject the takeoff. Make the decision in time to start the rejected takeoff maneuver by V1. If the decision is to reject the takeoff, the Captain clearly announces “REJECT,” immediately starts the rejected takeoff maneuver, and assumes control of the airplane. If the First Officer is making the takeoff, the First Officer maintains control of the airplane until the Captain makes a positive input to the controls.

Before 80 knots, reject the takeoff 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
- a side window opens
- the airplane is unsafe or unable to fly

Above 80 knots and before V1, reject the takeoff for any of the following:

- fire or fire warning
- engine failure
- predictive windshear warning
- the airplane is unsafe or unable to fly

During the takeoff, the crew member observing the non-normal situation immediately calls it out as clearly as possible.



## 777 Flight Crew Operations Manual

| Captain                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | First Officer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Without delay:</p> <p>Simultaneously close thrust levers, disconnect autothrottles, and apply maximum manual wheel brakes or verify operation of RTO autobrakes.</p> <p>If RTO autobrakes is selected, monitor system performance and apply manual wheel brakes if the AUTOBRAKE message is displayed or deceleration is not adequate.</p> <p>Apply reverse thrust up to the maximum amount consistent with conditions.</p> <p>Verify the speedbrakes are extended.</p> <p>Continue maximum braking until certain the airplane can stop on the runway.</p> | <p>Verify actions as follows:</p> <p>Thrust levers closed.</p> <p>Autothrottles disconnected.</p> <p>Maximum brakes applied.</p> <p>Reverse thrust applied.</p> <p>Verify speedbrake lever UP and call “SPEEDBRAKES UP.” If speedbrake lever not UP call “SPEEDBRAKES NOT UP.”</p> <p>When both REV indication(s) are green, call “REVERSERS NORMAL”</p> <p>If there is no REV indication(s) or the indication(s) stay amber, call “NO REVERSER LEFT ENGINE”, or “NO REVERSER RIGHT ENGINE” or “NO REVERSERS”</p> <p>Call out any omitted action items.</p> |
| <p>When stopping is assured:</p> <p>Start movement of the reverse thrust levers to reach the reverse idle detent before taxi speed.</p> <p>After the engines are at reverse idle, move the reverse thrust levers to full down.</p>                                                                                                                                                                                                                                                                                                                            | <p>Call out 60 knots.</p> <p>Communicate the reject decision to the control tower and cabin as soon as practical.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                       |



| Captain                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | First Officer |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <p>When the airplane is stopped, perform procedures as needed.</p> <p>Review Brake Cooling Schedule for brake cooling time and precautions (refer to the Performance Inflight chapter).</p> <p>Consider the following:</p> <ul style="list-style-type: none"><li>• the possibility of wheel fuse plugs melting</li><li>• the need to clear the runway</li><li>• the requirement for remote parking</li><li>• wind direction in case of fire</li><li>• alerting fire equipment</li><li>• not setting the parking brake unless passenger evacuation is needed</li><li>• advising the ground crew of the hot brake hazard</li><li>• advising passengers of the need to remain seated or evacuate</li><li>• completion of Non-Normal checklist (if appropriate) for conditions which caused the RTO</li></ul> |               |

Traffic Avoidance

Immediately accomplish the following by recall whenever a TCAS traffic advisory (TA) or resolution advisory (RA) occurs.

**WARNING:** Comply with RA if there is conflict between RA and air traffic control.

**WARNING:** Once an RA has been issued, safe separation could be compromised if current vertical speed is changed, except as necessary to comply with the RA. This is because TCAS II-to-TCAS II coordination may be in progress with the intruder aircraft, and any change in vertical speed that does not comply with the RA may negate the effectiveness of the other aircraft’s compliance with the RA

**Note:** If stick shaker or initial buffet occurs during the maneuver, immediately accomplish the APPROACH TO STALL RECOVERY procedure.

**Note:** If high speed buffet occurs during the maneuver, relax pitch force as necessary to reduce buffet, but continue the maneuver.

**Note:** Do not use flight director pitch commands until clear of conflict.



## 777 Flight Crew Operations Manual

### 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 disconnect the 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.                                                                                                                                                                                           |                  |

**Note:** \*Visually acquired traffic may not be the same traffic causing an RA. The visual perception of an encounter may be misleading, particularly at night.

**For a climb RA in landing configuration:**

| Pilot Flying                                                                                                                                                                                                                                                                                                         | Pilot Monitoring                                                                                                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| Disengage the autopilot and disconnect the autothrottle. Advance thrust levers forward to ensure maximum thrust is attained and call for FLAPS 20. Smoothly adjust pitch to satisfy the RA command. Follow the planned lateral flight path unless visual contact with the conflicting traffic requires other action. | Verify maximum thrust set. Position flap lever to 20 detent.                                                    |
| Verify a positive rate of climb on the altimeter and call "GEAR UP."                                                                                                                                                                                                                                                 | Verify a positive rate of climb on the altimeter and call "POSITIVE RATE."<br><br>Set landing gear lever to UP. |
| Attempt to establish visual contact.* Call out any conflicting traffic.                                                                                                                                                                                                                                              |                                                                                                                 |

**Note:** \*Visually acquired traffic may not be the same traffic causing an RA. The visual perception of an encounter may be misleading, particularly at night.

**Upset Recovery**

Historically, an upset was defined as unintentionally exceeding one or more of the following conditions:

- pitch attitude greater than 25 degrees nose up
- pitch attitude greater than 10 degrees nose down
- bank angle greater than 45 degrees
- less than the above parameters but flying at an airspeed inappropriate for the conditions

An upset condition is now considered any time an airplane is diverting from the intended airplane state. An airplane upset can involve pitch or roll angle deviations as well as inappropriate airspeeds for the conditions.

The following actions 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 dependent on the situation. Not all the actions may be needed once recovery is underway. If needed, use minimal pitch trim during initial recovery. Careful use of rudder to aid roll control should be considered only if roll control is ineffective and the airplane is not stalled.

**777 Flight Crew Operations Manual**

These actions assume that the airplane is not stalled. A stalled condition can exist at any attitude and can be recognized by one or more of the following:

- Stick shaker
- Buffet that can be heavy at times
- Lack of pitch authority
- Lack of roll control
- Inability to stop a descent

If the airplane is stalled, first recover from the stall by applying and maintaining nose down elevator until stall recovery is complete and stick shaker stops.

### Nose High Recovery

| Pilot Flying                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Pilot Monitoring                                                                                                                                                                                                |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• Recognize and confirm the developing situation.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                 |
| <ul style="list-style-type: none"> <li>• Disengage autopilot</li> <li>• Disconnect autothrottle</li> <li>• Recover                             <ul style="list-style-type: none"> <li>• Apply nose down elevator. Apply as much elevator as needed to obtain a nose down pitch rate.</li> <li>• Apply appropriate nose down stabilizer trim*</li> <li>• Reduce thrust</li> <li>• Roll (adjust bank angle) to obtain a nose down pitch rate*</li> </ul> </li> <li>• Complete the recovery:                             <ul style="list-style-type: none"> <li>• When approaching the horizon, roll to wings level</li> <li>• Check airspeed and adjust thrust</li> <li>• Establish pitch attitude</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Call out attitude, airspeed and altitude throughout the recovery.</li> <li>• Verify all needed actions have been done and call out any continued deviation.</li> </ul> |

**WARNING: \* Excessive use of pitch trim or rudder can aggravate an upset, result in loss of control, or result in high structure loads.**



Nose Low Recovery

| Pilot Flying                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Pilot Monitoring                                                                                                                                                                                          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"><li>Recognize and confirm the developing situation.</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                           |
| <ul style="list-style-type: none"><li>Disengage autopilot</li><li>Disconnect autothrottle</li><li>Recover<ul style="list-style-type: none"><li>Recover from stall, if needed</li><li>Roll in the shortest direction to wings level. If bank angle is more than 90 degrees, unload and roll*</li></ul></li><li>Complete the recovery:<ul style="list-style-type: none"><li>Apply nose up elevator</li><li>Apply nose up trim, if needed*</li><li>Adjust thrust and drag, if needed</li></ul></li></ul> | <ul style="list-style-type: none"><li>Call out attitude, airspeed, and altitude throughout the recovery.</li><li>Verify all needed actions have been done and call out any continued deviation.</li></ul> |

**WARNING:** \*Excessive use of pitch trim or rudder can aggravate an upset, result in loss of control, or result in high structural loads.

Windshear

Windshear Caution

For predictive windshear caution alert: (“MONITOR RADAR DISPLAY” aural)

| Pilot Flying                                                                                | Pilot Monitoring |
|---------------------------------------------------------------------------------------------|------------------|
| <ul style="list-style-type: none"><li>Maneuver as required to avoid the windshear</li></ul> |                  |

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 V<sub>1</sub>, there may not be sufficient runway remaining to stop if an RTO is initiated at V<sub>1</sub>. 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 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 degrees 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                                                                                                                                                 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>MANUAL FLIGHT</b> <ul style="list-style-type: none"> <li>• Disengage autopilot</li> <li>• Push either TO/GA switch</li> <li>• Aggressively apply maximum* thrust</li> <li>• Disconnect autothrottle(s)</li> <li>• Simultaneously roll wings level and rotate toward an initial pitch attitude of 15°</li> <li>• Retract speedbrakes</li> <li>• Follow flight director TO/GA guidance (if available)**</li> </ul> | <ul style="list-style-type: none"> <li>• Verify maximum* thrust</li> <li>• Verify all required actions have been completed and call out any omissions</li> </ul> |
| <b>AUTOMATIC FLIGHT</b> <ul style="list-style-type: none"> <li>• Push either TO/GA switch***</li> <li>• Verify TO/GA mode annunciation</li> <li>• Verify GA* thrust</li> <li>• Retract speedbrakes</li> <li>• Monitor system performance****</li> </ul>                                                                                                                                                             | <ul style="list-style-type: none"> <li>• Verify GA* thrust</li> <li>• Verify all required actions have been completed and call out any omissions</li> </ul>      |

| Pilot Flying                                                                                                                                                                                                                                                                                                                                                                                                             | Pilot Monitoring                                                                                                                                                                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>MANUAL OR AUTOMATIC FLIGHT</b> <ul style="list-style-type: none"> <li>• Do not change gear or flap configuration until windshear is no longer a factor</li> <li>• Maintain wings level to maximize climb gradient, unless a turn is required for obstacle clearance</li> <li>• Monitor vertical speed and altitude</li> <li>• Do not attempt to regain lost airspeed until windshear is no longer a factor</li> </ul> | <ul style="list-style-type: none"> <li>• Monitor vertical speed and altitude</li> <li>• Call out any trend toward terrain contact, descending flight path, or significant airspeed changes</li> </ul> |

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

**Note:** \* Maximum thrust can be obtained by advancing the thrust levers full forward if the EECs are in the normal mode. If terrain contact is imminent, advance thrust levers full forward.



777 Flight Crew Operations Manual

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**Note:** \*\* Do not exceed the Pitch Limit Indication.

**Note:** \*\*\* If TO/GA is not available, disengage autopilot and autothrottle(s) and fly manually.

**WARNING:** \*\*\*\* Severe windshear may exceed the performance capability of the AFDS. The pilot flying must be prepared to disengage the autopilot, disconnect autothrottle(s) and fly manually.

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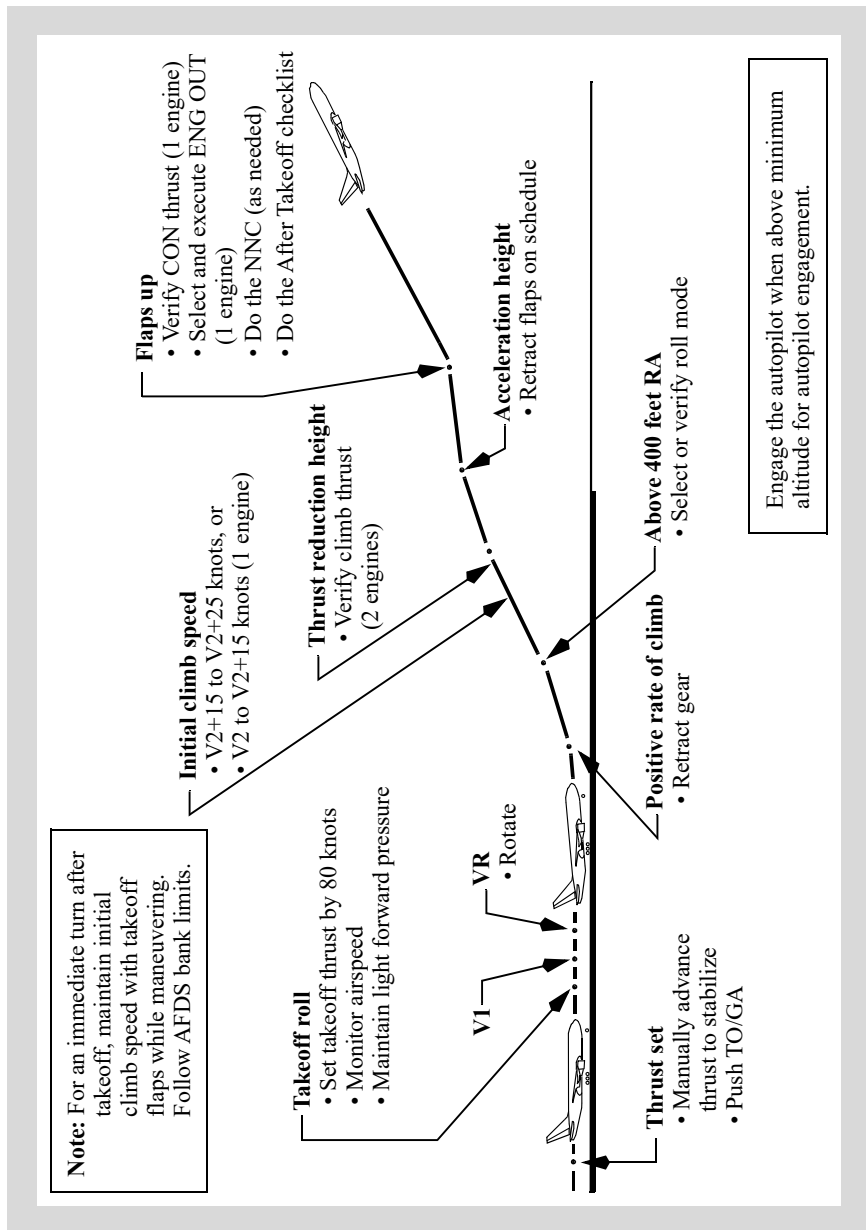
# Maneuvers

## Flight Patterns

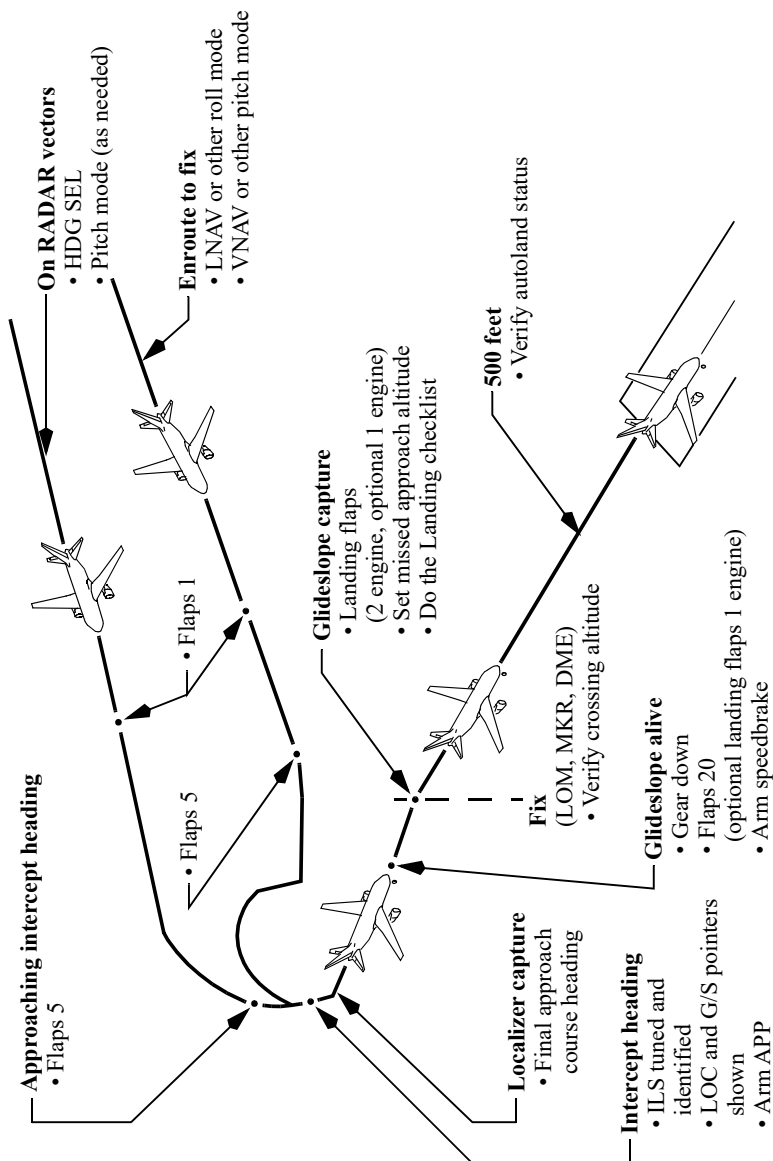
# Chapter MAN

## Section 2

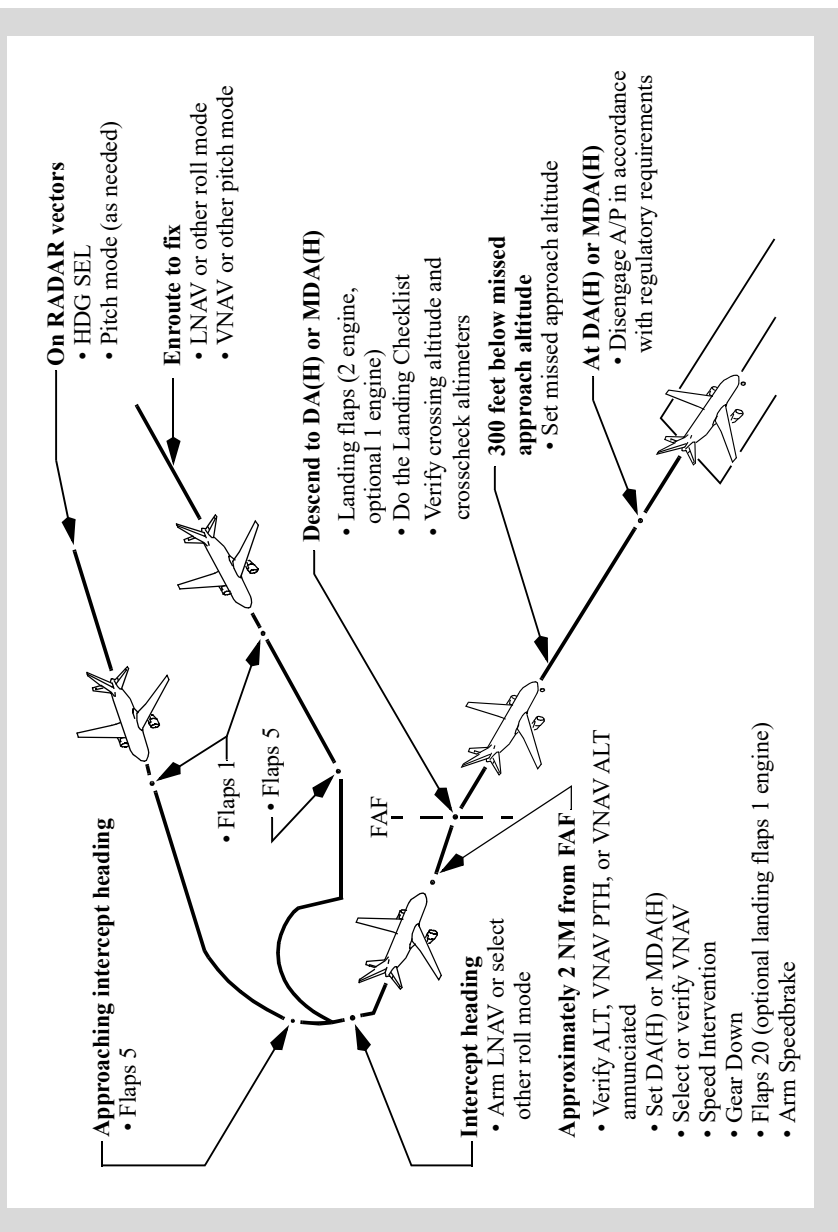
### Takeoff



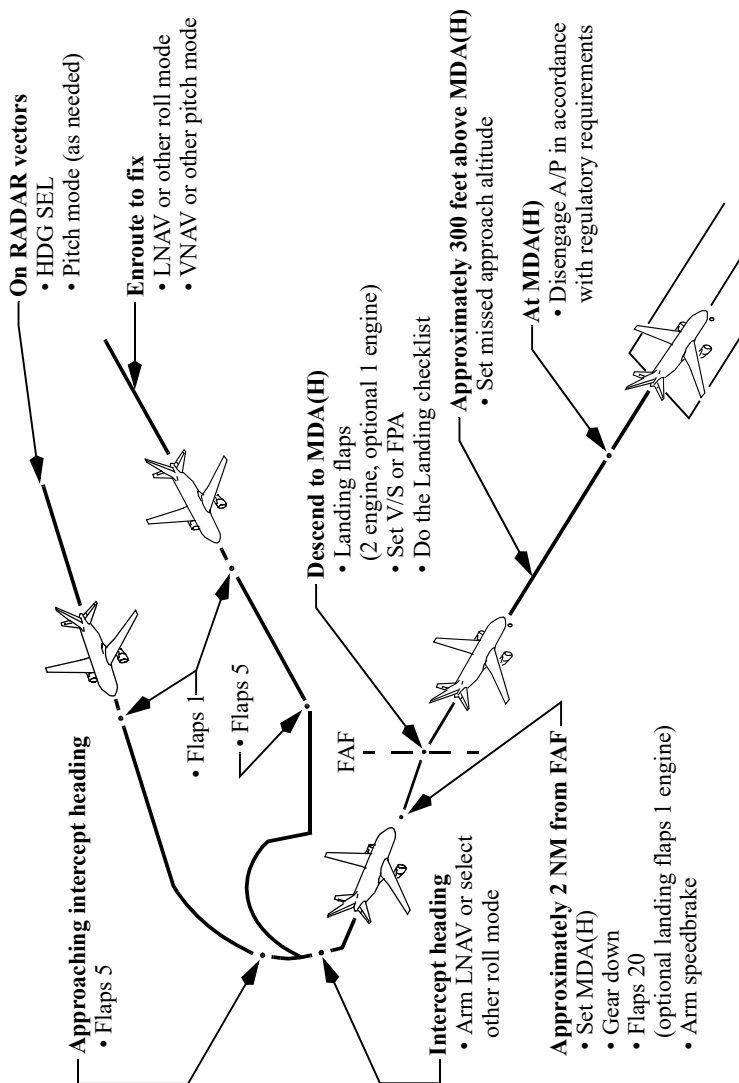
## ILS Approach



## Instrument Approach Using VNAV

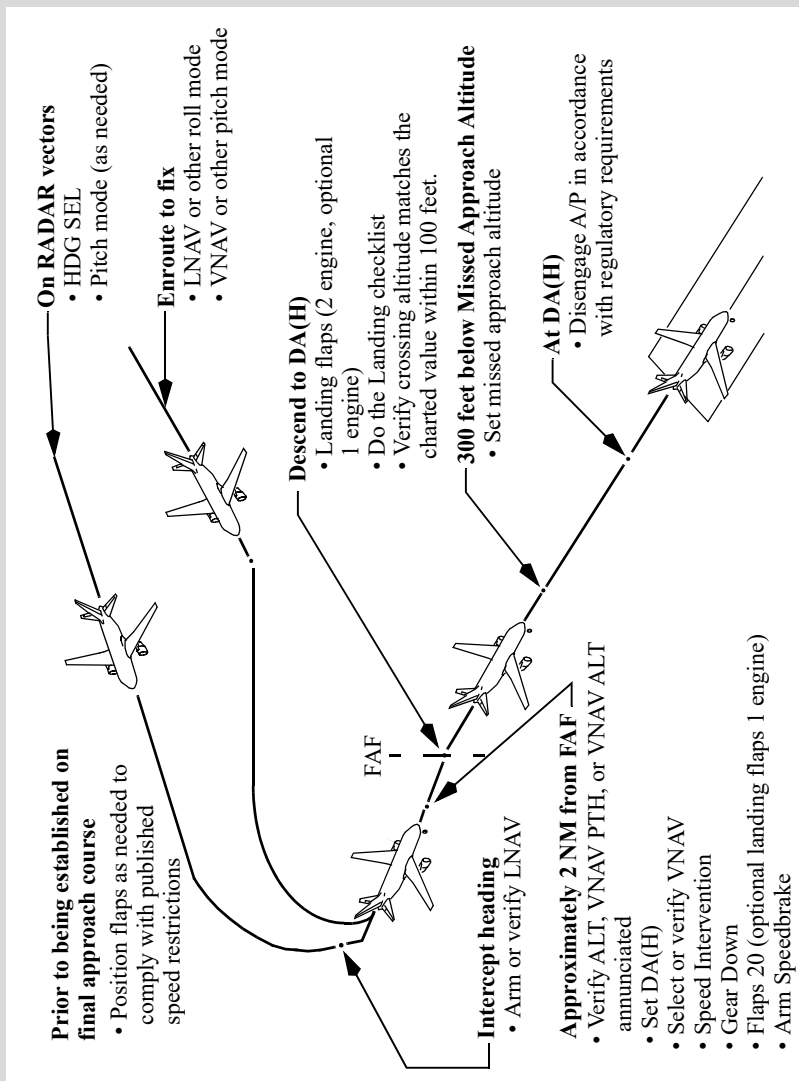


## Instrument Approach Using V/S or FPA



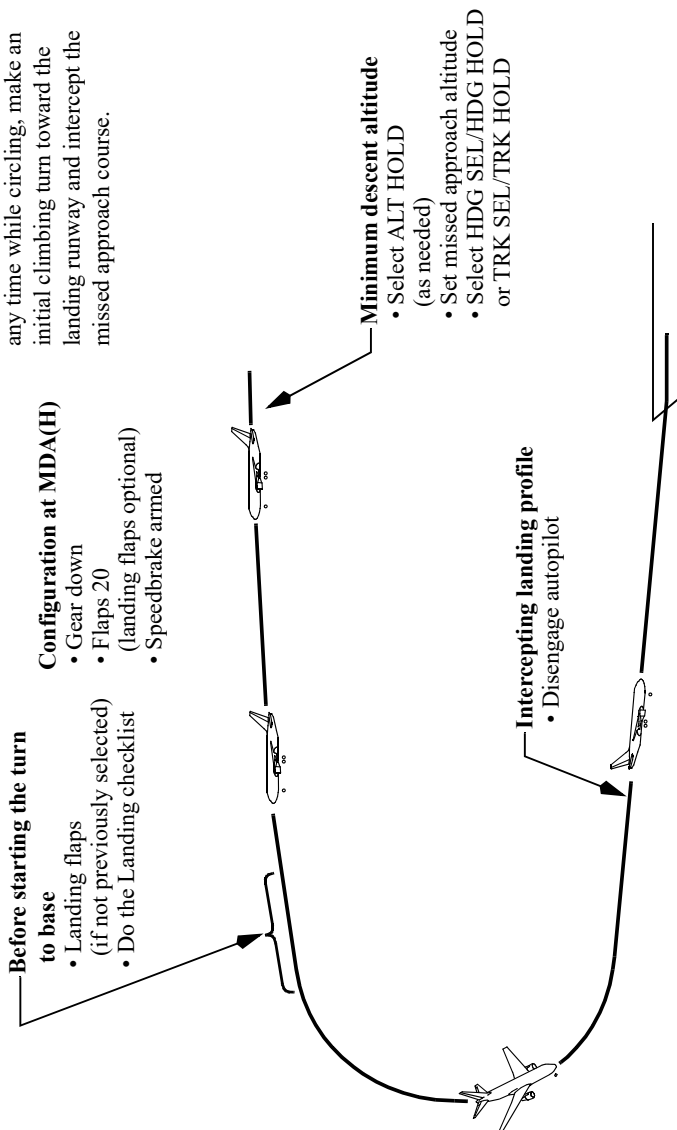


## Instrument Approach Flight Pattern - RNAV (RNP) AR

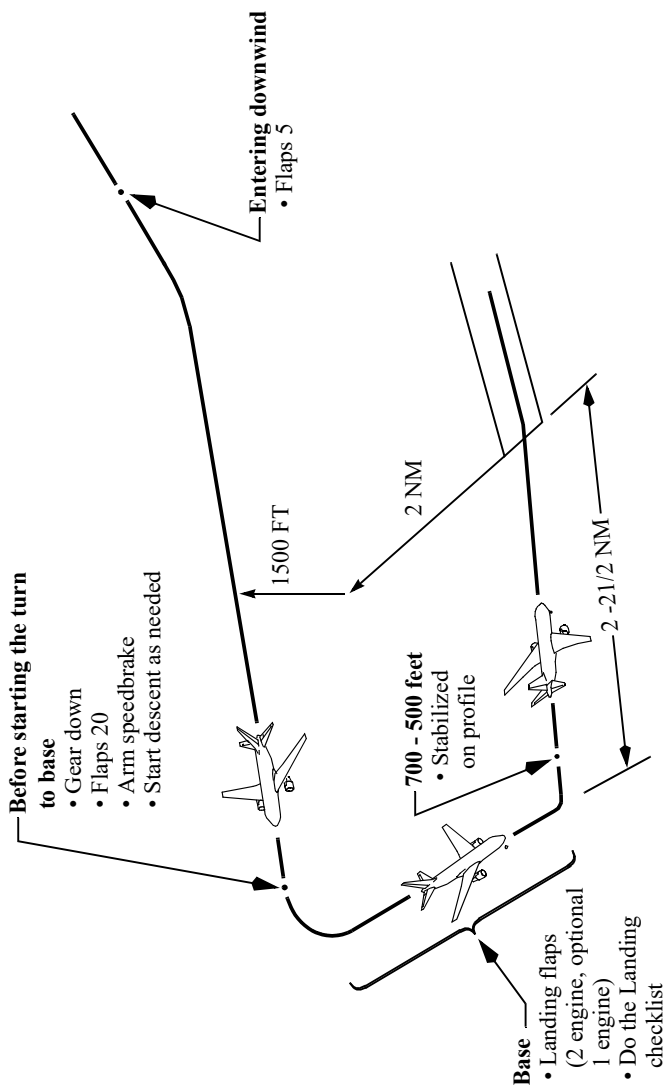


## Circling Approach

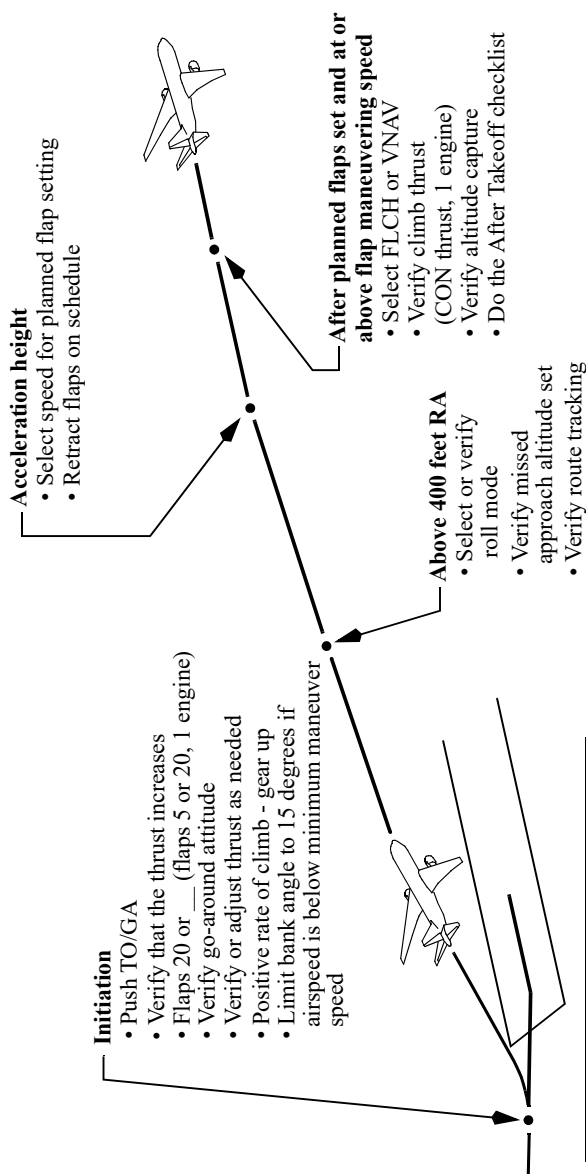
If a missed approach is needed at any time while circling, make an initial climbing turn toward the landing runway and intercept the missed approach course.



## Visual Traffic Pattern



## Go-Around and Missed Approach





## Checklist Instructions

## Chapter CI

### Table of Contents

### Section TOC

|                                            |                 |
|--------------------------------------------|-----------------|
| <b>Model Identification</b> .....          | <b>CI.ModID</b> |
| <b>Revision Record</b> .....               | <b>CI.RR</b>    |
| <b>QRH List of Effective Pages</b> .....   | <b>CI.LEP</b>   |
| <b>Normal Checklists</b> .....             | <b>CI.1</b>     |
| Introduction .....                         | CI.1.1          |
| Normal Checklist Operation .....           | CI.1.1          |
| Electronic Checklist Operation .....       | CI.1.2          |
| Checklist Content .....                    | CI.1.2          |
| Checklist Construction .....               | CI.1.3          |
| Electronic Checklist Malfunctions .....    | CI.1.3          |
| Single ECL malfunction .....               | CI.1.3          |
| Multiple ECL malfunctions .....            | CI.1.3          |
| <b>Non-Normal Checklists</b> .....         | <b>CI.2</b>     |
| Introduction .....                         | CI.2.1          |
| Annunciated Checklists .....               | CI.2.1          |
| Unannunciated Checklists .....             | CI.2.1          |
| Icon Checklists .....                      | CI.2.1          |
| Quick Action Index .....                   | CI.2.1          |
| Airplane Effectivity Statement .....       | CI.2.2          |
| Condition Statement .....                  | CI.2.2          |
| Objective Statement .....                  | CI.2.2          |
| Memory Items vs. Reference Items .....     | CI.2.2          |
| Additional Information Section .....       | CI.2.2          |
| Electronic Checklist Operation .....       | CI.2.2          |
| Starting a Checklist without an Icon ..... | CI.2.3          |
| Using CHKL OVRD .....                      | CI.2.3          |
| Using CHKL RESET .....                     | CI.2.4          |
| Using ITEM OVRD .....                      | CI.2.4          |

---

|                                                         |         |
|---------------------------------------------------------|---------|
| Non-Normal Checklist Operation. . . . .                 | CI.2.4  |
| Start a Checklist . . . . .                             | CI.2.4  |
| Do Memory Items . . . . .                               | CI.2.5  |
| Call for Checklist and Do Initial Actions . . . . .     | CI.2.5  |
| Do Reference Items. . . . .                             | CI.2.5  |
| "Confirm" Step . . . . .                                | CI.2.6  |
| Areas of Responsibility: Ground vs. In Flight . . . . . | CI.2.6  |
| Inoperative Items. . . . .                              | CI.2.6  |
| Consequential Alert Messages . . . . .                  | CI.2.7  |
| Deferred Items. . . . .                                 | CI.2.7  |
| Checklist Complete . . . . .                            | CI.2.8  |
| Special Situations . . . . .                            | CI.2.8  |
| Troubleshooting . . . . .                               | CI.2.8  |
| Land At Nearest Suitable Airport . . . . .              | CI.2.9  |
| Immediate Landing . . . . .                             | CI.2.9  |
| Engine Shutdown . . . . .                               | CI.2.9  |
| Loss of Indications . . . . .                           | CI.2.9  |
| Assumptions . . . . .                                   | CI.2.9  |
| Use of Captain's Discretion . . . . .                   | CI.2.10 |
| Non-Normal Situation Guidelines Overview . . . . .      | CI.2.11 |
| Non-Normal Checklist Legend. . . . .                    | CI.2.12 |
| Redirection Symbol. . . . .                             | CI.2.12 |
| Separator Symbol . . . . .                              | CI.2.12 |
| Task Divider Symbol . . . . .                           | CI.2.12 |
| Decision Symbol . . . . .                               | CI.2.12 |
| Precaution Symbol . . . . .                             | CI.2.12 |
| Checklist Complete Symbol . . . . .                     | CI.2.12 |

**Checklist Instructions**  
**Model Identification****Chapter CI**  
**Section ModID****General**

The airplanes listed in the table below are covered in this QRH. The numbers are used to distinguish data peculiar to one or more, but not all of the airplanes. Where data applies to all airplanes listed, no reference is made to individual airplane numbers.

The table permits flight crew correlation of configuration differences by Registry Number in alpha/numeric order within an operator's fleet for airplanes covered in this handbook. 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 chapter 0 of volume 1 of this handbook's associated Flight Crew Operations Manual.

Registry number(s) reflect the most current information supplied by the operator to the Boeing Company through the SRM process and 60 days prior to the subject revision date. Registry numbers received after that date will be incorporated at the next scheduled revision. If a registry number is not provided the FCOM will default to serial number.

Airplane number is supplied by the operator. Registry number is supplied by the national regulatory agency. Serial and tabulation numbers are supplied by Boeing.

| <b>Airplane Number</b> | <b>Registry Number</b> | <b>Serial Number</b> | <b>Tabulation Number</b> |
|------------------------|------------------------|----------------------|--------------------------|
| 001                    | AP-BGJ                 | 33775                | WC446                    |
| 002                    | AP-BGK                 | 33776                | WC447                    |
| 003                    | AP-BGL                 | 33777                | WC448                    |
| 004                    | AP-BGY                 | 33781                | WD001                    |
| 005                    | AP-BGZ                 | 33782                | WD002                    |
| 101                    | AP-BHV                 | 33778                | WD786                    |
| 102                    | AP-BHW                 | 33779                | WD787                    |
| 212                    | AP-BHX                 | 35296                | WC449                    |
| 103                    | AP-BID                 | 33780                | WD788                    |
| 208                    | AP-BMG                 | 32716                | WC363                    |
| 209                    | AP-BMH                 | 32717                | WC364                    |
| 101                    | AP-BMS                 | 35782                | WD981                    |



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**Checklist Instructions**  
**Revision Record****Chapter CI**  
**Section RR****QRH Revision Transmittal Letter**

To: All holders of Pakistan International Airlines Corporation 777 Flight Crew Operations Manual, Boeing Document Number D632W001-PIA.

Subject: Quick Reference Handbook (QRH) Revision.

This revision reflects the most current information available to The Boeing Company 60 days before the subject revision date.

General information below explains the use of revision bars to identify new or revised information. Highlights in the Revision Highlights section explain the revision bar changes in this revision.

**Revision Record**

| No. | Revision Date     | Date Filed |
|-----|-------------------|------------|
| 24  | June 15, 2015     |            |
| 26  | April 1, 2016     |            |
| 28  | December 15, 2016 |            |
| 30  | December 15, 2017 |            |
| 32  | December 15, 2018 |            |
| 34  | December 15, 2019 |            |
| 36  | December 15, 2020 |            |
| 38  | December 15, 2021 |            |
| 40  | December 15, 2022 |            |
| 42  | December 15, 2023 |            |
| 44  | December 15, 2024 |            |

| No. | Revision Date     | Date Filed |
|-----|-------------------|------------|
| 25  | December 15, 2015 |            |
| 27  | June 15, 2016     |            |
| 29  | June 15, 2017     |            |
| 31  | June 15, 2018     |            |
| 33  | June 15, 2019     |            |
| 35  | June 15, 2020     |            |
| 37  | June 15, 2021     |            |
| 39  | June 15, 2022     |            |
| 41  | June 15, 2023     |            |
| 43  | June 15, 2024     |            |
| 45  | June 15, 2025     |            |

**General**

The Boeing Company issues flight crew operations manual and QRH revisions to provide new or revised procedures and information. Formal revisions also incorporate appropriate information from previously issued flight crew operations manual bulletins.

The revision date is the approximate date the manual is mailed to the customer.

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QRH revisions, part of the formal FCOM revisions, include a QRH Revision Transmittal Letter, a new QRH Revision Record, QRH Revision Highlights, and a current QRH List of Effective Pages. Use the information on the new QRH Revision Record and QRH List of Effective Pages to verify the QRH content.

Pages containing revised technical material have revision bars associated with the changed text or illustration. Editorial revisions (for example, spelling corrections) may have revision bars with no associated highlight.

The record above should be completed by the person incorporating the revision into the manual.

---

## QRH Filing Instructions

Consult the QRH 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.

---

## QRH Revision Highlights

Be careful when inserting changes not to throw away pages from the manual that are not replaced. Using the QRH List of Effective Pages (CI.LEP) can help determine the correct content of the QRH.

Throughout the QRH, airplane effectivity may be updated to reflect coverage as listed on the Model Identification page (CI.ModID), or to show service bulletin airplane effectivity. Highlights are not supplied for these types of changes.

This QRH 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.

Most of the 777 section level and package level performance table of contents are updated to a more descriptive entry. This update issues new page dates in the entire affected section(s). Please be sure to review the data for changes.



## Checklist Instructions

### Revision Highlights

## Chapter CI

### Section RR

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#### Chapter NNC - Non-Normal Checklists

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

###### ELT ON

NNC.1.8 - Revised title to include an icon.

NNC.1.8 - Added a step to notify ATC.

###### Window Damage Fwd L, R

NNC.1.10 - Revised capitalization of unannunciated NNC.

##### Section 2 - Air Systems

###### BLEED OFF ENG L, R

NNC.2.10 - Revised EICAS reference to align with the message.

##### Section 11 - Flight Management, Navigation

###### GPS Data Unreliable

NNC.11.10 - Added GPS Data Unreliable checklist.

---

#### Chapter Man - Maneuvers

##### Section 1 - Non Normal Maneuvers

###### Ground Proximity Warning System (GPWS) Response

MAN.1.2 - Capitalized beginning of sentence.

MAN.1.2 - Capitalized beginning of sentence.

MAN.1.2 - Capitalized beginning of sentence.

MAN.1.3 - Changed the grammar.

MAN.1.3 - Revised to add a note for erroneous terrain look-ahead warnings due to GPS interference.



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**Preface****QRH List of Effective Pages****Chapter CI****Section LEP****Quick Reference Handbook****Quick Action Index**

\* QA.Index.1-2 June 15, 2025

**EICAS Messages (tab)**

\* EICAS.Index.1-12 June 15, 2025

**Unannunciated Checklists (tab)**

\* Unann.Index.1-2 June 15, 2025

**Alphabetical (tab)**

\* Alpha.Index.1-12 June 15, 2025

**Normal Checklists (tab)**

|      |                   |
|------|-------------------|
| NC.1 | December 15, 2024 |
| NC.2 | June 13, 2011     |
| NC.3 | June 13, 2011     |
| NC.4 | June 16, 2008     |

**0 Miscellaneous (tab)**

|           |                   |
|-----------|-------------------|
| 0.TOC.1-2 | December 15, 2020 |
| 0.1       | December 12, 2011 |
| 0.2       | December 15, 2018 |
| 0.3       | December 15, 2020 |
| 0.4       | December 15, 2020 |
| 0.5       | December 15, 2020 |
| 0.6       | December 15, 2020 |
| 0.7       | December 12, 2011 |
| 0.8       | June 15, 2018     |

**1 Airplane Gen., Emer. Equip., Doors, Windows (tab)**

|           |                   |
|-----------|-------------------|
| 1.TOC.1-2 | December 15, 2018 |
| 1.1       | December 15, 2018 |
| 1.2       | December 15, 2017 |
| 1.3       | April 1, 2016     |
| 1.4       | April 1, 2016     |
| 1.5       | December 15, 2017 |
| 1.6       | April 1, 2016     |
| 1.7       | April 1, 2016     |
| * 1.8     | June 15, 2025     |
| 1.9       | December 15, 2017 |

|        |               |
|--------|---------------|
| * 1.10 | June 15, 2025 |
| 1.11   | April 1, 2016 |
| 1.12   | June 15, 2022 |
| 1.13   | June 15, 2022 |
| 1.14   | April 1, 2016 |

**2 Air Systems (tab)**

|           |                   |
|-----------|-------------------|
| 2.TOC.1-2 | December 15, 2023 |
| 2.1       | December 12, 2011 |
| 2.2       | December 15, 2019 |
| 2.3       | December 15, 2019 |
| 2.4       | December 15, 2021 |
| 2.5       | December 15, 2021 |
| 2.6       | December 15, 2021 |
| 2.7       | December 15, 2019 |
| 2.8       | December 15, 2019 |
| 2.9       | December 15, 2020 |
| * 2.10    | June 15, 2025     |
| 2.11      | December 15, 2020 |
| 2.12      | December 15, 2023 |
| 2.13      | December 15, 2023 |
| 2.14      | December 15, 2023 |
| 2.15      | December 15, 2023 |
| 2.16      | December 15, 2023 |
| 2.17      | December 15, 2024 |
| 2.18      | December 15, 2024 |
| 2.19      | June 15, 2024     |
| 2.20      | December 15, 2023 |
| 2.21      | December 15, 2023 |
| 2.22      | December 15, 2023 |
| 2.23      | December 15, 2024 |
| 2.24      | December 15, 2024 |
| 2.25      | June 15, 2024     |
| 2.26      | December 15, 2023 |
| 2.27      | December 15, 2023 |
| 2.28      | December 15, 2023 |
| 2.29      | December 15, 2023 |
| 2.30      | December 15, 2023 |
| 2.31      | December 15, 2023 |
| 2.32      | December 15, 2023 |
| 2.33      | December 15, 2023 |
| 2.34      | December 15, 2023 |
| 2.35      | December 15, 2023 |
| 2.36      | December 15, 2023 |

\* = Revised, Added, or Deleted

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|                                 |                   |                                |                   |
|---------------------------------|-------------------|--------------------------------|-------------------|
| <b>3 Anti-Ice, Rain (tab)</b>   |                   | 7.8                            | December 15, 2020 |
| 3.TOC.1-2                       | December 15, 2024 | 7.9                            | December 15, 2020 |
| 3.1                             | December 13, 2010 | 7.10                           | December 15, 2020 |
| 3.2                             | December 13, 2010 | 7.11                           | December 15, 2020 |
| 3.3                             | December 15, 2021 | 7.12                           | December 15, 2020 |
| 3.4                             | December 15, 2021 | 7.13                           | December 15, 2020 |
| 3.5                             | December 15, 2021 | 7.14                           | December 15, 2020 |
| 3.6                             | December 15, 2022 | 7.15                           | December 15, 2020 |
| 3.7                             | December 15, 2021 | 7.16                           | December 15, 2022 |
| 3.8                             | December 15, 2021 | 7.17                           | December 15, 2020 |
| 3.9                             | December 15, 2021 | 7.18                           | December 15, 2022 |
| 3.10                            | December 15, 2021 | 7.19                           | December 15, 2022 |
| 3.11                            | December 15, 2024 | 7.20                           | December 15, 2022 |
| 3.12                            | December 15, 2024 | 7.21                           | December 15, 2020 |
| 3.13                            | December 15, 2021 | 7.22                           | December 15, 2020 |
| 3.14                            | June 15, 2021     | 7.23                           | December 15, 2020 |
| 3.15                            | June 15, 2021     | 7.24                           | December 15, 2024 |
| 3.16                            | December 15, 2018 | 7.25                           | December 15, 2024 |
| <b>4 Automatic Flight (tab)</b> |                   | 7.26                           | December 15, 2020 |
| 4.TOC.1-2                       | June 16, 2008     | 7.27                           | December 15, 2022 |
| 4.1                             | December 15, 2021 | 7.28                           | December 15, 2022 |
| 4.2                             | December 13, 2010 | 7.29                           | December 15, 2022 |
| <b>5 Communications (tab)</b>   |                   | 7.30                           | December 15, 2022 |
| 5.TOC.1-2                       | April 1, 2016     | 7.31                           | December 15, 2022 |
| 5.1                             | December 12, 2011 | 7.32                           | December 15, 2022 |
| 5.2                             | April 1, 2016     | 7.33                           | December 15, 2022 |
| <b>6 Electrical (tab)</b>       |                   | 7.34                           | December 15, 2022 |
| 6.TOC.1-2                       | June 16, 2008     | 7.35                           | December 15, 2022 |
| 6.1                             | June 15, 2012     | 7.36                           | December 15, 2022 |
| 6.2                             | June 15, 2012     | 7.37                           | December 15, 2022 |
| 6.3                             | December 15, 2012 | 7.38                           | June 15, 2023     |
| 6.4                             | June 15, 2012     | 7.39                           | December 15, 2023 |
| 6.5                             | December 15, 2012 | 7.40                           | June 15, 2023     |
| 6.6                             | June 15, 2022     | 7.41                           | December 15, 2022 |
| <b>7 Engines, APU (tab)</b>     |                   | 7.42                           | December 15, 2022 |
| * 7.TOC.1-2                     | June 15, 2025     | 7.43                           | December 15, 2022 |
| 7.1                             | December 15, 2013 | 7.44                           | December 15, 2022 |
| 7.2                             | December 15, 2022 | 7.45                           | December 15, 2022 |
| 7.3                             | December 15, 2021 | 7.46                           | December 15, 2022 |
| 7.4                             | December 15, 2022 | 7.47                           | December 15, 2022 |
| 7.5                             | December 15, 2020 | 7.48                           | December 15, 2022 |
| 7.6                             | December 15, 2020 | <b>8 Fire Protection (tab)</b> |                   |
| 7.7                             | December 15, 2020 | 8.TOC.1-2                      | December 15, 2022 |
|                                 |                   | 8.1                            | December 13, 2010 |
|                                 |                   | 8.2                            | June 15, 2022     |
|                                 |                   | 8.3                            | June 15, 2021     |

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777 Flight Crew Operations Manual

|                                |                   |                                               |                   |
|--------------------------------|-------------------|-----------------------------------------------|-------------------|
| 8.4                            | December 15, 2023 | 9.14                                          | December 15, 2017 |
| 8.5                            | June 15, 2023     | 9.15                                          | December 12, 2011 |
| 8.6                            | June 15, 2024     | 9.16                                          | December 15, 2024 |
| 8.7                            | December 15, 2021 | 9.17                                          | December 15, 2024 |
| 8.8                            | June 15, 2021     | 9.18                                          | December 15, 2017 |
| 8.9                            | June 15, 2021     | 9.19                                          | December 15, 2017 |
| 8.10                           | June 15, 2021     | 9.20                                          | December 15, 2015 |
| 8.11                           | June 15, 2021     | 9.21                                          | December 15, 2015 |
| 8.12                           | June 15, 2021     | 9.22                                          | December 15, 2015 |
| 8.13                           | June 15, 2021     | 9.23                                          | December 15, 2015 |
| 8.14                           | June 15, 2021     | 9.24                                          | December 15, 2015 |
| 8.15                           | June 15, 2021     | 9.25                                          | December 15, 2015 |
| 8.16                           | June 15, 2021     | 9.26                                          | June 15, 2019     |
| 8.17                           | June 15, 2021     | 9.27                                          | December 15, 2015 |
| 8.18                           | June 15, 2021     | 9.28                                          | December 15, 2017 |
| 8.19                           | June 15, 2021     | 9.29                                          | June 15, 2020     |
| 8.20                           | June 15, 2021     | 9.30                                          | December 15, 2017 |
| 8.21                           | June 15, 2021     | 9.31                                          | December 15, 2017 |
| 8.22                           | December 15, 2021 | 9.32                                          | December 12, 2011 |
| 8.23                           | December 15, 2021 | <b>10 Flight Instruments, Displays (tab)</b>  |                   |
| 8.24                           | June 15, 2021     | 10.TOC.1-2                                    | June 15, 2023     |
| 8.25                           | June 15, 2023     | 10.1                                          | December 15, 2020 |
| 8.26                           | December 15, 2021 | 10.2                                          | December 15, 2017 |
| 8.27                           | December 15, 2021 | 10.3                                          | December 15, 2017 |
| 8.28                           | December 15, 2021 | 10.4                                          | December 15, 2017 |
| 8.29                           | June 15, 2021     | 10.5                                          | December 15, 2017 |
| 8.30                           | June 15, 2021     | 10.6                                          | December 15, 2016 |
| 8.31                           | June 15, 2021     | 10.7                                          | June 15, 2023     |
| 8.32                           | December 15, 2021 | 10.8                                          | June 15, 2023     |
| 8.33                           | December 15, 2021 | 10.9                                          | June 15, 2023     |
| 8.34                           | December 15, 2021 | 10.10                                         | June 15, 2023     |
| <b>9 Flight Controls (tab)</b> |                   | <b>11 Flight Management, Navigation (tab)</b> |                   |
| 9.TOC.1-2                      | December 15, 2017 | * 11.TOC.1-2                                  | June 15, 2025     |
| 9.1                            | December 15, 2015 | 11.1                                          | December 15, 2024 |
| 9.2                            | December 12, 2011 | 11.2                                          | December 15, 2022 |
| 9.3                            | December 13, 2010 | 11.3                                          | December 15, 2022 |
| 9.4                            | June 15, 2019     | 11.4                                          | June 15, 2022     |
| 9.5                            | December 15, 2015 | 11.5                                          | June 15, 2022     |
| 9.6                            | December 15, 2015 | 11.6                                          | June 15, 2020     |
| 9.7                            | December 15, 2015 | 11.7                                          | June 15, 2023     |
| 9.8                            | June 15, 2016     | * 11.8                                        | June 15, 2025     |
| 9.9                            | June 15, 2016     | 11.9                                          | June 15, 2020     |
| 9.10                           | December 13, 2010 | * 11.10                                       | June 15, 2025     |
| 9.11                           | December 15, 2015 | * 11.11                                       | June 15, 2025     |
| 9.12                           | December 12, 2011 | * 11.12                                       | June 15, 2025     |
| 9.13                           | December 13, 2010 |                                               |                   |

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|                      |                   |                              |                   |
|----------------------|-------------------|------------------------------|-------------------|
| * 11.13              | June 15, 2025     | 12.35                        | December 15, 2015 |
| * 11.14              | June 15, 2025     | 12.36                        | December 15, 2015 |
| * 11.15              | June 15, 2025     | <b>13 Hydraulics (tab)</b>   |                   |
| * 11.16              | June 15, 2025     | 13.TOC.1-2                   | December 15, 2022 |
| * 11.17              | June 15, 2025     | 13.1                         | December 13, 2010 |
| * 11.18              | June 15, 2025     | 13.2                         | December 15, 2022 |
| * 11.19              | June 15, 2025     | 13.3                         | December 15, 2022 |
| * 11.20              | June 15, 2025     | 13.4                         | December 15, 2022 |
| * 11.21              | June 15, 2025     | 13.5                         | December 15, 2022 |
| * 11.22              | June 15, 2025     | 13.6                         | June 15, 2018     |
| <b>12 Fuel (tab)</b> |                   | 13.7                         | June 15, 2018     |
| 12.TOC.1-2           | December 15, 2015 | 13.8                         | June 15, 2018     |
| 12.1                 | June 13, 2011     | 13.9                         | June 15, 2018     |
| 12.2                 | June 13, 2011     | 13.10                        | June 15, 2018     |
| 12.3                 | June 15, 2020     | 13.11                        | June 15, 2018     |
| 12.4                 | June 13, 2011     | 13.12                        | June 15, 2018     |
| 12.5                 | June 13, 2011     | 13.13                        | June 15, 2018     |
| 12.6                 | December 15, 2013 | 13.14                        | June 15, 2018     |
| 12.7                 | December 15, 2013 | 13.15                        | June 15, 2018     |
| 12.8                 | December 15, 2017 | 13.16                        | June 15, 2018     |
| 12.9                 | December 15, 2012 | 13.17                        | June 15, 2018     |
| 12.10                | December 15, 2012 | 13.18                        | June 15, 2018     |
| 12.11                | December 15, 2016 | 13.19                        | June 15, 2018     |
| 12.12                | December 15, 2012 | 13.20                        | June 15, 2018     |
| 12.13                | December 15, 2013 | 13.21                        | June 15, 2018     |
| 12.14                | December 15, 2013 | 13.22                        | June 15, 2018     |
| 12.15                | December 15, 2013 | 13.23                        | December 15, 2022 |
| 12.16                | December 15, 2014 | 13.24                        | December 15, 2022 |
| 12.17                | June 15, 2020     | 13.25                        | December 15, 2022 |
| 12.18                | December 15, 2012 | 13.26                        | December 15, 2022 |
| 12.19                | December 15, 2012 | 13.27                        | December 15, 2022 |
| 12.20                | December 15, 2012 | 13.28                        | December 15, 2022 |
| 12.21                | December 15, 2012 | 13.29                        | December 15, 2022 |
| 12.22                | December 15, 2015 | 13.30                        | December 15, 2022 |
| 12.23                | December 15, 2015 | 13.31                        | June 15, 2024     |
| 12.24                | December 15, 2015 | 13.32                        | December 15, 2022 |
| 12.25                | December 15, 2015 | <b>14 Landing Gear (tab)</b> |                   |
| 12.26                | December 15, 2017 | 14.TOC.1-2                   | December 15, 2019 |
| 12.27                | December 15, 2017 | 14.1                         | December 15, 2015 |
| 12.28                | December 15, 2015 | 14.2                         | December 13, 2010 |
| 12.29                | December 15, 2015 | 14.3                         | December 15, 2019 |
| 12.30                | December 15, 2015 | 14.4                         | December 15, 2019 |
| 12.31                | December 15, 2015 | 14.5                         | December 15, 2019 |
| 12.32                | December 15, 2015 | 14.6                         | December 15, 2019 |
| 12.33                | December 15, 2015 | 14.7                         | December 15, 2019 |
| 12.34                | December 15, 2017 |                              |                   |

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Pink pages contain the PIA-developed Additional Operational Information

| Page                                                                | date            |
|---------------------------------------------------------------------|-----------------|
| Operational Information (tab)<br>( <i>BOMB ON BOARD Checklist</i> ) |                 |
| OI PIA 1.3 – 4                                                      | September, 2018 |

Please insert this page facing CI.LEP.2

## 777 Flight Crew Operations Manual

|                                                  |                   |              |                   |
|--------------------------------------------------|-------------------|--------------|-------------------|
| 14.8                                             | December 15, 2019 | PI-QRH.11.15 | June 15, 2023     |
| 14.9                                             | December 15, 2019 | PI-QRH.11.16 | June 15, 2023     |
| 14.10                                            | December 15, 2019 | PI-QRH.11.17 | June 15, 2023     |
| 14.11                                            | December 15, 2019 | PI-QRH.11.18 | June 15, 2023     |
| 14.12                                            | December 15, 2019 | PI-QRH.11.19 | June 15, 2023     |
| <b>15 Warning Systems (tab)</b>                  |                   | PI-QRH.11.20 | June 15, 2023     |
| 15.TOC.1-2                                       | June 15, 2016     | PI-QRH.11.21 | June 15, 2023     |
| 15.1                                             | December 13, 2010 | PI-QRH.11.22 | June 15, 2023     |
| 15.2                                             | June 13, 2011     | PI-QRH.11.23 | June 15, 2023     |
| 15.3                                             | December 10, 2007 | PI-QRH.11.24 | June 15, 2023     |
| 15.4                                             | June 15, 2016     | PI-QRH.11.25 | June 15, 2023     |
| 15.5                                             | June 15, 2016     | PI-QRH.11.26 | June 15, 2023     |
| 15.6                                             | June 15, 2016     | PI-QRH.11.27 | June 15, 2023     |
| 15.7                                             | June 15, 2016     | PI-QRH.11.28 | June 15, 2023     |
| 15.8                                             | June 15, 2016     | PI-QRH.11.29 | June 15, 2023     |
| <b>Operational Information (tab)</b>             |                   | PI-QRH.11.30 | June 15, 2023     |
| OI.TOC.1-2                                       | December 15, 2013 | PI-QRH.11.31 | June 15, 2023     |
| OI.1.1                                           | December 10, 2007 | PI-QRH.11.32 | June 15, 2023     |
| OI.1.2                                           | June 16, 2008     | PI-QRH.11.33 | June 15, 2023     |
| <b>Performance Inflight - QRH (tab)</b>          |                   | PI-QRH.11.34 | June 15, 2023     |
| PI-QRH.TOC.1-2                                   | December 15, 2021 | PI-QRH.11.35 | June 15, 2023     |
| <b>777-200ER GE90-94B KG M FAA TO1-10 TO2-20</b> |                   | PI-QRH.11.36 | June 15, 2023     |
| PI-QRH.TOC.10.1-4                                | June 15, 2023     | PI-QRH.11.37 | June 15, 2023     |
| PI-QRH.ModID.10.1-2                              | April 1, 2016     | PI-QRH.11.38 | June 15, 2023     |
| PI-QRH.10.1                                      | December 15, 2014 | PI-QRH.11.39 | June 15, 2023     |
| PI-QRH.10.2                                      | December 15, 2014 | PI-QRH.11.40 | June 15, 2023     |
| PI-QRH.10.3                                      | December 15, 2014 | PI-QRH.12.1  | December 15, 2014 |
| PI-QRH.10.4                                      | December 15, 2014 | PI-QRH.12.2  | December 15, 2014 |
| PI-QRH.10.5                                      | December 15, 2015 | PI-QRH.12.3  | December 15, 2014 |
| PI-QRH.10.6                                      | December 15, 2015 | PI-QRH.12.4  | December 15, 2014 |
| PI-QRH.11.1                                      | December 15, 2020 | PI-QRH.12.5  | December 15, 2014 |
| PI-QRH.11.2                                      | December 15, 2020 | PI-QRH.12.6  | December 15, 2014 |
| PI-QRH.11.3                                      | December 15, 2020 | PI-QRH.12.7  | December 15, 2014 |
| PI-QRH.11.4                                      | June 15, 2023     | PI-QRH.12.8  | December 15, 2014 |
| PI-QRH.11.5                                      | June 15, 2023     | PI-QRH.12.9  | December 15, 2014 |
| PI-QRH.11.6                                      | June 15, 2023     | PI-QRH.12.10 | December 15, 2014 |
| PI-QRH.11.7                                      | June 15, 2023     | PI-QRH.12.11 | December 15, 2014 |
| PI-QRH.11.8                                      | June 15, 2023     | PI-QRH.12.12 | December 15, 2014 |
| PI-QRH.11.9                                      | June 15, 2023     | PI-QRH.13.1  | June 15, 2023     |
| PI-QRH.11.10                                     | June 15, 2023     | PI-QRH.13.2  | December 15, 2020 |
| PI-QRH.11.11                                     | June 15, 2023     | PI-QRH.13.3  | December 15, 2020 |
| PI-QRH.11.12                                     | June 15, 2023     | PI-QRH.13.4  | December 15, 2020 |
| PI-QRH.11.13                                     | June 15, 2023     | PI-QRH.13.5  | December 15, 2020 |
| PI-QRH.11.14                                     | June 15, 2023     | PI-QRH.13.6  | December 15, 2020 |
|                                                  |                   | PI-QRH.14.1  | December 15, 2014 |
|                                                  |                   | PI-QRH.14.2  | December 15, 2014 |
|                                                  |                   | PI-QRH.14.3  | December 15, 2014 |

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777 Flight Crew Operations Manual

|                                                     |                   |                                                         |                   |
|-----------------------------------------------------|-------------------|---------------------------------------------------------|-------------------|
| PI-QRH.14.4                                         | December 15, 2014 | PI-QRH.21.29                                            | June 15, 2023     |
| PI-QRH.14.5                                         | December 15, 2014 | PI-QRH.21.30                                            | June 15, 2023     |
| PI-QRH.14.6                                         | December 15, 2014 | PI-QRH.21.31                                            | June 15, 2023     |
| PI-QRH.15.1                                         | June 15, 2023     | PI-QRH.21.32                                            | June 15, 2023     |
| PI-QRH.15.2                                         | December 15, 2020 | PI-QRH.21.33                                            | June 15, 2023     |
| PI-QRH.15.3                                         | June 15, 2021     | PI-QRH.21.34                                            | June 15, 2023     |
| PI-QRH.15.4                                         | December 15, 2020 | PI-QRH.21.35                                            | June 15, 2023     |
| PI-QRH.15.5                                         | December 15, 2020 | PI-QRH.21.36                                            | June 15, 2023     |
| PI-QRH.15.6                                         | December 15, 2020 | PI-QRH.21.37                                            | June 15, 2023     |
| <b>777-200LR GE90-110B1L KG M FAA TO1-10 TO2-20</b> |                   | PI-QRH.21.38                                            | June 15, 2023     |
| PI-QRH.TOC.20.1-4                                   | June 15, 2023     | PI-QRH.21.39                                            | June 15, 2023     |
| PI-QRH.ModID.20.1-2                                 | December 15, 2015 | PI-QRH.21.40                                            | June 15, 2023     |
| PI-QRH.20.1                                         | December 15, 2014 | PI-QRH.22.1                                             | December 15, 2014 |
| PI-QRH.20.2                                         | December 15, 2014 | PI-QRH.22.2                                             | December 15, 2014 |
| PI-QRH.20.3                                         | December 15, 2014 | PI-QRH.22.3                                             | December 15, 2014 |
| PI-QRH.20.4                                         | December 15, 2014 | PI-QRH.22.4                                             | December 15, 2014 |
| PI-QRH.20.5                                         | June 15, 2017     | PI-QRH.22.5                                             | December 15, 2014 |
| PI-QRH.20.6                                         | December 15, 2015 | PI-QRH.22.6                                             | December 15, 2014 |
| PI-QRH.21.1                                         | December 15, 2020 | PI-QRH.22.7                                             | December 15, 2014 |
| PI-QRH.21.2                                         | December 15, 2020 | PI-QRH.22.8                                             | December 15, 2014 |
| PI-QRH.21.3                                         | December 15, 2020 | PI-QRH.22.9                                             | December 15, 2014 |
| PI-QRH.21.4                                         | June 15, 2023     | PI-QRH.22.10                                            | December 15, 2014 |
| PI-QRH.21.5                                         | June 15, 2023     | PI-QRH.22.11                                            | December 15, 2020 |
| PI-QRH.21.6                                         | June 15, 2023     | PI-QRH.22.12                                            | December 15, 2020 |
| PI-QRH.21.7                                         | June 15, 2023     | PI-QRH.23.1                                             | December 15, 2014 |
| PI-QRH.21.8                                         | June 15, 2023     | PI-QRH.23.2                                             | December 15, 2014 |
| PI-QRH.21.9                                         | June 15, 2023     | PI-QRH.23.3                                             | December 15, 2015 |
| PI-QRH.21.10                                        | June 15, 2023     | PI-QRH.23.4                                             | December 15, 2014 |
| PI-QRH.21.11                                        | June 15, 2023     | PI-QRH.23.5                                             | December 15, 2014 |
| PI-QRH.21.12                                        | June 15, 2023     | PI-QRH.23.6                                             | December 15, 2014 |
| PI-QRH.21.13                                        | June 15, 2023     | PI-QRH.23.7                                             | December 15, 2014 |
| PI-QRH.21.14                                        | June 15, 2023     | PI-QRH.23.8                                             | December 15, 2014 |
| PI-QRH.21.15                                        | June 15, 2023     | PI-QRH.24.1                                             | December 15, 2014 |
| PI-QRH.21.16                                        | June 15, 2023     | PI-QRH.24.2                                             | December 15, 2014 |
| PI-QRH.21.17                                        | June 15, 2023     | PI-QRH.24.3                                             | December 15, 2014 |
| PI-QRH.21.18                                        | June 15, 2023     | PI-QRH.24.4                                             | December 15, 2014 |
| PI-QRH.21.19                                        | June 15, 2023     | PI-QRH.25.1                                             | June 15, 2023     |
| PI-QRH.21.20                                        | June 15, 2023     | PI-QRH.25.2                                             | December 15, 2020 |
| PI-QRH.21.21                                        | June 15, 2023     | PI-QRH.25.3                                             | December 15, 2015 |
| PI-QRH.21.22                                        | June 15, 2023     | PI-QRH.25.4                                             | December 15, 2020 |
| PI-QRH.21.23                                        | June 15, 2023     | PI-QRH.25.5                                             | December 15, 2015 |
| PI-QRH.21.24                                        | June 15, 2023     | PI-QRH.25.6                                             | December 15, 2020 |
| PI-QRH.21.25                                        | June 15, 2023     | <b>777-300ER GE90-115BL KG M FAA TO1-10 TO2-20 PCC2</b> |                   |
| PI-QRH.21.26                                        | June 15, 2023     | PI-QRH.TOC.30.1-4                                       | June 15, 2023     |
| PI-QRH.21.27                                        | June 15, 2023     | PI-QRH.ModID.30.1-2                                     | December 15, 2021 |
| PI-QRH.21.28                                        | June 15, 2023     | PI-QRH.30.1                                             | December 15, 2021 |

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777 Flight Crew Operations Manual

|              |                   |                                              |                   |
|--------------|-------------------|----------------------------------------------|-------------------|
| PI-QRH.30.2  | December 15, 2021 | PI-QRH.32.3                                  | December 15, 2021 |
| PI-QRH.30.3  | December 15, 2021 | PI-QRH.32.4                                  | December 15, 2021 |
| PI-QRH.30.4  | December 15, 2021 | PI-QRH.32.5                                  | December 15, 2021 |
| PI-QRH.30.5  | December 15, 2021 | PI-QRH.32.6                                  | December 15, 2021 |
| PI-QRH.30.6  | December 15, 2021 | PI-QRH.32.7                                  | December 15, 2021 |
| PI-QRH.31.1  | December 15, 2021 | PI-QRH.32.8                                  | December 15, 2021 |
| PI-QRH.31.2  | December 15, 2021 | PI-QRH.32.9                                  | December 15, 2021 |
| PI-QRH.31.3  | December 15, 2021 | PI-QRH.32.10                                 | December 15, 2021 |
| PI-QRH.31.4  | June 15, 2023     | PI-QRH.32.11                                 | December 15, 2021 |
| PI-QRH.31.5  | June 15, 2023     | PI-QRH.32.12                                 | December 15, 2021 |
| PI-QRH.31.6  | June 15, 2023     | PI-QRH.33.1                                  | December 15, 2021 |
| PI-QRH.31.7  | June 15, 2023     | PI-QRH.33.2                                  | December 15, 2021 |
| PI-QRH.31.8  | June 15, 2023     | PI-QRH.33.3                                  | December 15, 2021 |
| PI-QRH.31.9  | June 15, 2023     | PI-QRH.33.4                                  | December 15, 2021 |
| PI-QRH.31.10 | June 15, 2023     | PI-QRH.33.5                                  | December 15, 2021 |
| PI-QRH.31.11 | June 15, 2023     | PI-QRH.33.6                                  | December 15, 2021 |
| PI-QRH.31.12 | June 15, 2023     | PI-QRH.33.7                                  | December 15, 2021 |
| PI-QRH.31.13 | June 15, 2023     | PI-QRH.33.8                                  | December 15, 2021 |
| PI-QRH.31.14 | June 15, 2023     | PI-QRH.34.1                                  | December 15, 2021 |
| PI-QRH.31.15 | June 15, 2023     | PI-QRH.34.2                                  | December 15, 2021 |
| PI-QRH.31.16 | June 15, 2023     | PI-QRH.34.3                                  | December 15, 2021 |
| PI-QRH.31.17 | June 15, 2023     | PI-QRH.34.4                                  | December 15, 2021 |
| PI-QRH.31.18 | June 15, 2023     | PI-QRH.34.5                                  | December 15, 2021 |
| PI-QRH.31.19 | June 15, 2023     | PI-QRH.34.6                                  | December 15, 2021 |
| PI-QRH.31.20 | June 15, 2023     | PI-QRH.35.1                                  | June 15, 2023     |
| PI-QRH.31.21 | June 15, 2023     | PI-QRH.35.2                                  | December 15, 2021 |
| PI-QRH.31.22 | June 15, 2023     | PI-QRH.35.3                                  | December 15, 2021 |
| PI-QRH.31.23 | June 15, 2023     | PI-QRH.35.4                                  | December 15, 2021 |
| PI-QRH.31.24 | June 15, 2023     | PI-QRH.35.5                                  | December 15, 2021 |
| PI-QRH.31.25 | June 15, 2023     | PI-QRH.35.6                                  | December 15, 2021 |
| PI-QRH.31.26 | June 15, 2023     | <b>777-300ER GE90-115BL KG M JAA PAX GAS</b> |                   |
| PI-QRH.31.27 | June 15, 2023     | <b>TO-10 TO2-20</b>                          |                   |
| PI-QRH.31.28 | June 15, 2023     | PI-QRH.TOC.40.1-4                            | June 15, 2023     |
| PI-QRH.31.29 | June 15, 2023     | PI-QRH.ModID.40.1-2                          | December 15, 2017 |
| PI-QRH.31.30 | June 15, 2023     | PI-QRH.40.1                                  | December 15, 2017 |
| PI-QRH.31.31 | June 15, 2023     | PI-QRH.40.2                                  | December 15, 2017 |
| PI-QRH.31.32 | June 15, 2023     | PI-QRH.40.3                                  | December 15, 2017 |
| PI-QRH.31.33 | June 15, 2023     | PI-QRH.40.4                                  | December 15, 2017 |
| PI-QRH.31.34 | June 15, 2023     | PI-QRH.40.5                                  | December 15, 2017 |
| PI-QRH.31.35 | June 15, 2023     | PI-QRH.40.6                                  | December 15, 2017 |
| PI-QRH.31.36 | June 15, 2023     | PI-QRH.41.1                                  | December 15, 2020 |
| PI-QRH.31.37 | June 15, 2023     | PI-QRH.41.2                                  | December 15, 2020 |
| PI-QRH.31.38 | June 15, 2023     | PI-QRH.41.3                                  | December 15, 2020 |
| PI-QRH.31.39 | June 15, 2023     | PI-QRH.41.4                                  | June 15, 2023     |
| PI-QRH.31.40 | June 15, 2023     | PI-QRH.41.5                                  | June 15, 2023     |
| PI-QRH.32.1  | December 15, 2021 | PI-QRH.41.6                                  | June 15, 2023     |
| PI-QRH.32.2  | December 15, 2021 | PI-QRH.41.7                                  | June 15, 2023     |

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|              |                   |                        |                   |
|--------------|-------------------|------------------------|-------------------|
| PI-QRH.41.8  | June 15, 2023     | PI-QRH.43.3            | December 15, 2017 |
| PI-QRH.41.9  | June 15, 2023     | PI-QRH.43.4            | December 15, 2017 |
| PI-QRH.41.10 | June 15, 2023     | PI-QRH.43.5            | December 15, 2017 |
| PI-QRH.41.11 | June 15, 2023     | PI-QRH.43.6            | December 15, 2017 |
| PI-QRH.41.12 | June 15, 2023     | PI-QRH.43.7            | December 15, 2017 |
| PI-QRH.41.13 | June 15, 2023     | PI-QRH.43.8            | December 15, 2017 |
| PI-QRH.41.14 | June 15, 2023     | PI-QRH.44.1            | December 15, 2017 |
| PI-QRH.41.15 | June 15, 2023     | PI-QRH.44.2            | December 15, 2017 |
| PI-QRH.41.16 | June 15, 2023     | PI-QRH.44.3            | December 15, 2017 |
| PI-QRH.41.17 | June 15, 2023     | PI-QRH.44.4            | December 15, 2017 |
| PI-QRH.41.18 | June 15, 2023     | PI-QRH.44.5            | December 15, 2017 |
| PI-QRH.41.19 | June 15, 2023     | PI-QRH.44.6            | December 15, 2017 |
| PI-QRH.41.20 | June 15, 2023     | PI-QRH.45.1            | June 15, 2023     |
| PI-QRH.41.21 | June 15, 2023     | PI-QRH.45.2            | December 15, 2020 |
| PI-QRH.41.22 | June 15, 2023     | PI-QRH.45.3            | December 15, 2017 |
| PI-QRH.41.23 | June 15, 2023     | PI-QRH.45.4            | December 15, 2020 |
| PI-QRH.41.24 | June 15, 2023     | PI-QRH.45.5            | December 15, 2017 |
| PI-QRH.41.25 | June 15, 2023     | PI-QRH.45.6            | December 15, 2020 |
| PI-QRH.41.26 | June 15, 2023     | <b>Maneuvers (tab)</b> |                   |
| PI-QRH.41.27 | June 15, 2023     | * Man.TOC.1-2          | June 15, 2025     |
| PI-QRH.41.28 | June 15, 2023     | MAN.05.1               | December 10, 2007 |
| PI-QRH.41.29 | June 15, 2023     | MAN.05.2               | June 16, 2008     |
| PI-QRH.41.30 | June 15, 2023     | MAN.1.1                | June 15, 2015     |
| PI-QRH.41.31 | June 15, 2023     | * MAN.1.2              | June 15, 2025     |
| PI-QRH.41.32 | June 15, 2023     | * MAN.1.3              | June 15, 2025     |
| PI-QRH.41.33 | June 15, 2023     | * MAN.1.4              | June 15, 2025     |
| PI-QRH.41.34 | June 15, 2023     | * MAN.1.5              | June 15, 2025     |
| PI-QRH.41.35 | June 15, 2023     | * MAN.1.6              | June 15, 2025     |
| PI-QRH.41.36 | June 15, 2023     | * MAN.1.7              | June 15, 2025     |
| PI-QRH.41.37 | June 15, 2023     | * MAN.1.8              | June 15, 2025     |
| PI-QRH.41.38 | June 15, 2023     | * MAN.1.9              | June 15, 2025     |
| PI-QRH.41.39 | June 15, 2023     | * MAN.1.10             | June 15, 2025     |
| PI-QRH.41.40 | June 15, 2023     | * MAN.1.11             | June 15, 2025     |
| PI-QRH.42.1  | December 15, 2017 | * MAN.1.12             | June 15, 2025     |
| PI-QRH.42.2  | December 15, 2017 | * MAN.1.13             | June 15, 2025     |
| PI-QRH.42.3  | December 15, 2017 | * MAN.1.14             | June 15, 2025     |
| PI-QRH.42.4  | December 15, 2017 | MAN.2.1                | December 15, 2016 |
| PI-QRH.42.5  | December 15, 2017 | MAN.2.2                | December 15, 2016 |
| PI-QRH.42.6  | December 15, 2017 | MAN.2.3                | December 15, 2016 |
| PI-QRH.42.7  | December 15, 2017 | MAN.2.4                | December 15, 2016 |
| PI-QRH.42.8  | December 15, 2017 | MAN.2.5                | December 15, 2016 |
| PI-QRH.42.9  | December 15, 2017 | MAN.2.6                | December 15, 2016 |
| PI-QRH.42.10 | December 15, 2017 | MAN.2.7                | December 15, 2016 |
| PI-QRH.42.11 | December 15, 2020 | MAN.2.8                | June 15, 2021     |
| PI-QRH.42.12 | December 15, 2020 |                        |                   |
| PI-QRH.43.1  | December 15, 2017 |                        |                   |
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777 Flight Crew Operations Manual

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|-------------------------------------------------------|-------------------|
| <b>Checklist Instructions (tab)</b>                   |                   |
| CI.TOC.1-2                                            | June 15, 2022     |
| <b>Model Identification</b>                           |                   |
| CI.ModID.1-2                                          | December 15, 2018 |
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| <b>Revision Highlights</b>                            |                   |
| * CI.RR.3                                             | June 15, 2025     |
| * CI.RR.4                                             | June 15, 2025     |
| <b>List of Effective Pages</b>                        |                   |
| * CI.LEP.1-10                                         | June 15, 2025     |
| <b>Checklist Instructions - Normal Checklists</b>     |                   |
| CI.1.1                                                | December 15, 2014 |
| CI.1.2                                                | December 15, 2021 |
| CI.1.3                                                | December 15, 2022 |
| CI.1.4                                                | June 16, 2008     |
| <b>Checklist Instructions - Non-Normal Checklists</b> |                   |
| CI.2.1                                                | December 15, 2021 |
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| CI.2.3                                                | December 15, 2023 |
| CI.2.4                                                | June 15, 2022     |
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| CI.2.6                                                | June 15, 2022     |
| CI.2.7                                                | June 15, 2022     |
| CI.2.8                                                | June 15, 2022     |
| CI.2.9                                                | June 15, 2023     |
| CI.2.10                                               | June 15, 2022     |
| CI.2.11                                               | June 15, 2022     |
| CI.2.12                                               | June 15, 2022     |
| <b>Fire Eng on Ground L, R</b>                        |                   |
| Back Cover.1                                          | June 15, 2021     |
| Back Cover.2                                          | June 15, 2023     |
| <b>Evacuation</b>                                     |                   |
| Back Cover.3                                          | December 15, 2021 |
| Back Cover.4                                          | December 15, 2021 |

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## Checklist Instructions

### Normal Checklists

## Chapter CI

### Section 1

### Introduction

This introduction gives guidelines for use of the printed version of the Normal Checklist (NC) as well as the Electronic Checklist (ECL).

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 a procedure was not completed:

- stop the checklist
- complete the procedure
- do the checklist from the start

Try to do checklists before or after high work load times. The flight 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."

---

## Electronic Checklist Operation

Operation with an electronic normal checklist is the same as with a printed normal checklist except that, there is no need to read aloud or visually confirm items that are complete (green). For the BEFORE TAKEOFF and LANDING checklists, the PM announces " \_\_\_\_ CHECKLIST COMPLETE," the PF visually confirms that the CHECKLIST COMPLETE indication is shown, and the PF announces "CHECKLIST COMPLETE."

Closed loop (sensed) checklist items change from white to green when the action is taken. The PM is responsible to check off any open loop (not sensed) item and to verify that all closed loop items are green. See Chapter 10, Flight Instruments, Displays, for a complete description of the electronic checklist system.

---

## Checklist Content

The checklist has the minimum items needed to operate the airplane safely.

Normal checklists have items that meet any of the following criteria:

- items essential to safety of flight that are not monitored by an alerting system, or
- items essential to safety of flight that are monitored by an alerting system but if not done, would likely result in a catastrophic event if the alerting system fails, or
- needed to meet regulatory requirements, or
- items needed to maintain fleet commonality between the 737, 747, 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, "FUEL CONTROL switches...CUTOFF" refers to the position of the switches.

Because normal checklists are done routinely, some checklist items are simplified to be more conversational such as "Autobrake...RTO" instead of "AUTOBRAKE selector...RTO".

---

## Electronic Checklist Malfunctions

### Single ECL malfunction

Malfunctions of the electronic checklist system are extremely rare. One possible malfunction is a closed-loop action item that does not turn green. In this case, confirm that the control position or system condition is correct as stated in the checklist step, then use the item override key (ITEM OVRD) to complete the step. Continue to use ECL.

### Multiple ECL malfunctions

If any other malfunction occurs in the ECL, or the ECL content is not correct, discontinue use of the ECL and use the backup checklist (QRH or equivalent) for the remainder of the flight. Use the EICAS alert messages, but disregard the checklist icons on the EICAS message list. Do not combine the use of ECL and QRH.

If the CHKL INCOMPLETE NORM or CHKL NON-NORMAL messages show, confirm that the appropriate checklist has been completed using the QRH or equivalent, then ignore the message.

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## Checklist Instructions

### Non-Normal Checklists

## Chapter CI

### Section 2

### Introduction

The non-normal checklists chapter contains checklists used by the flight crew to manage non-normal situations. The checklists are grouped in sections which match the system description chapters in Volume 2.

### Annunciated Checklists

Most checklists correspond to an EICAS alert message. The EICAS alert message indicates a non-normal condition, and is the cue to select and do the associated checklist.

### Unannunciated Checklists

Checklists without an EICAS alert message (such as Ditching) are called unannunciated checklists. Most unannunciated checklists are in the associated system section. For example, Fuel Leak is in section 12, Fuel. Unannunciated checklists with no associated system are in section 0, Miscellaneous.

### Icon Checklists

A rectangle icon [ ] precedes all EICAS alert messages that have procedural steps, notes, or other information of which the flight crew should be aware. The rectangle icon is removed from the EICAS alert message when the checklist has been completed. In the printed non-normal checklists, the titles also have the rectangle icon to agree with the EICAS alert message. EICAS alert messages without rectangle icons are informational, have no procedural steps or notes, or the action is obvious (such as OVERSPEED).

### Quick Action Index

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 AUTOBRAKE) are annunciated by an EICAS alert message or other indication. Checklist titles in upper and lower case (such as Window Damage L, R) are not annunciated.

---

## Airplane Effectivity Statement

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.

## Condition Statement

All checklists have condition statements. The condition statement briefly describes the situation that caused the EICAS alert message. Unannounced checklists also have condition statements to help in understanding the reason for the checklist.

## Objective Statement

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.

## Memory Items vs. Reference Items

Checklists can have both memory and reference items. Memory items are immediate actions that must be done before reading the rest of the checklist. These actions must be done from memory or from an approved, immediately accessible reference such as an Electronic Checklist (ECL) or Quick Reference Checklist (QRC), and need to be done prior to doing reference items. In the printed non-normal checklists, the last memory item is followed by a dashed horizontal line. In the electronic checklists, memory items are not identified. Reference items are actions to be done while reading the checklist.

## Additional Information Section

Some checklists have additional information at the end of the checklist. The additional information provides data the flight crew may wish to consider. The additional information does not need to be read.

---

## Electronic Checklist Operation

A non-normal menu is given for the electronic checklist.

The primary purposes of the non-normal menu are to access unannounced checklists and to access the condition statements for EICAS alert messages without rectangle icons.

The non-normal menu is also used to access checklists for EICAS alert messages with rectangle icons to allow review of the checklist. Operation of the electronic checklist is described in section 10; Flight Instruments, Displays.

Closed loop (sensed) checklist items change from white to green when the action is taken. The pilot monitoring must "check off" any open loop (not sensed) items and verify that all closed loop items are green.

## **Starting a Checklist without an Icon**

Non-normal checklists are typically accomplished based on an EICAS message showing with an icon. But in some cases, a checklist needs to be accomplished when there is no checklist icon. In these cases, the checklist must be opened from the ECL non-normal menu.

These are some cases when a checklist is started without an icon:

- Unannunciated checklist
- A non-normal condition can occur more than one time in a single flight. On the second occurrence, if the checklist is a latched checklist, the EICAS message shows again, but without an icon. The icon does not show because the checklist is latched in the complete state from the first time the message showed. If this occurs, open the checklist from the non-normal menu and restart the checklist by selecting the CHKL RESET key on the ECL screen. There is no indication on ECL of which checklists are latched.
- Checklist is opened only for review without the intent to accomplish it (see section Using CHKL OVRD)
- Checklist is opened accidentally (see section Using CHKL OVRD)

## **Using CHKL OVRD**

The flight crew can decide not to accomplish a checklist after it has been opened.

The three most common reasons for this are:

- The condition addressed by the checklist no longer exists and the checklist does not need to be accomplished
- The checklist was opened only for review without the intent to accomplish it
- The checklist was opened accidentally

If the flight crew decides not to do the checklist, select the CHKL OVRD key on the bottom of the checklist page before closing ECL and before selecting another checklist. This forces the checklist back to the inactive state. Otherwise, the checklist can remain active.

---

Using CHKL OVRD also removes the following items associated with the overridden checklist:

- Notes collected on the Notes page
- Inhibited checklists
- Deferred items added to the end of normal checklists

If the flight crew wants to pause the checklist and complete it later, do not use CHKL OVRD. In this case, the flight crew can close ECL or navigate to another checklist. The in-progress checklist stays active and continues to be available in the checklist queue or via the NON-NORMAL key. The CHKL NON-NORMAL advisory message may show on EICAS to remind the crew of the active checklist.

## Using CHKL RESET

If a checklist that is in progress needs to be restarted, select the CHKL RESET key on the bottom of the checklist page. This resets the checklist to the beginning and keeps it active.

## Using ITEM OVRD

A flight crew can decide not to accomplish an individual line item in an ECL checklist, either because an airplane system malfunction does not allow the line item to be completed or based on captain's discretion. When that line item is the current line item in ECL, select the ITEM OVRD key at the bottom of the ECL screen. The line item changes to cyan and the current line item box advances to the next incomplete line item. ECL treats the overridden line item as complete.

---

## 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. In the printed non-normal checklists, when special items are needed to configure the airplane for landing, the items are included in the Deferred Items section of the checklist. In the electronic checklists, deferred items are automatically added to the end of the applicable normal checklist. Flight patterns for some engine out situations are located in the Maneuvers chapter and show the sequence of configuration changes.

## Start a Checklist

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). 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.



## **Do Memory Items**

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.

## **Call for Checklist and Do Initial Actions**

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
- the airplane effectivity (if applicable) as needed to verify the correct checklist
- 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. With the electronic checklist, items that are complete (green) do not need to be read or verified. The item numbers do not need to be read.

## **Do Reference Items**

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. It is recommended that the flight crew read aloud all the choices in a "Choose one" step before taking action, to reduce the chance of error.

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.

## "Confirm" Step

The word "Confirm" is added to checklist items when both flight crewmembers must verbally agree before action is taken. During an inflight non-normal situation, verbal confirmation is required for:

- an autothrottle arm switch
- an engine thrust lever
- a fuel control switch
- an engine or APU fire switch, or a cargo fire arm switch
- a generator drive disconnect switch.

This does not apply to the Dual Eng Fail/Stall checklist.

Confirmation is not needed for completion of non-normal checklist items when on the ground.

There is no requirement for specific words to say during a confirm step or for physical actions such as touching or pointing to a control.

## Areas of Responsibility: Ground vs. In Flight

With the airplane stationary on the ground:

- the captain and the first officer take action based on preflight and postflight areas of responsibility.

With the airplane in flight or in motion on the ground:

- the pilot flying and the pilot monitoring take action based on each crewmember's area of responsibility.

After moving the control, the flight crewmember taking the action also states the checklist response.

## Inoperative Items

Checklists include an Inoperative Items table only when the condition of the items is needed for planning the rest of the flight and the condition is not shown on EICAS. The inoperative items, including the consequences (if any), are read aloud by the pilot monitoring. The pilot flying does not need to repeat this information but must acknowledge that the information was heard and understood.

---

## Consequential Alert Messages

Consequential EICAS alert messages can show as a result of a primary failure condition (such as AUTO SPEEDBRAKE as a result of HYD PRESS SYS C) or as a result of doing a non-normal checklist (such as PACK L or PACK R as a result of doing the Smoke, Fire or Fumes checklist). Consequential messages are shown for flight crew awareness, with the rectangle icons automatically removed. The flight crew does not do the checklists for consequential EICAS alert messages. In the printed primary checklist, the statement "Do not accomplish the following checklists:" is included to inform the flight crew of consequential checklists. In the electronic primary checklist, the statement "Inhibited checklists:" is included to inform the flight crew of consequential checklists. When doing the electronic primary checklist, the statement and the list of checklists do not need to be read. All consequential EICAS alert messages may not show while doing the primary checklist, depending on operational circumstances.

## Deferred Items

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. In the printed non-normal checklists, these items are included in the Deferred Items section of the checklist and can be delayed until the usual point during descent, approach or landing. In the electronic checklists, these items are automatically added to the end of the applicable normal checklist and can 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 flight crewmember taking the action also states the response.

The Deferred Items section of the printed non-normal checklist includes the Descent, Approach and Landing normal checklists if one or more of the following occur:

- an item is deferred
- a normal checklist response is changed as a result of the non-normal situation. (The changed response is printed in **bold** type)

Use these checklists instead of the usual DESCENT, APPROACH, and LANDING normal checklists. In the electronic checklists, when there are deferred items, the items are automatically added to the end of the usual DESCENT, APPROACH, or LANDING normal checklist. 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.

## Checklist Complete

In the printed non-normal checklists, each checklist has a checklist complete symbol at the end.

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 a checklist complete symbol. In the electronic checklists, each checklist has a "Checklist Complete" item at the end. There is only one checklist complete item.

After completion of each non-normal checklist, the pilot monitoring states "\_\_\_\_ CHECKLIST COMPLETE."

## Special Situations

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 perform several checklists or combine the elements of more than one checklist. Consider doing memory items first. In all situations, the captain assesses the situation and uses good judgment to determine the safest course of action.

## Troubleshooting

It should be noted that, in determining the safest course of action, troubleshooting (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.

---

## Land At Nearest Suitable Airport

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 (main engine generator, APU generator, or backup power system [both generators])
- any other situation determined by the flight crew to have a significant adverse effect on safety if the flight is continued.

## Immediate Landing

It must be stressed that for smoke that continues or a fire that cannot be positively confirmed to be completely extinguished, the earliest possible descent, landing, and evacuation must be done.

If a smoke, fire or fumes situation becomes uncontrollable, the flight crew should consider an immediate landing. Immediate landing implies immediate diversion to a runway. However, in a severe situation, the flight crew should consider an overweight landing, a tailwind landing, an off-airport landing, or a ditching.

## Engine Shutdown

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.

## Loss of Indications

There are no non-normal checklists for the loss of engine indications, or automatic display of the secondary engine indications. Automatic display of secondary engine parameters due to engine oil quantity or vibration is for flight crew awareness and does not require pilot action. Continue normal system or engine operation unless an EICAS alert message shows or a limit is exceeded.

## Assumptions

Non-normal checklists also assume:

- During engine start and before takeoff, the associated non-normal checklist is done if an EICAS alert message is shown or a non-normal situation is identified. After completion of the checklist, the Dispatch Deviations Guide (DDG) or operator equivalent is consulted to determine if Minimum Equipment List (MEL) dispatch relief is available.

- System controls are in the normal configuration for the phase of flight before the start of the non-normal checklist.
- Aural alerts are silenced and the system is reset by the flight crew as soon as the cause of the alert is recognized.
- The EICAS message list is canceled after all checklists are complete or on hold so that future messages are more noticeable.
- The EMERGENCY position of the oxygen regulator is used when needed to supply positive pressure in the masks and goggles to remove contaminants. The 100% position of the oxygen regulator is used when positive pressure is not needed, but contamination of the flight deck air exists. The Normal position of the oxygen regulator is used if prolonged use is needed and the situation allows. Normal boom microphone operation is restored when oxygen is no longer in use.
- Indicator lights are tested to verify suspected faults.
- In flight, reset of a tripped circuit breaker is not recommended. 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.
- When a non-normal checklist directs the flight crew to attempt only one reset of a switch per flight, a second reset of the switch should not be done until maintenance has cleared the malfunction. After the one reset attempt, the flight crew should select ITEM OVRD for any additional checklist steps directing the flight crew to attempt a reset of the same switch.

## Use of Captain's Discretion

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 Situation Guidelines Overview

This is a general overview of how non-normal situations should be conducted.

Consider maximum use of autoflight system to reduce workload, if available and appropriate. If flight directors are selected on, ensure the proper flight director modes are selected.

| Pilot Flying                                                                                                | Pilot Monitoring                                                                                                                                           |
|-------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Recognizes and announces the non-normal situation. Other pilot acknowledges.                                |                                                                                                                                                            |
| <b>MAINTAIN AIRPLANE CONTROL</b><br>Ensure that the flight path is under control.                           | Monitor the flight path.                                                                                                                                   |
|                                                                                                             | <b>ANALYZE THE SITUATION</b><br>Review all EICAS alert messages to identify the non-normal situation.<br>Prioritize alerts and recommend course of action. |
| Acknowledges and confirms the Pilot Monitoring's identification or recommendation.                          |                                                                                                                                                            |
| <b>TAKE THE PROPER ACTION</b><br>Do the NNC memory items based on each crewmember's area of responsibility. |                                                                                                                                                            |
| Call for the appropriate NNC.                                                                               |                                                                                                                                                            |
|                                                                                                             | Completes the NNC.                                                                                                                                         |
| Review all EICAS alert messages, and do other NNCs as needed.                                               |                                                                                                                                                            |
| <b>EVALUATE THE NEED TO LAND</b><br>Review options for diversion or continued flight.                       |                                                                                                                                                            |

---

## 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



The decision symbol is used to identify possible choices.

### Precaution Symbol



The precaution symbol is used to identify information the flight crew must consider before taking the action.

### Checklist Complete Symbol



The checklist complete symbol indicates that the checklist is complete.





**Fire Eng on Ground L, R Checklist is  
on the reverse side of this page.**



**Fire Eng on Ground L, R**

Condition: One or more of these occur on the ground:

- Fire is observed in the affected engine
- Fire is detected in the affected engine

- 1 Thrust levers (both) . . . . . Idle

C
- 2 PARKING BRAKE . . . . . Set

C
- 3 Advise the cabin.

C or F/O
- 4 FUEL CONTROL switch  
(affected side) . . . . . CUTOFF

C
- 5 Engine fire switch  
(affected side) . . . . . Pull

F/O
- 6 Engine fire switch  
(affected side) . . . . . Rotate to the stop  
and hold for 1 second

F/O
- 7 Choose one:

◆Evacuation is **needed**:

▶▶Go to the Evacuation checklist on  
page Back Cover.4

■ ■ ■ ■

◆Evacuation is **not** needed:

▶▶Go to step 8
- 8 Advise the cabin.

C
- 9 Advise ATC.

F/O
- ■ ■ ■



**Evacuation Checklist is on the  
reverse side of this page.**



Evacuation

Condition: An evacuation is needed.

- 1 PARKING BRAKE. . . . . Set C
  - 2 OUTFLOW VALVE switches  
(both) . . . . . MAN F/O
  - 3 OUTFLOW VALVE MANUAL  
switches (both) . . . . . Hold in OPEN  
until the outflow  
valve indications show fully  
open to depressurize the airplane F/O
  - 4 FUEL CONTROL switches  
(both) . . . . . CUTOFF C
  - 5 Advise the cabin to evacuate. C
  - 6 Advise ATC. F/O
  - 7 Engine fire switches (both) . . . . . Pull F/O
  - 8 APU fire switch . . . . . Override and pull F/O
  - 9 **If** an engine or APU fire is **observed or indicated**:  
Related fire  
switch . . . . . Rotate to the stop  
and hold for 1 second F/O
- ■ ■ ■