OPERATIONS MANUAL
FLT CREW TRAINING

PROJECT OPENSKY
CRJ

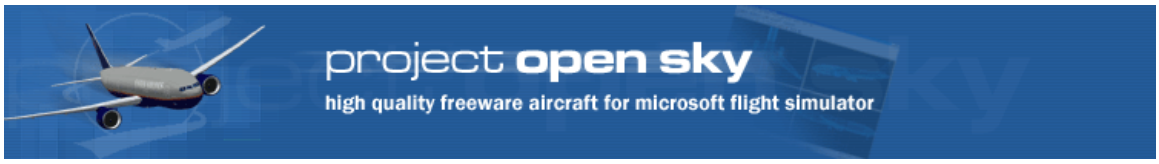
TAXI, TAKEOFF, CLIMB, CRUISE, DESCENT & LANDING

Photo by Bob Jones

By Warren C. Daniel
Project Opensky
Flight Dynamics Designer

www.project-opensky.com

ETOPS773@aol.com



Disclaimer

This manual is not provided from, endorsed by, or affiliated with Bombardier Aerospace, British Airways, Air France, Delta Connection – Comair, Frontier Airliners, or any other airline in any way.

Any exact similarities between this manual and Project Opensky aircraft to actually aircraft, procedures, or airline carriers are strictly coincidental.

All copyrights remain the property of their respective owners.

The procedures contained within are this author's interpretation of generic flight operations. These procedures are not always accurate in all situations.

All diagrams have been recreated to mimic actual procedures or scenarios, however, are not taken from actual materials whatsoever.

This manual is not intended for real world flight.

Project Opensky aircraft are intended as a freeware add-on for Microsoft Flight Simulator 2002.

Photo by Bob Jones

Scheme by Jaco Du Preeze

Project Opensky
Bombardier Canadair Regional Jet -- CRJ-Series
Version 2002.1.5

Model Designers
Mitsushi Yutaka

Flight Dynamics Designer
Warren C. Daniel

Master Textures
Thomas Stillner

Technical Resource
Nick Peterson
Simon Ng

Many thanks to Melanie and Andrew for their feedback and experience. Flight model based on the most realistic data possible and actual pilot experiences on the CRJ.

PREFACE

This manual serves as a reference for operating procedures and training maneuvers. The flight profiles show the basic recommended configuration during flight.

The maneuvers should normally be accomplished as illustrated. However, due to airport traffic, ATC distance separation requirements, and radar vectoring, modifications may be necessary.

Exercise good judgment.

Photo and paint by Bob Jones

PRINCIPLE DIMENSION AND AREAS

Bombardier CRJ – Aircraft Reference Manual

Flight Simulator 2002 Professional Edition

Bombardier CRJ-100/200 - ER/LR - Specs

Dimensions:
Span 69 ft 7 in
Length 87 ft 10 in
Height 20 ft 5in

Engines:
200ER/LR:
GE CF34-3B1 x 2
TO Thrust Rating: 9,220 lb

100ER/LR:
GE CF34-3A x 2
TO Thrust Rating: 8,729 lb

Weight and Capacities
MaxTOW: 51,000 lb
ZFW: 44,000 lb (ER), 39,000 lb (LR)
Max Fuel Cap.: 14,305 lb
Passengers: 50
Crew: 2+1
Total Baggage Volume: 473 cu ft

Performance
Typical Cruise Speed:
M.74 - Normal Cruise
M.81 - High Speed Cruise

Range: 1,645 nm (ER), 2,005 nm (LR)
Fuel flow: 1540pph @ cruise FL240

TAXI

1) The nose wheel steering and the engine thrust are used to taxi the airplane.

2) Make sure you have the necessary clearance when you go near a parked airplane or other structures.

3) When the APU in the taxi airplane or the parked airplane is on you must have a minimum clearance of 50 feet between the APU exhaust port and the adjacent airplane's wingtip (fuel vent).

4) The CRJ has enough power to coast on its own power, with 0% idle. Apply 10 – 20% N1 to roll the aircraft, then pull thrust back to idle. On 2-engine taxi, pilot must ride the brakes as the plane will continue to accelerate. One-engined taxi is recommended.

5) The taxi speed must not be more than approximately 30 knots. Speeds more than 30 knots added to long taxi distances would cause heat to collect in the tires. Recommended speed is 20 knots. Beware of changing GS numbers due to tailwinds during taxi.

6) Before making a turn, decrease the speed of the airplane to a speed of approximately 8 to 12 knots. Make all turns at a slow taxi speed to prevent tire skids.

7) Do not try to turn the airplane until it has started to move.

8) Make sure you know the taxi turning radius.

9) Monitor the wingtips and the horizontal stabilizer carefully for clearance with buildings, equipment, and other airplanes.

10) When a left or right engine is used to help make a turn, use only the minimum power possible.

11) Do not let the airplane stop during a turn.

12) Do not use the brakes to help during a turn. When you use the brakes during a turn, they will cause the main and nose landing gear tires to wear.

13) When it is possible, complete the taxi in a straight-line roll for a minimum of 10 feet.
NOTE: This will remove the torsional stresses in the landing gear components, and in the tires.

14) Use the Inertial Reference System (IRS) in the ground speed (GS) mode to monitor the taxi speed.

15) If the airplane taxi speed is too fast (with the engines at idle), operate the brakes slowly and smoothly for a short time. NOTE: This will decrease the taxi speed.

16) If the taxi speed increases again, operate the brakes as you did in the step before.

17) Always use the largest radius possible when you turn the airplane. NOTE: This will decrease the side loads on the landing gear, and the tire wear will be decreased.

18) Extra care must be given to turn the aircraft due to the fuselage length and wingspan. A minimum distance from the edge of the pavement must be maintained to reverse the aircraft's direction.

19) Operate the brakes to stop the airplane.

20) Set the parking brake after the airplane has stopped.

TAKEOFF

1) Restart 2nd engine if on single-engine taxi.

2) Align aircraft with runway centerline.

3) Increase power to approximately 50% N1 for 5 – 10 seconds.

4) Watch EICAS indicator for engine problems or aircraft alarms.

5) Increase power smoothly to pre-determined N1 speeds based on aircraft takeoff weight, (85% - 105% N1). This can either be done manually or using the autothrottle with the autopilot engaged.

6) At Vr, rotate aircraft 10 degrees upwards. (See Appendix A for speed reference cards.)

7) Hold nose at +10 degrees until positive rate of climb is confirmed, then raise landing gear after V2.

8) Set initial climbout speed to V2+10-20 KTS.

9) Maintain +2000 fpm climb to 2000 FT @ 200 knots. Climb at 250 knots +2500 fpm after 2000 FT to 10,000 FT.

10) At 2000 FT, begin slat retraction. Maximum slat speed limits @ Maximum Gross Weight of 53,000 lbs are:

Slat Position	Max Speed
0	191
8	179
20	173
30	169
45	161

11) Increase speed to 200 knots and in accordance with ATC instructions (max 250 KTS below 10,000 FT).

12) For full maneuverability beneath 10,000 FT, slats must be fully retracted with aircraft at minimum safe airspeed.

CLIMB

1) Once climb thrust or airspeed is set, the autopilot will compensate for environmental condition changes automatically during the climb.

2) It is recommended that the aircraft be flown manually up to 15,000 FT, weather and ATC traffic conditions permitting. However, in high traffic conditions, to easy the workload of the pilot, the autopilot MCP altitude intervention may be engaged above a minimum altitude of 80 FT with the landing gear up.

3) Climb settings use a 10 – 20% derate of thrust up to 10,000 FT, then increases linearly to max thrust at 30,000 FT.

4) For **enroute climb**, climb at a rate of 2500 FPM, pursuant to ATC and traffic conditions. If there is no altitude or airspeed restrictions, accelerate to the recommended speed. The sooner the aircraft can be accelerated to the proper climb speed, the more fuel and time efficient the flight.

5) As **engine and wing icing** may occur during the climb and descent, the engine anti-icing system should be in the AUTO or ON position whenever icing is possible. NOTE: Failure to do so may result in engine stall, overheating, or engine damage.

6) **For normal economy climb**, follow ATC speed restrictions of 250 KTS below 10,000 FT. If permitted by ATC and no speed restriction below 10,000 FT, increase speed to 290 KTS. Above 10,000 FT, climb at 290 KTS or .74 MACH. Climb speed table is as follows:

ALTITUDE	**SPEED**
Sea Level to 10,000 FT	250 KTS
Above 10,000 FT	290 KTS/.74 MACH

7) **Max climb speed** is 290 knots until reaching .74 MACH at initial cruise altitude.

8) **For engine out climb**, speed and performance various with gross weight and altitude, however 250 knots at 1000 – 1500 FPM may be used.

9) Set **standard barometer** above airport transition level (depends on local airport geography).

10) **Standard climb profile** is as follows:

- 2500 fpm: below 10,000 FT
- 1500 fpm: FL100 - FL150
- 1000 fpm: FL150 - FL200
- 500 fpm: above FL200

CRUISE

1) **Cruise** at .74 MACH. Alternative cruise: .77 MACH.

2) **Hi-speed** cruise at .81 @ fuel burn penalty.

3) **Typical cruise altitude** 20,000s FLs.

4) **Fuel burn is** 1540 pph per engine at FL240.

5) **Headwinds** will increase engine power, reduce cruise speed and decrease range.

6) **Tailwinds** will decrease engine power, increase cruise speed and increase range.

7) Follow previously entered FMC waypoints.

8) **Fuel Freeze --** Extended operation at cruise altitude will lower fuel temperature. Fuel cools at a rate of 3 degrees C per hour, with a max of 12 degrees C in extreme conditions. Fuel temperatures tend to follow TAT (total air temperature). To raise fuel temperature/TAT, a combination of factors can be employed:

   - Descend into warmer air.
   - Deviate to warmer air.
   - Increase Mach speed.

   An increase of 0.01 MACH will increase TAT by 0.5 – 0.7 degrees C.

9) **Increased fuel burn** can result from:
   - High TAT
   - Lower cruiser altitude than originally planned.
   - More than 2,000 FT above the optimum calculated altitude.
   - Speed faster or slower than .84 MACH cruise.
   - Strong headwind.
   - Unbalanced fuel.
   - Improper aircraft trim.

10) **Fuel penalties** are:

   - 2000 FT above optimum – 3 percent increase in fuel usage
   - 4000 FT below optimum – 5 percent increase in fuel usage
   - 8000 FT below optimum –12 percent increase in fuel usage
   - M.01 above M.74 – 3 percent increase in fuel usage
   - High speed cruise of M.81 – 19% increased fuel usage

11) In the case of **engine out cruise**, it may be necessary to descend.

12) Trim aircraft for proper elevator alignment.

13) In case of engine out cruise, trim rudder for directional alignment.

14) Deviate from flight plan for weather, turbulence, or traffic as necessary after receiving clearance from ATC.

DESCENT

1) Descend at pre-determined TOD (Top of Decent)

2) Descend at 320 KT above 10,000 FT.

3) Use speedbrakes or thrust to minimize vertical path error.

4) Proper descent planning is necessary to ensure proper speed and altitude at the arrival point. Distance required for descent is 3NM/1000FT. Descent rates are as follows:

Intended Speed	**Decent Rate**	
	CLEAN	WITH SPEEDBRAKES
.74 MACH/310 KTS	2300 FPM	5500 FPM
250 KTS	1400 FPM	3600 FPM
VREF 30 + 80 KTS	1100 FPM	2200 FPM

5) Plan to descend so that aircraft is at approximately 10,000 FT above ground level, 250 KTS, 30 miles from airport.

6) Using speedbrakes will reduce the times and distances by half.

7) Arm speedbrakes and autobraking to position 1 on initial descent.

8) Set airport altimeter below transition level.

9) Avoid using the landing gear for drag above 180-200 KTS to avoid damage to doors or passenger discomfort.

10) **Recommended approach planning**, ATC and airport rules permitting:

- 210 KTS below 10,000 FT, 30 miles from airport.
- 180-190 KTS, 23 miles from airport.
- 170 KTS, 16 – 17 miles from airport.
- VREF, 5 – 7 miles from airport.

11) **In case of rapid descend due to depressurization**, bring aircraft down to a safe altitude as smoothly as possible. Using the autopilot is recommended. Check for structural damage. Avoid high load maneuvering.

12) **Stall recovery** can be accomplished by lowering the aircraft's nose and increasing power at once to gain airspeed. Beware of terrain. Accelerate to VREF 30 + 80 KTS. Do not retract gear until confirmed stall recovery and positive rate of climb. Keep nose at 5 degrees above the horizon or less.

13) If deployed, do not retract slats during the recovery, as it will result in altitude loss.

14) In the event of engine out approach, approach at VREF+5 @ flaps 30.

15) Under normal conditions **land at VREF @ flaps 45.** (For Appendix A for reference cards.)

16) The Project Opensky CRJ is a CATII aircraft, meaning the aircraft is capable of landing on autopilot in conditions where visibility is down to 50ft AGL.

17) **ILS Approach** - During initial maneuvering for the approach, extend flaps to 8 and slow to 180-200kts. When the localizer is alive, extend flaps to 20 and slow to 170kts. At one dot below glideslope intercept, extend the landing gear and flaps to 30. Begin slowing to final approach speed. At the final approach fix, extend flaps to 30 and slow to Vref + 5. Be stabilized by 1000 feet above field level. This means, gear down, flaps 45, Vref +5 and engines spooled. Plan to cross the runway threshold at Vref.

18) **Visual Approach** - Similar to the ILS approach. The major difference is that aircraft must be stabilized by 500 feet above field level, as opposed to 1000 feet.

19) Land the aircraft. At average gross weights, at full flaps @ VREF, the CRJ will have a –3 nose down pitch. When landing the aircraft, flare to +1 degree nose up.

20) Disengage (autopilot autothrottle will disengage) reverse thrust at 80 knots.

21) Disengage autobraking at 60 knots or as necessary.

22) Turn off onto high-speed taxiways at 30 knots or less.

23) Decelerate to 8 – 12 knots for 90 degree turns.

24) Taxi to gate.

Photo by Gary Hayes

Project Opensky Bombardier CRJ – Frequently Asked Questions

Q) I added a new panel and can't see the wings. What happened?

A) Add the following lines to the panel.cfg file:

```
[VCockpit01]
size_mm=256,256
pixel_size=256,256
texture=$panel1
background_colour=0,0,0
visible=0

gauge00=Lear_45!PFD, -15, -13, 295, 320

[VCockpit02]
size_mm=256,256
pixel_size=256,256
texture=$panel2
background_colour=0,0,0
visible=0

gauge00=boeing747-400!Multi-Function Display, -0, 20, 250, 190

[VCockpit03]
size_mm=256,256
pixel_size=256,256
texture=$panel3
background_colour=0,0,0
visible=0

gauge00=Lear_45!EICAS, -15, -13, 295, 320

[VCockpit04]
size_mm=128,256
pixel_size=128,256
texture=$panel4
background_colour=0,0,0
visible=0

gauge00=Lear_45!Backup Attitude, -4, -3, 135, 128
gauge01=Lear_45!Backup Altimeter, 0, 132, 128, 125
```

Q) When I taxi down the runway, the plane keeps accelerating. Is that normal?

A) Yes. The CRJ zips along fine at 0% throttle. Either keep riding the brakes, or taxi on 1 engine.

Q) The CRJ comes in for a landing with the nose pointed down. And I doing something wrong?

A) No, it's common to see them approach that way. Go to any airport or check them out on airliners.net. Just try not to land on the nose gear.

Best Panel (Our VC)!!!!:

Best 2-D Freeware Panel:

Finally, we have our own panels!!!

Avsim.com
(search for Dave Durst)

Best all around panel with excellent
Or download from his page at:

http://www.fspanels.com/

Look under Biz Jets and CRJ

Notes from our CRJ Pilot friends

Typically, pilots are very happy with the CRJ. They rave about the technology. “The CRJ has a fair amount of idle thrust. We taxi single-engine easily and if you two-engine taxi, you'll be riding the brakes. The engines spool from idle to takeoff power in about 3 seconds and it's fairly powerful at that setting.”

“At about 20000ft, it really starts to drop off. It's underpowered up high because the engines have been de-rated slightly to prolong engine life. About about 24-25000ft, we normally can only do 500fpm climb in the summer when full. A little better than that in winter or empty.” The plane typically is underpowered over 20,000 ft, but has no problems reaching M.74 or M.77 at altitude. Most trips are made in the mid- to upper-20,000 range.

Pilots say the hardest thing, is getting a good landing out of the CRJ because during the landing, the nose is so low. They say “It's not hard to get a good landing out of it, it's hard to get a bad landing out of it, and it's REAL hard to get a REAL GOOD landing out of it.”

--Many thanks to Melanie and Andrew for their help and knowledge. Please send general comments to the forum at: www.projectopensky.com.

Remember that Project Opensky creates these aircraft for free, because we enjoy it. Do not bog us down with ignorant or unnecessary comments or criticism. If you feel you can do better, by all means, please do so, so that we may all benefit from everyone’s hard work.

APPENDIX A

Speed reference cards

<Note:> These speed cards are simplified and do not take into account SL or temp changes. Not to be used for real-world navigation.

Project Opensky Canadiar Regional Jet 39,000 LBS					
Takeoff					
Flaps 8°			Flaps 20°		
Vr	122		Vr	115	
V2	136		V2	126	
Vfto	161				
Landing					
Flaps	0°	8°	20°	30°	45°
Maneuvering	168	156	151	146	138
Vref	158	146	141	136	128

Project Opensky Canadiar Regional Jet 40,000 LBS					
Takeoff					
Flaps 8°			Flaps 20°		
Vr	124		Vr	117	
V2	138		V2	127	
Vfto	163				
Landing					
Flaps	0°	8°	20°	30°	45°
Maneuvering	170	158	153	148	140
Vref	160	148	143	138	130

Project Opensky

Canadiar Regional Jet

41,000 LBS

Takeoff					
Flaps 8°			Flaps 20°		
Vr	127		Vr	119	
V2	140		V2	129	
Vfto	166				

Landing					
Flaps	0°	8°	20°	30°	45°
Maneuvering	172	160	155	150	142
Vref	162	150	145	140	132

Project Opensky

Canadiar Regional Jet

42,000 LBS

Takeoff					
Flaps 8°			Flaps 20°		
Vr	129		Vr	121	
V2	141		V2	130	
Vfto	168				

Landing					
Flaps	0°	8°	20°	30°	45°
Maneuvering	173	161	155	151	143
Vref	163	151	145	141	133

Project Opensky Canadiar Regional Jet 45,000 LBS						
Takeoff						
Flaps 8°			Flaps 20°			
Vr	135		Vr	126		
V2	146		V2	135		
Vfto	173					
Landing						
Flaps	0°	8°	20°	30°	45°	
Maneuvering	178	166	160	156	148	
Vref	168	156	150	146	138	

Project Opensky Canadiar Regional Jet 51,000 LBS						
Takeoff						
Flaps 8°			Flaps 20°			
Vr	146		Vr	137		
V2	155		V2	148		
Vfto	185					
Landing						
Flaps	0°	8°	20°	30°	45°	
Maneuvering	188	176	170	166	158	
Vref	178	166	160	156	148	

APPENDIX B

CRJ Checklist

<Note:> Not to be used for real-world navigation.

BEFORE ENGINE START:

PARKING BRAKE.....SET
ENSURE BRAKES ARE SET

FUEL QUANTITY/BALANCE.....CHECKED
CHECK THAT FUEL MEETS AMOUNT REQUIRED FOR FLIGHT AND IS BALANCED PROPERLY

CABIN SIGNS.....SET
SEATBELT SIGN AND NO SMOKING SIGNS ON

FLIGHT INSTRUMENTS/BUGS.....SET
CHECK FOR PROPER ALTIMETER SETTING, NO FAILURE FLAGS AND AIRSPEED BUGGED FOR PROPER TAKEOFF V-SPEEDS. ALTITUDE ALERT SET FOR DEPARTURE CLEARANCE

NAV RADIOS/FMS.....SET
RADIOS ARE SET UP FOR DEPARTURE ROUTE AND PROPER FLIGHT PLAN/DEPARTURE ENTERED INTO FMS

BLEEDS/AIRCONDITIONING.....SET
ENGINE/APU BLEEDS OPEN AND AIR COND. PACKS SHUT OFF FOR ENGINE START

EXTERIOR LIGHTS.....SET
NAV LIGHTS ON, BEACON LIGHTS ON

AFTER START:

PITOT HEAT.....ON
PITOT HEAT CHECKED ON

WINDOW HEAT.....ON
WINDOW HEAT CHECKED ON

ANTI-ICE.....AS REQD
SELECT ENGINE ON IF ICING CONDITIONS EXIST

BLEEDS/AIRCONDITIONING.....SET
ENGINE BLEEDS OPEN, APU BLEED CLOSE
AIRCONDITIONING PACKS ON AND ON ENGINE BLEEDS

ELECTICAL PANEL.....SET
ELECTRICAL PANEL SET TO GENERATORS

APU.....OFF
AFTER 2 MINUTE COOL DOWN PERIOD
SELECT APU OFF

TAXI:

BRAKES.....CHECKED
SOFTLY TEST BRAKES

FLAPS/SLATS.....SET
ENSURE FLAPS AND SLATS ARE SET AT PROPER TAKEOFF SETTING

FLIGHT CONTROLS.....CHECKED
COMPLETE FULL LEFT/RIGHT AILERON CHECK, FULL TRAVEL ELEVATOR CHECK AND FULL LEFT/RIGHT RUDDER DEFLECTION

TAKEOFF BRIEFING.....COMPLETE
BRIEF ON FOLLOWING ITEMS:
TAKEOFF TYPE- ROLLING OR STATIC
TAKEOFF RUNWAY
ABORT CONSIDERATIONS
AIRBORNE EMERGENCY CONSIDERATIONS AND RETURN TO FIELD CONSIDERATIONS
V-SPEEDS
DEPARTURE PROCEDURE/ROUTE
NAV RADIOS AND TRANSPONDER CODE
ALTITUDE LIMIT
ANTI-ICE AND WEATHER FACTORS

BEFORE TAKEOFF:

CABIN CREW.....NOTIFIED
ON CYCLE OF NO SMOKING SIGN(2 CHIMES)

TRANSPONDER.....ON
ENSURE TRANSPONDER IS ON AND PROPER CODE IS SET

BLEEDS/AIRCONDITIONING.....SET
SELECT AIR CONDITIONING PACKS TO PROPER SETTING BASED ON TAKEOFF PERFORMANCE

EXTERIOR LIGHTS.....ON
LANDING LIGHTS AND STROBE LIGHTS ON

PARKING BRAKE.....OFF
ENSURE PARKING BRAKE IS RELEASED

AFTER TAKEOFF:

LANDING GEAR.....UP/LTS OUT
ENSURE LANDING GEAR IS RETRACTED AND IN TRANSIT LIGHTS ARE OUT

CLIMB POWER.....SET
SET CLIMB POWER

FLAPS/SLATS.....UP
AFTER MINIMUM SPEEDS, ENSURE FLAPS AND SLATS ARE RETRACTED

BLEEDS/AIRCONDITIONING.....SET
ENSURE AIRCONDITIONING PACKS ARE ON

ANTI-ICE.....AS REQD
ENSURE ENGINE AND WING ANTI-ICE ON IF ICING CONDITIONS ARE PRESENT

ABOVE 10,000FT:

STERILE COCKPIT.....CHIME
ONE CHIME OF NO SMOKING SIGN

LANDING LIGHTS.....OFF

ABOVE 18,000FT:

ALTIMETERS.....RESET
RESET ALTIMETERS TO 29.92

CRUISE:

CRUISE POWER.....SET
SET POWER TO CRUISE SETTING

CABIN SIGNS.....AS REQD
SEATBELT SIGN AT CAPTAINS DISCRETION

BELOW 18,000FT:

ALTIMETERS.....RESET
RESET ALTIMETERS TO LANDING FIELD ALTIMETER SETTING

DESCENT:

CABIN SIGNS.....ON
SEATBELT AND NO SMOKING SIGNS ON

ANTI-ICE.....AS REQD
SELECT ENGINE AND WING ANTI-ICE ON
IF ICING CONDITIONS ARE PRESENT OR
WILL BE ENCOUNTERED

FLIGHT INSTRUMENTS/BUGS.....SET
SET AIRSPEED BUG TO LANDING VREF
CHECK ALTIMETERS ARE SET TO LANDING
ATIMETER SETTING

NAV RADIOS/FMS.....SET
SET RADIOS FOR LANDING RUNWAY OR
APPROACH. SET ARRIVAL PROCEDURE AND
APPROACH IN FMS

APPROACH BRIEFING.....COMPLETE
APPROACH BRIEFING SHOULD INCLUDE:
APPROACH TYPE AND LANDING RUNWAY
FREQUENCIES
FINAL APPROACH COURSE
MINIMUM ALTITUDES
VREF SPEEDS
MISSED APPROACH PROCEDURES
ANY SPECIAL CONSIDERATIONS-ICE/WET
RUNWAY ETC...

BELOW 10,000FT:

STERILE COCKPIT.....CHIME
ONE CHIME OF NO SMOKING SIGN

BEFORE LANDING:

CABIN CREW.....NOTIFY
ONE CYCLE OF NO SMOKING SIGN(2 CHIMES)

LANDING GEAR.....DOWN/GREEN
CHECK LANDING GEAR IS EXTENDED AND ALL GREEN LIGHTS ARE ILLUMINATED WITH NO RED/UNSAFE LIGHTS SHOWING

FLAPS/SLATS.....SET
CHECK LANDING FLAPS ARE SET IN FINAL LANDING CONFIGURATION

SPEEDBRAKES.....ARM
ENSURE SPEEDBRAKES ARE ARMED FOR AUTODEPLOY

AUTOBRAKES.....SET
IF NEEDED, SET AUTOBRAKES TO PROPER SETTING FOR RUNWAY CONDITION/LENGTH

AFTER LANDING:

EXTERIOR LIGHTS.....SET
LANDING LIGHTS, WING AND STROBE LIGHTS OFF

PITOT HEAT.....OFF

WINDOW HEAT.....OFF

ANTI-ICE.....AS REQD
WING HEAT OFF, ENGINE ANTI-ICE ON IF ICING CONDITIONS ARE PRESENT

FLAPS.....UP
RETRACT FLAPS/SLATS

SPEEDBRAKES.....RETRACTED
RETRACT AND STOW SPEEDBRAKES

TRANSPONDER.....STBY
PLACE TRANSPONDER TO STANDBY

APU.....START
START APU FOR GROUND USE

BLEEDS/AIRCONDITIONING.....SET
BLEEDS AND PACKS CONFIGURED FOR GROUND USE

PARKING/SHUTDOWN:

PARKING BRAKE.....SET
SET PARKING BRAKES

ELECTRICAL PANEL.....SET
SET ELECTRICAL PANEL TO APU OR GROUND POWER

BLEEDS/AIRCONDITIONING.....SET
SET PACKS TO APU/EXTERNAL AIR AND CLOSE ENGINE BLEEDS

ANTI-ICE.....OFF
CLOSE ENGINE ANTI-ICE VALVES

START LEVERS.....CUTOFF
PLACE ALL START LEVERS TO CUTOFF AND WATCH FOR INDICATIONS OF ENGINE SHUTDOWN

CABIN SIGNS.....SET
SEAT BELT SIGN OFF

EXTERIOR LIGHTS.....SET
BEACON AND TAXI LIGHTS OFF, NAV LIGHTS ON

BLEEDS/AIRCONDITONING