

RECEIVING / SAFETY CHECK

PARKING BRAKE.....SET
HYDRAULIC PUMPS.....OFF
BATTERIES.....AUTO
AVIONICS MASTER.....ON
FUEL PUMPS.....CHKD / ON
ICE PROTECTION.....CHKD / SET
START / STOP SELECTORS.....STOP
CABIN SIGNS.....SET
APU.....START
AUTOPILOT / FGC.....CHKD / SET
DISPLAY CONTROL PANEL.....SET
RMU / FMS (GPS).....SET FOR DEP
FUEL QUANTITY.....CHKD / RESET
PITCH TRIM.....CHKD / SET
STANDBY ATTITUDE IND.....UNCAGED
ALTIMETERS.....SET / X-CHKD

BEFORE START / PUSHBACK

CABIN SIGNS.....ON
ROTATING BEACON.....ON
GPU.....DISCONNECT
DOORS / WINDOWS.....CHKD / CLSD
FUEL QUANTITY.....SET / CHKD
NOSEWHEEL STEERING.....DISENGAGED

AFTER START

HYDRAULIC PUMPS.....AUTO
GENERATORS.....CHKD / ON

TAXI

FLIGHT CONTROLS.....CHKD / FREE
TRIMS.....THREE SET
FLAPS.....SET 9°
SPEED BRAKE.....CLOSED
FLIGHT DIRECTOR / FGC.....TOGA / SET
INSTRUMENTS / MFD PAGES.....CHKD / SET
TAKEOFF DATA / SPEEDS.....CHKD / SET
CROSSFEED.....CLOSED
TAKEOFF BRIEF.....COMPLETE

BEFORE TAKEOFF

FLIGHT ATTENDANT.....NOTIFIED
EXTERIOR LIGHTS.....ON
FUEL QUANTITY.....BALANCED
BRAKE TEMPS.....CHKD
EICAS.....CHKD
TAKEOFF CONFIG.....PUSH / OK

AFTER TAKEOFF

LANDING GEAR.....UP
FLAPS.....UP
THRUST RATING.....CLIMB
APU.....AS REQUIRED
LDG LTS / FA.....OFF THRU 10K / NOTIFIED

CRUISE

THRUST RATING.....CRUISE
CABIN SIGNS.....AS REQUIRED

IN RANGE

CABIN SIGNS / LDG LIGHTS.....ON
ALTIMETERS.....SET / X-CHKD
LANDING DATA / SPEEDS.....CHKD / SET
APPROACH BRIEF.....COMPLETE

APPROACH

RADIO MGT UNIT.....SET FOR APPR
INBOUND APPR COURSE.....SET
SPEED BRAKE.....CLOSED
CROSSFEED.....CLOSED

LANDING

FLIGHT ATTENDANT.....NOTIFIED
LANDING GEAR.....DOWN / 3 GREEN
FLAPS.....SET
THRUST RATING.....TAKEOFF
AUTOPILOT / YAW DMPR.....OFF BY 200AGL

AFTER LANDING

FLAPS.....UP
TRIMS.....RESET
TAXI LIGHTS.....ON
EXTERIOR LIGHTS.....OFF
APU.....AS REQUIRED

SHUTDOWN

PARKING BRAKE.....SET
THRUST LEVERS.....IDLE
HYDRAULIC PUMPS.....OFF
NOSEWHEEL STEERING.....DISENGAGED
START / STOP SELECTORS.....STOP
ROTATING BEACON.....OFF
CABIN SIGNS.....AS REQUIRED

TERMINATING

STANDBY ATTITUDE IND.....CAGED
FUEL PUMPS.....OFF
GPU.....CONNECTED
APU.....OFF
AVIONICS MSTR / BATTERIES.....OFF

AVERAGE FUEL CONSUMPTIONS

TAKEOFF	6000 PPH
CLIMB	3500 PPH
CRUISE	3000 PPH
TAXI FUEL	500 LBS
HOLD / RESERVE FUEL	1000 LBS

TAKEOFF V SPEEDS CHART – FLAPS 9°

FLAPS 9, T/O-1, NORMAL V2

Press Alt	OAT C	OAT C	OAT C
1000'	-54 TO +43	+44 TO +52	
1001'-3000'	-54 TO +38	+39 TO +44	
3001'-5000'	-54 TO +23	+24 TO +32	+33 TO +41
5001'-7000'		-54 TO +18	+19 TO +38
>7000'		-54 TO +16	+17 TO +34

Wt(x100)	V1	VR	V2	V1	VR	V2	V1	VR	V2	TGT	VFS
485	135	135	144	136	136	144	138	138	144	140+	176
480	133	133	143	135	135	143	137	137	143	140+	175
470	132	132	142	134	134	142	136	136	142	140+	174
460	130	130	140	132	132	140	134	134	140	140+	172
450	129	129	139	130	130	139	134	134	140	140+	170
440	127	127	137	128	128	137	132	132	139	140+	169
430	125	125	136	127	127	136	130	130	137	140	167
420	123	123	134	125	125	134	129	129	136	138	165
410	120	121	133	123	123	133	127	127	134	137	163
400	118	119	131	121	121	131	123	123	131	136	161
390	116	117	130	119	119	130	121	121	130	134	159
380	114	115	128	117	117	128	119	119	128	133	157
370	111	113	126	115	115	126	117	117	126	131	155
360	109	111	124	111	112	124	115	115	124	130	154
350	107	108	123	109	110	122	113	113	123	128	151
340	105	106	121	107	108	121	110	110	121	127	149
330	103	105	120	105	106	119	108	108	119	125	147
320	101	104	119	102	103	117	106	106	117	124	145
310	101	104	119	100	102	118	104	104	115	124	143
300	101	104	120	97	100	113	101	101	113	124	140

Note: "+" indicates Target Speeds less than Vref+10

USE THE CHART ABOVE TO DETERMINE THE V SPEED BUGS FOR TAKEOFF

V1 – Decision speed at which if an engine failure or unsafe condition occurs below this speed the takeoff must be aborted. If an engine failure or unsafe condition occurs at or above this speed the takeoff **MUST** continue.

VR – Rotation speed, even with one engine inoperative.

V2 – Takeoff safety speed. Minimum safe flying speed if an engine fails immediately after takeoff.

TGT – Landing approach target speed. Set before takeoff in case the need for an approach and landing becomes necessary shortly after takeoff. Use the AP speed bug to indicate TGT.

VFS – Enroute climb speed. This is the single engine best rate of climb speed in the clean configuration, i.e. gear and flaps UP. To set the Selected Airspeed bug in the Airspeed Display of the PFD to indicate VFS, use the SPD rotary knob on the FGC. Selected airspeed readout is found at the top of the Airspeed Display.

LANDING V SPEEDS CHART – FLAPS 22°

LDG 22	EMB-145 LANDING SPEED FLAPS 22			LDG 22
	VFS	Vref22	Vga9	
Weight				Target
48000	175	143	166	153
47000	174	142	164	152
46000	172	141	162	151
45000	170	138	161	148
44000	169	137	160	147
43000	167	136	158	146
42000	165	134	156	144
41000	163	133	154	143
40000	161	131	153	141
39000	159	130	151	140
38000	157	128	149	138
37000	155	126	147	136
36000	154	125	145	135
35000	151	123	143	133
34000	149	121	142	131
33000	147	120	140	130
32000	145	118	137	128
31000	143	116	135	126
30000	140	115	133	125
29000	138	113	131	123
28000	136	111	129	121

USE THE CHART ABOVE TO DETERMINE THE V SPEED BUGS FOR LANDING

VFS – Enroute climb speed. This is the single engine best rate of climb speed in the clean configuration, i.e. gear and flaps UP. Use the V1 speed bug to indicate VFS.

Vref22 – Landing reference speed with 22° of flaps. Use the VR speed bug to indicate Vref22.

Vga9 – Flap 9° Go-Around safety speed. Use the V2 speed bug to indicate Vga9.

Target – Landing approach target speed. Vref22 + 10 knots. Use the AP speed bug to indicate Target.

WHEN TO USE FLAPS 22°

Approach and landing using a flap setting of 22° will be necessary under the following conditions:

- CAT II Operations
- At the captain's discretion and runway length permitting, when landing at airports experiencing high crosswinds, wind gusts in excess of 20 knots, wind shear, thunderstorms in the terminal area, or any other weather phenomena producing unpredictable atmospheric conditions.

LANDING V SPEEDS CHART – FLAPS 45°

LDG 45	EMB-145 LANDING SPEED FLAPS 45			LDG 45
Weight	VFS	Vref45	Vga9	Target
48000	175	136	166	140+
47000	174	135	164	140+
46000	172	134	162	140+
45000	170	132	161	140+
44000	169	131	160	140+
43000	167	130	158	140
42000	165	128	156	138
41000	163	127	154	137
40000	161	126	153	136
39000	159	124	151	134
38000	157	123	149	133
37000	155	121	147	131
36000	154	120	145	130
35000	151	118	143	128
34000	149	117	142	127
33000	147	115	140	125
32000	145	114	137	124
31000	143	114	135	124
30000	140	114	133	124
29000	138	114	131	124
28000	136	114	129	124

Note: "+" indicates Target Speeds less than Vref+10

USE THE CHART ABOVE TO DETERMINE THE V SPEED BUGS FOR LANDING

VFS – Enroute climb speed. This is the single engine best rate of climb speed in the clean configuration, i.e. gear and flaps UP. Use the V1 speed bug to indicate VFS.

Vref45 – Landing reference speed with 45° of flaps. Use the VR speed bug to indicate Vref45.

Vga9 – Flap 9° Go-Around safety speed. Use the V2 speed bug to indicate Vga9.

Target – Landing approach target speed. Vref45 + 10 knots. If chart indicates 140+, Target is less than Vref45 + 10 knots. Use 140 knots as Target in that case. Use AP speed bug to indicate Target.

Max Structural Landing Weights:

ERJ-135LR	40,785 lbs	ERJ-140LR	41,226 lbs	ERJ-145LR	42,549 lbs
ERJ-135ER	40,785 lbs	ERJ-140ER	41,226 lbs	ERJ-145ER	41,226 lbs

Zero Fuel Weights for Specific Author's .AIR files:

Sam Chin	37,111 lbs
Ron Freimuth	37,112 lbs

ERJ-145 Procedures, Flight Profiles, and Callouts

Normal Takeoff

- When cleared for takeoff, Pilot Flying (PF) will advance the thrust levers and call “Set Thrust”. Pilot Not Flying (PNF) verifies on EICAS the proper engine indications and responds with “Thrust Set”.
- Accelerating through 80kts, PNF will call “80 knots.” The PF will verify correct airspeed indication and will respond with “Crosscheck”.
- If any abnormalities occur prior to reaching V1, the takeoff will be aborted and the Rejected Takeoff procedures will be complied with.
- At V1 and VR, PNF will call “V1, Rotate”.
- PF will rotate smoothly to the initial pitch attitude of 14 degrees nose up as indicated by the flight director. Maintain this pitch attitude in the initial climb.
- Upon indication on the altimeter and vertical speed indicator of a positive rate of climb, PNF will call “Positive Rate”. The PF will then command “Gear Up”.
- As the aircraft climbs through acceleration height, (specific for each runway, but typically between 500’ – 1000’ AGL depending on obstacles) PNF will call “Acceleration Height”. If airspeed is less than V2+15, then the PF will level off and maintain acceleration height to accelerate to V2+15. If airspeed is at V2+15 or greater, then PNF will call “V2+15”. PF will continue climb and command “Flaps Up”.
- As the aircraft accelerates through VFS, PNF will call “VFS” and the PF will then call for “Climb Thrust, After Takeoff Checklist”.
- At the PF’s discretion, Speed Hold or Flight Level Change, Full Bank, and/or Yaw Damper may be called for at this time.

Rejected Takeoff

- During the takeoff run, if an abnormality occurs prior to V1, the takeoff will be rejected.
- When the abnormality is announced, the Captain will call “Reject, Reject”. Retard the power and apply maximum brakes and reverse thrust if available.
- Bring the aircraft to a full stop before accomplishing any other procedures.

Engine Failure on Takeoff at or after V1

- If a power loss occurs after accelerating through V1, takeoff shall be continued.
- At V1 and VR, PNF will call “V1, Rotate”.
- When power loss occurs, PNF will call “Power Loss” and the PF will respond with “Max Thrust”.
- Rotate smoothly to no more than 14-degrees pitch attitude and maintain directional control.
- Upon positive rate of climb, PNF will call “Positive Rate” and PF will call for “Gear Up”.
- Pitch for and maintain V2 during the initial climb.
- At acceleration height, PNF will call “Acceleration Height”. PF will call for “Altitude Hold” and level the aircraft to maintain acceleration height.

ERJ – 135/140/145 PANEL PROJECT

- As the aircraft accelerates through V₂+15, PNF will call “V₂+15” and PF will then call for “Flaps Up”.
- As the aircraft reaches V_{FS}, PNF will call “V_{FS}” and the PF will call for “Speed Hold V_{FS}, Max Continuous Thrust”.
- At a safe altitude, typically at least 1500’AGL, the Engine Failure procedures will be called for, followed by the After Takeoff Checklist.

Normal 2 Engine ILS Approach

- In general, when within the terminal area, the aircraft should be configured at Flaps 9° and at a speed of 180kts. The Approach Checklist should be completed prior to beginning any approach.
- When the glide slope indication comes alive, PF will call for “Gear Down, Flaps 22”. PNF will lower the gear, set the flaps and set 140 knots on the airspeed bug.
- Approximately ½ a dot below the glide slope, with the airspeed below 145kts, PF will call for “Flaps 45, Landing Checklist”. PNF will then set the flaps, set the speed bug to V_{app}, set the Missed Approach altitude into the altitude pre-select, and accomplish the landing checklist.
- Maintain target speed (V_{app}) until descending through DA and then reduce power slightly to cross 50’ above the threshold at V_{ref}. Touchdown within the touchdown zone.

Normal 2 Engine Non-Precision Approach

- Aircraft should be configured at Flaps 9°, speed 180kts, with the Approach Checklist completed.
- Approximately 2-3 miles from the FAF, PF will call for “Gear Down, Flaps 22, Set MDA”. The PNF will lower the gear, set the flaps, set the speed bug to 140kts, and put the MDA (rounded to next highest 100 feet) into the altitude pre-select.
- Approximately 1 mile from the FAF, at airspeed below 145kts, PF will call for “Flaps 45, Landing Checklist”. PNF will set the flaps and set the speed bug to target speed.
- Upon reaching the FAF, PF will call for VS mode and 1200-1500 fpm down, and begin timing if appropriate.
- When level at the MDA, PNF will set the Missed Approach altitude into the altitude pre-select.
- With the runway in sight and reaching the visual descent point, PF will announce “Leaving MDA” and begin descent out of MDA towards the runway.
- Maintain target speed until approximately 200’AGL and then reduce power slightly to cross 50’ above the threshold at V_{ref}.

Go-Around

- Press the GA buttons on the thrust levers and advance the thrust levers full forward.
- Smoothly rotate to an initial 10-degree pitch attitude.
- PF will call “Go Around, Max Thrust, Flaps 9”

ERJ – 135/140/145 PANEL PROJECT

- Upon indication of positive rate of climb, PNF will call “Positive Rate” and the PF will respond with the commands “Gear Up, Heading, Low Bank”. The PNF will raise the gear, select HDG and BNK modes for the initial go-around climbout.
- Maintain airspeed of no less than Vga9.

Single Engine Approach

- A single engine approach differs from a normal approach in that the Vref will be the normal Flaps 45 Vref+10kts. The speeds under the VR and Vapp bugs will thus be increased by 10kts. Landing flaps will be 22°. Upon a go-around or missed approach, apply the single engine takeoff procedures described above.
- On an ILS, at no later than one dot below the glide slope, PF will call for “Gear Down, Flaps 22, Landing Checklist”. The PNF will lower the gear, set the flaps, bug the target speed and finish the landing checklist.
- On a non-precision, PF will call for “Gear Down, Flaps 22, Landing Checklist” when approximately 2-3 miles from FAF.
- Maintain target speed until descending through @ 200’AGL, then reduce power to cross 50’ above the threshold at Vref. Touchdown within the touchdown zone.

Visual Approach

- Aircraft should enter downwind at no less than 1500’AGL and configured at Flaps 9° and a speed of 180kts.
- Abeam touchdown point, PF calls for “Gear Down, Flaps 22”. PNF will lower the gear, set the flaps and set speed bug at 140kts. PF will start timer.
- After 30 seconds, turn base and begin a normal (@700fpm) descent from pattern altitude. At approximately 1000’AGL, with speed less than 145kts, PF will call for “Flaps 45, Landing Checklist”. PNF will then set flaps and put the speed bug at target speed.
- Maintain target on final and plan to cross 50’ above threshold at Vref to touchdown within the touchdown zone.

Thanks to **Bruce Uillyot** for the initial checklist and charts document.

Thanks to **Lou Kostyo** for polishing the presentation and contents of this document.

The second part of this document, ERJ-145 Procedures, Flight Profiles, and Callouts, was compiled by **Kevin Au**. Thank you Kevin.