

ERJ PANEL PROJECT INTRODUCTORY FLIGHT



Now that you have read through the manual, you are now ready to take the next step and see the ERJ panel in action. The Introductory Flight is from George Bush Intercontinental Airport/Houston (KIAH) to Corpus Christi International Airport (KCRP), a distance of 199.1 nautical miles, taking 42 minutes. Continental Express uses this route in their simulator training. The flight plan is from Houston (KIAH) using the Palacios 1 departure/Palacios transition along Jet Route J29 to Corpus Christi VOR (115.50) to an ILS precision instrument approach to runway 13 at Corpus Christi International (KCRP). The flight plan shorthand is KIAH.PALCS1.PSX.J29.CRP.KCRP at FL220.

Let's get started. Once in FS2000, go to the "Flights" menu and choose "Select Flight." Under "Available Flights" find and select "**ERJ Panel Tutorial**" and click on the green checkmark to load the ERJ-145 aircraft, panel, situation, and weather. You are at one of Continental Express' departure gates and the aircraft is powered down. It is dawn on a beautiful October day in Texas, a perfect time for flying. If you haven't already done so, print the ERJ panel checklist and fold it in half lengthwise.

RECEIVING / SAFETY CHECK

Configure the cockpit and systems for flight while receiving passengers, baggage, catering, and servicing. Assuming default keyboard command assignments, enter the cockpit by pressing "S". Select the **overhead panel** display by clicking the black button on the windshield center post just below the magnetic compass and seat height adjustment sights. Consult the checklist and follow the descriptions below.

PARKING BRAKE – Check that the parking brake lever on the center console is set. Clicking on the parking brake lever will engage or disengage the parking brake. When engaging the parking brake, the parking brake lever moves up and rotates 90 degrees. The parking brake should already be engaged.

HYDRAULIC PUMPS – On the **HYDRAULIC** panel on the left side of the overhead panel, ensure that both electric hydraulic pump rotary switches are in the **OFF** position.

ERJ PANEL PROJECT INTRODUCTORY FLIGHT

BATTERIES – On the **ELECTRICAL** panel on the overhead panel, select the **AUTO** position on the rotary switch labeled **BATT 1**. You will notice the following:

- The panel instruments become active. The panel displays will also activate if fsuipc.dll is installed and configured to provide continuous battery power.
- A female voice alert will state “AURAL UNIT, OK” to inform you that the aural warning system is operating normally.
- A Ground Power Unit (GPU) is now available and indicated by “GPU AVAIL” on the lighted pushbutton labeled **GPU**.
- The **GEN 1** and **GEN 2** pushbuttons on the **ELECTRICAL** panel show an indication of off-line because the engines are shut down. This is normal.
***NOTE:** When the horizontal bars on the pushbuttons are illuminated, this means the items require attention. The ERJ is a “Dark Cockpit” aircraft; thus, when it’s dark in the cockpit, it’s OK.*
- The Clock is functional and various buttons show functional data.

Click on the **Master Caution** indicator on the glareshield to extinguish the flashing amber light. One aural chime will accompany the **Master Caution** when it first illuminates. To get your attention, the red **Master Warning** indicator above this will be accompanied by three aural chimes when it first illuminates.

PANEL LIGHTS – This item is not on the checklist. On the far left of the glareshield, there is a knob labeled **PANEL LT**. Since it is early morning, click on this knob to illuminate the panel text. This lighting is used for night flight. Panel floodlights are also available. The **FLOOD** knob is to the right of the **PANEL** knob.

***NOTE:** The Clock, Pushback Control Panel, and backup gauges display erratically with the floodlights on. Cycling the PANEL LT knob usually cures the Clock and backup gauges. This will not help the Pushback Control Panel.*

AVIONICS MASTER – On the bottom right of the **ELECTRICAL** panel, click on the left illuminated **Avionics Master** pushbutton to activate the following displays on the main panel: **PFD** (Primary Flight Display), **MFD** (Multi Function Display), **RMU** (Radio Management Unit), and the **EICAS** (Engine Indication and Crew Alerting System).

***NOTE:** When using fsuipc.dll these units will already be activated.*

FUEL PUMPS – On the **MFD** (the large middle display on the main panel), click the selection button under **SYS**, which should initialize the system display area to the **T/O**, or Takeoff Page. There is a box around **T/O**, indicating that **T/O** is the active page. Click the selection button under **FUEL** to initialize the Fuel Page. The box will move and appear around **FUEL**. The electric fuel pumps will indicate **OFF**. On the **FUEL** panel on the overhead panel, select the **ON** position of the **TANK 1** and **TANK 2** fuel pump rotary switches. Each pump on the **MFD** Fuel Page will now indicate **ON**.

NAV LIGHTS – This item is not on the checklist. The navigation lights are always on. Check the **NAV** switch on the **EXTERIOR LIGHTS** panel on the overhead panel is **ON**. If the switch is not in the **ON** position, click on the switch to turn on the navigation lights.

ERJ PANEL PROJECT INTRODUCTORY FLIGHT

ICE PROTECTION – On the **PITOT HEAT / WINDSHIELD WIPER** panel, check that the pushbutton labeled **PITOT HEAT** is dark to ensure the ice protection is set.

START / STOP SELECTORS – On the **START / STOP** panel on the top right side of the overhead panel, ensure that each engine's rotary switch is in the **STOP** position.

CABIN SIGNS – On the far right of the overhead panel under **PASS SIGNS**, select the **NO SMK** cabin sign. One aural tone will activate.

APU – Return to the **ELECTRICAL** panel on the left side of the overhead panel. Click on the **START** position of the rotary switch labeled **APU MASTER** to activate the Auxiliary Power Unit (APU). On the bottom left of the **EICAS** display, readouts for APU percentage and APU temperature in Celsius will appear and start to increase. APU % will change from amber to green when greater than 95%. You will hear the APU start, spool up, and reach a steady state of 103 – 104% and approximately 330°C. Check that the pushbutton labeled **APU GEN** on the **ELECTRICAL** panel is dark to ensure the APU generator came on-line. Select the **ELEC** page on the **MFD** and check that a green 28.5 Volts is indicated under the white "APU" label when the APU has stabilized.

NOTE: The TANK 2 fuel pump must be ON to start the APU.

AUTOPILOT / FGC – Configure the Autopilot / Flight Guidance Controller for departure. The Flight Guidance Controller is the large control module on the right side of the glareshield. Starting from the right on the **FGC** (Flight Guidance Controller):

- The **FD2** button and **CRS2** knob are non-functioning.
- Set an initial altitude of 4000 feet using the rotary knob labeled **ASEL**. The selected altitude will be displayed in the **PFD** in blue just above the altitude tape. The blue selected altitude bug will move to the top of the altitude tape.
NOTE: *There are two mouse click zones on either side of the ASEL rotary knob, the inner adjusting selected altitude in 100's and the outer in 1000's.*
- Set the Enroute Climb Speed (VFS) to 167 using the rotary knob labeled **SPD** on the **FGC**. This V speed is explained below and is determined by using the Takeoff Chart. The selected airspeed will be displayed in the **PFD** in blue just above the airspeed tape. The blue selected airspeed bug moves from the top of the Airspeed Display when 167 KIAS is visible on the airspeed tape.
NOTE: *There are two mouse click zones on either side of the SPD rotary knob, the inner adjusting selected airspeed in 1's and the outer in 10's.*
- Click on the **CPL** (*CouPLE*) button on the **FGC**. This will specify which Autopilot and computer (Captain's or First Officer's) the **FGC** will use. A green arrow just above the **EADI** in the **PFD** will appear pointing left, indicating the Captain's side will be used. In this panel, you cannot select the FO's side, so there will be no computer disagreement warning or caution messages.
- Click on the **BNK** button on the **FGC**. This will place the Autopilot in Low Bank mode, which limits Autopilot bank angle. A green bracket will appear at the top of the **EADI** between the bank angle indicators.
- Activate the Flight Director in the **EADI** by clicking the **FD1** button on the **FGC**. The Flight Director command bars can be displayed as "V-bars" that

ERJ PANEL PROJECT INTRODUCTORY FLIGHT

move together or two individual “bars” that move independently. Choose between the two types of Flight Director command bars by using the button labeled **ET** on the **DCP** (Display Control Panel) at the glareshield’s center.

- Click on the red **TOGA** button on the side of the left thrust lever. A green “TO” (*TakeOff*) will appear to the right of the green couple arrow at the top of the **PFD** display in the active vertical mode annunciator area. **TOGA** sets the Flight Director to 14 degrees positive pitch. A green “ROL” will appear to the left of the couple arrow in the active lateral mode annunciator area and indicates the active lateral mode is default roll control.

NOTE: *If the TOGA button is selected while in the air on an approach, “GA” (Go Around) will appear instead of “TO”.*

- The selected heading appears in blue at the bottom left corner of the **PFD** under the white “HDG” label. Using the rotary knob labeled **HDG** on the **FGC** set the heading bug to 147°, the departure runway heading for runway 15L. The blue selected heading bug will move around the compass rose in the **PFD** and **MFD** to 147°.
- Select Heading Mode by clicking on the **HDG** button on the **FGC**. “HDG” will replace “ROL” in the **PFD**. The Flight Director will now indicate a turn toward the selected heading.
- The selected course for NAV1 appears as a green number in the **PFD**, just to the left of the green “CRS” label below the airspeed tape and Mach indicator. Set the outbound course of 204° from the first VOR, the Humble VOR (IAH) just off the end of runway 15R, by using the rotary knob labeled **CRS1** on the left side of the **FGC**. The green course needle in the **EHSI** will move to 204°. Since the VOR cannot be received on the ramp, the CDI remains centered.

DISPLAY CONTROL PANEL – The Display Control Panel is the center control module on the glareshield to the left of the **FGC** and above the **MFD**.

- Click the **NAV** button on the **DCP** to ensure that the active navigational information displayed in the **PFD** and **MFD** is coming from the navigation radios and not from a previously loaded flight plan in Flight Simulator.
NOTE: *The display should already be set to NAV mode. The course needle, CDI, and navigation information in the PFD and MFD are displayed in green when data is supplied from the NAV1 radio. These items will be magenta if FMS mode is selected and supplying navigation information. If the FMS button is selected at this time out of curiosity, the NAV button and TOGA button will need to be reselected before continuing.*
- The **ET** button will change the type of Aircraft Symbol and Flight Director command bars in the **EADI**. This is actually Elapsed Time on the real ERJ.
- The **GSPD / TTG** button will change the display in the lower right corner of the **PFD** to Ground Speed or Time To Go to the next navigation point. The value is displayed in green next to a white “GSPD KTS” or “TTG MIN” label.
- The **FULL / WX** button will change the display of the **EHSI** in the **PFD** from full compass rose mode to the 100 degree arc mode.
- Two round, notched knobs labeled **BRG** set the sensing mode for the two **bearing needles** displayed in the **EHSI**. Place the mouse cursor on the left

ERJ PANEL PROJECT INTRODUCTORY FLIGHT

BRG knob until a “+” appears. Then, click twice on the **BRG** knob until the blue “O OFF” in the bottom left of the **PFD** indicates “O ADF”.

- Place the cursor on the right **BRG** knob until a “+” appears and click once so the white “◇ OFF” indicates “◇ NAV2.” The corresponding colored bearing needles will only display in the **EHSI** when receiving navigational information.
- By clicking on the **RA-c-TST** knob on the **DCP**, Minimum Altitude for an approach (DH or MDA) is set in the **PFD** to the left of the Altitude Display as a blue number next to the white “RA” label. Set the RA value to 200.

NOTE: RA is Radio Altitude and is used to measure the Minimum Altitude.

RMU / FMS (GPS) – Set the **RMU** (Radio Management Unit) and the **FMS** (Flight Management System) for the departure.

NOTE: The term FMS (Flight Management System) is employed, although the default Flight Simulator GPS system is used to simulate the ERJ FMS.

To set a frequency: On the **RMU**, click the button with the white horizontal bar to the left or right of a blue *standby frequency* to activate a highlighted box around the frequency. The first three digits of a COM or NAV frequency or the first two digits of an ADF frequency will be in the highlighted portion of the box. Once highlighted, use the rotary knob on the bottom right of the **RMU** to tune the first part of the frequency either up or down. Click the button again to move the highlighted portion of the selection box to the numbers right of the decimal point for a COM or NAV frequency. Clicking the button again on the ADF moves the highlighted portion of the box to the right to the next numbers of the frequency. Use the rotary knob to tune the next part of the frequency. Click the button again after all numbers are set to place the new frequency in *standby*.

To move a standby frequency to the active frequency: Click the button with the white bar and vertical tails on each end next to a white *active frequency*. The white and blue frequencies will switch positions. The Transponder does not have a standby area. Transponder numbers can only be increased, not decreased.

- Change the blue standby frequency of COM 1 to 124.05, which is ATIS.
- Change the blue standby frequency of NAV1 to 116.60, the IAH VOR, and move it to the active frequency position. The active frequency is white.
- Set the NAV1 standby frequency to 111.90, the ILS RWY 15L at KIAH. The ILS RWY 15L may be needed in case an emergency occurs shortly after takeoff and return to the airport is necessary. The standby frequency is blue.
- Change the blue standby frequency of NAV2 to 117.30, the PSX VOR, and move it to the active frequency position.
- Set the NAV2 standby frequency to 115.50, the CRP VOR.
- Change the blue standby frequency of ADF1 to 379.0 (HS), the Marbe Outer Compass Locator for the ILS RWY 15L at KIAH, and move it to the active frequency position. The blue bearing needle is now displayed in the **EHSI**.
- Set the ADF1 standby frequency to 382.0 (CR), the Concorde Outer Compass Locator at Corpus Christi.
- Set the TNSP (Transponder) to 3122, since that is the squawk code given by Clearance Delivery.

ERJ PANEL PROJECT INTRODUCTORY FLIGHT

To load the flight plan: Select the “Flights” menu and then select “Flight Planner.” Click the “Load” button on the bottom menu of the Flight Planner and find the flight plan file named “ERJ Panel Tutorial.PLN”. Highlight it, and then click “OK.” The “Edit Route” tab of the Flight Planner provides detailed information about the flight plan, navigational aids, and airports. The flight plan is loaded into the **FMS** when exiting the Flight Planner by clicking the green checkmark. For those using FSNavigator, load “ERJ Tutorial.fsn”.

FUEL QUANTITY – Go to the “Aircraft” menu and select “Fuel.” Enter 2500 in each fuel tank under the “Pounds” heading and click the green checkmark. Select the **FUEL** page on the **MFD** menu. The **Fuel** page will now display 5050 lbs. TOTAL fuel because Flight Simulator will usually round up the entered value.

PITCH TRIM – Pitch trim is displayed under the white “PITCH” label in the bottom right corner of the **EICAS**. Set takeoff pitch trim to a green positive setting of 6 units and a green “UP” label by clicking the bottom of the **TRIM** button on the left yoke handle.

STANDBY ATTITUDE IND – Ensure that the backup **ADI** is uncaged. Clicking on the “PULL TO CAGE” knob cages the gyro and displays a red “OFF” flag.

ALTIMETERS – Switch the COM 1 standby frequency 124.05 into the active frequency position to get the current airport altimeter of 30.15. Click on the black button on the windshield center post to remove the overhead panel display to be able to see the ATIS information scroll across the top of the screen. Set the altimeter to 30.15 using the knob at the bottom right of the **PFD** labeled **BARO**. The altimeter setting is displayed next to the white “IN” label below the altimeter tape in the **PFD**. The altimeter should read 100’.

NOTE: *To switch between inches of mercury and millibars atmospheric pressure, click the button labeled IN/HPA button on the bottom left of PFD. 30.15 IN = 1021 HPA*

BEFORE START / PUSHBACK

The aircraft is now loaded, prepared, and serviced for the flight. It is departure time. Select the **overhead panel**, select the **T/O** page on the **MFD**, switch the active ATIS frequency to standby in COM 1 on the **RMU**, and continue with the checklist below.

CABIN SIGNS – On the far right of the overhead panel under **PASS SIGNS**, click on the **FSTN BELTS** cabin sign. One aural tone will activate.

ROTATING BEACON – On the overhead panel under **EXTERIOR LIGHTS**, select the **RED BCN** switch. This advises ground crew of pushback and engine start. This action also closes the airplane service hatches and doors, disconnects ground power, and activates the Flight Data Recorder (not simulated).

GPU – Check the **GPU** pushbutton on the overhead **ELECTRICAL** panel to ensure the “GPU AVAIL” light is out, indicating that ground power has been disconnected from the aircraft.

ERJ PANEL PROJECT INTRODUCTORY FLIGHT

DOORS / WINDOWS – Check that all aircraft doors and hatches are closed by checking the **T/O** page. The door and hatch indicators should all be green. If there is a boxed red “DOORS OPEN” message on the **T/O** page, check the **RED BCN** switch.

FUEL QUANTITY – Select the **FUEL** page on the **MFD** menu. Check the **EICAS** and **Fuel** page to confirm total fuel as required.

NOSEWHEEL STEERING – Disengaged. Check the **EICAS** message area for the amber STEER INOP text message.

NOTE: *Make sure your joystick is calibrated before starting the pushback. Since most problems with erratic pushback are due to incorrect joystick calibration, you might have to disable your joystick during the pushback phase.*

Pushback procedure: Pushback from the departure gate is accomplished by using the Pushback Control Panel located on the glareshield just above the **PFD**.

- Click on the rotary knob labeled **DIST** until the indicator line is pointing to the 10 o'clock position.
- Click on the rotary knob labeled **HDG** until the indicator line is pointing to the 4 o'clock position.
- Click on the **CALL** button to start the pushback sequence. Follow the instructions from the ground crew.

NOTE: *Pushback is done in SLEW mode. DON'T do anything else at this stage except follow the instructions. Do not change view windows.*

After the aircraft comes to a complete stop and the parking brake has been set, visually clear the area to the left and have Joe (First Officer) clear the ramp area to the right. The engines may be started at this time if the ramp is clear of vehicles and personnel.

ENGINE START: Engine start is very simple for the ERJ. There must be a bleed air source (APU or one engine running) to begin turbine rotation, and the fuel pump for that engine must be on. Presently, the APU is running providing bleed air and both fuel pumps are on. The APU generator is also providing electrical power.

- Start the Number 2 (Right) engine first by using the right rotary knob on the **Start / Stop** panel found on the upper right side of the overhead panel. Click on the **START** position of the rotary knob and hold down the mouse button until the green “IGN A” indication next to the right ITT (Interstage Turbine Temperature) gauge on the **EICAS** disappears. This occurs at approximately 20% N2 at which time the ITT reading will rise rapidly indicating the engine has started. Release the mouse button when this happens. The rotary knob will then automatically move to the **RUN** position after release. Cancel the flashing amber **Master Caution** indicator on the glareshield by clicking on it.
- Start the Number 1 (Left) engine using the same procedure as above with the left **Start / Stop** rotary knob. The **Master Caution** will not activate.
- Complete the items on the **After Start** checklist.

ERJ PANEL PROJECT INTRODUCTORY FLIGHT

AFTER START

HYDRAULIC PUMPS – Set the two electric hydraulic pump rotary knobs to **AUTO** on the **HYDRAULIC** panel on the overhead panel. A blue CHECK A1 PERF advisory text message will appear in the message section of the **EICAS** for ten seconds to advise the FADEC (Full Authority Digital Engine Control) application is installed.

GENERATORS – Check that the **GEN 1** and **GEN 2** pushbuttons on the **ELECTRICAL** panel are dark indicating the generators are on-line. Select the **ELEC** page on the **MFD**. Output and loads under the “GEN1” and “GEN2” labels should be 28.0 Volts/120 Amps.

TAXI

Clearance to taxi to Runway 15L has been received from ground control. Turn on the **TAXI** light located on the **EXTERIOR LIGHTS** panel, close the **overhead panel**, and release the parking brake. Runway 15L is straight ahead. Press “SHIFT + J” to create a Top-Down view window showing the location of the aircraft on the airport. This window may be moved to a position that does not restrict the windshield view by dragging it with the mouse. Press “J” to remove the window when it is no longer needed. Taxi to the runway while keeping taxi speed under 15 knots and accomplish the following tasks.

FLIGHT CONTROLS – Visually check that the yoke and rudder pedals move in the correct direction.

TRIMS – Check that the aileron and rudder trim indicators, labeled “ROLL” and “YAW” respectively, in the **EICAS** are centered and the elevator trim labeled “PITCH” is set to a positive “UP” setting within the green band (normal takeoff range). In this case, a green “6” should be indicated for takeoff.

FLAPS – Move the flap lever on the center console one notch to the takeoff position of 9 degrees. A green “9” will be shown in the **EICAS** next to the “FLAPS” label.

SPEED BRAKE – The speed brake should be closed. A white “CLD” will be shown next to the “SPLRS” label in the **EICAS**.

FLIGHT DIRECTOR / FGC – The following should be displayed in green at the top of the **PFD** indicating the Flight Director is activated, **TOGA** has been selected, and Heading Mode is the active lateral mode.

HDG ← TO
|—————|

The green bracket represents the bank angle limit of Low Bank mode, which is 14 degrees. The Flight Director command bars should be indicating a turn to the left toward the selected heading of 147°.

ERJ PANEL PROJECT INTRODUCTORY FLIGHT

INSTRUMENTS / MFD PAGES – Check that all instruments are in the green range on the **EICAS** and that the message area shows only the white END message.

- Check the **ELEC**, **HYD**, **FUEL**, **ECS/AI**, and **T/O** system pages on the **MFD**. When all system pages have been checked, select the **RTN** button.
- Check the Clock for both local and GMT time.

NOTE: To determine whether the Clock is showing local (LOC) or Greenwich Mean Time (GMT), look for a dot between the last two numbers above “LOC” for local and between the first two numbers above “GMT” for GMT. Use the oval switch on the left of the Clock to switch between LOC and GMT time.

TAKEOFF DATA / SPEEDS – To determine the V Speeds for takeoff, find the takeoff weight and air temperature. The weight of the fully loaded aircraft before adding fuel (zero fuel weight) is 37,111 lbs. The fuel load is 5,000 lbs. Adding these two figures together gives a gross takeoff weight of 42,111 lbs. Find the outside air temperature by looking at the top right of the **MFD**. Use the temperature labeled “TAT”, which is the True Air Temperature of 14°C. Using these figures, determine the V speeds using the “FLAPS 9, T/O-1, NORMAL V2” schedule in the Checklist and Procedures document.

Under the first column for Press Alt 1000', OAT C –54 TO +43, and next to 430 for Wt(x100), read the following:

V1 = 125 knots

VR = 125 knots

V2 = 136 knots

TGT = 140 knots – Next to last speed to the right under the TGT column. The **AP** V speed bug. This is the Landing **A**pproach target speed, set before takeoff so that it will be readily available should the need for an immediate approach and landing arise.

VFS = 167 knots – Last speed to the right under the VFS column. The selected airspeed bug previously set in the **PFD** using the **SPD** rotary knob on the **FGC**. This is **Enroute Climb Speed**, which is the single engine best rate of climb speed in the clean configuration, i.e. flaps and gear **UP**. This speed is also used as a reference speed to engage the Yaw Damper, set Climb thrust, and disengage Low Bank mode on takeoff.

NOTE: Standard operating procedure is to round up to the next heaviest weight. Since the gross takeoff weight is 42,111 lbs., the next heaviest weight is 43,000 lbs., thus 430.

On the **MFD** menu, sequentially select **MFD** and **SPDS** to initialize the V speeds page. Select the button under “V1”. The magenta dashed line turns amber. Use the rotary knob on the bottom right of the **MFD** to set the V1 speed bug. First set V1 to 125, then continue down the row until all V speeds are set. When finished, select the **RTN** button.

Now, click on the right footrest below the **RMU** and above the right rudder pedal. The **Thrust Rating Panel** will open. Check for the blue “T/O-1” on the top of the **EICAS**.

NOTE: T/O thrust mode is set automatically on the ground before takeoff.

ERJ PANEL PROJECT INTRODUCTORY FLIGHT

CROSSFEED – Open the overhead panel and ensure that the **XFEED** (crossfeed) rotary knob on the **FUEL** panel is in the **OFF** position.

TAKEOFF BRIEF – "Left seat departure, standard callouts and procedures. Any problems before V1, reject the takeoff, advise the tower and tell the folks to remain seated. Any problem after V1, we'll continue the takeoff, acceleration height for 15L is **938'** mean sea level (MSL), no special departure procedures, and we'll deal with it in the air. Otherwise, on the Palacios One, we'll fly runway heading up to 4000 feet for vectors to SKUBA. Weather is good, we're below max landing weight, speeds and radios are set if we have to come back. Any questions?"

***NOTE:** Acceleration heights are specific for each runway an airline is authorized to use. The acceleration height values are logged in a book kept in the cockpit that has all the allowable takeoff weights for each runway at each airport. This info is not available to simmers. The best thing simmers can do is use a standard of 500' AGL since that is the lowest acceleration height available, unless an obstacle warrants a higher figure.*

BEFORE TAKEOFF

You should now be holding short of runway 15L with the parking brake set.

FLIGHT ATTENDANT – Move the **NO SMK** switch to **OFF**, then back **ON** to notify the cabin crew of impending takeoff and to take their seat.

***NOTE:** On the real ERJ, the pilots use the PA system to notify the flight attendants.*

EXTERIOR LIGHTS – Select the **TAXI** switch to **OFF**. Select the **LDG1**, **NOSE**, and **LDG2** (the three landing light switches function as one), and **STROBE** switches on the overhead **EXTERIOR LIGHTS** panel to **ON**. Close the overhead panel.

FUEL QUANTITY – Select **SYS** on the **MFD** menu and then the **FUEL** page. Check and confirm fuel amounts on the **EICAS** and **FUEL** page are consistent. The fuel quantities should be equal or close to equal in both tanks.

BRAKE TEMPS – Release the parking brake. Select the **HYD** page on the **MFD** and check that the **BRAKES TEMP** indicators are in the green range. Select **RTN** on the **MFD** after checking brake temperatures.

EICAS – Check engine gauges, fuel flow, pressures, temperatures, engine vibration, and ensure there are no text messages other than the white END message.

TAKEOFF CONFIG – Click the **T/O CONFIG CHECK** button located to the right of the Flap Lever on the center console. A female aural voice alert of "Takeoff OK" is heard if the aircraft is correctly configured for takeoff. A Master Warning accompanied by an aural warning will occur if a condition exists prohibiting takeoff (i.e. flaps, brakes, trim). The red indicator on the glareshield will flash until cancelled by clicking on the indicator.

ERJ PANEL PROJECT INTRODUCTORY FLIGHT

Additionally, a red NO T/O CONFIG warning text message will appear in the **EICAS**. Correct the condition and repress the **T/O CONFIG CHECK** button to clear the warning.

Clearance for takeoff has been received from the tower. Taxi into position on runway 15L and perform final checks and selections.

NOTE: *Flight Simulator incorrectly shows the runway as 14L.*

Click on the **ET** button on the Clock until the lower time reads “0:00” each time it is clicked. This will start the **elapsed flight time**. Once in the air, this time cannot be reset, but can be reset to zero while on the ground. Before takeoff is the time to reset and start the Clock.

Here are the things to keep in mind when executing the takeoff...

Begin the takeoff roll by smoothly advancing the thrust levers to takeoff thrust. Keep the N1 readout in the green range. Maintain runway centerline with small rudder inputs.

- ✓ Smoothly **Rotate** at a rate of 3 degrees of pitch per second at **VR**.
 - ✓ Rotating too fast will cause the Pitch Limit Indicator to appear in the **EADI**.
 - ✓ Stop rotation when **EADI aircraft symbol** is **aligned** with the **Flight Director**.
 - ✓ **Maintain 14 degrees** commanded **pitch** for initial climbout.
 - ✓ When **vertical speed** indicates a **positive rate of climb**, retract **Landing Gear**.
 - ✓ **Hold** commanded **pitch** until climbing **through** acceleration height **938’** MSL.
 - ✓ Once past **V2 + 15** = 136 + 15 = **151 knots**, retract the **Flaps**.
 - ✓ Once past **VFS = 167** (selected airspeed bug)...
 - Set thrust rating to **Climb thrust** – **CLB** button on **Thrust Rating Panel**
 - Disengage Low Bank mode – **BNK** button on **FGC**
 - Engage the Yaw Damper – **YD** button on the **FGC**
 - Change vertical mode – **FLC** button on the **FGC**
-

Fly runway heading and climb and maintain 4000’. Reduce thrust to keep the airspeed below 250 knots. If you exceed 250 knots below 10,000’, you will receive an aural and visual alert on the **PFD** that will be hard to miss. Reduce thrust if this occurs. An aural three-chime altitude alert will activate when within 1000’ of the selected altitude.

If you have not already done so, engage the Autopilot on climbout by selecting the **AP** button on the **FGC**. If preferred, engage the Autopilot once the aircraft is stabilized at the selected altitude of 4000’. If the Yaw Damper is not already engaged, the Yaw Damper will engage with the Autopilot. The Yaw Damper stays engaged unless disengaged with the **YD** button on the **FGC**, even if the Autopilot is disengaged.

NOTE: *Both the Autopilot and Yaw Damper will be disengaged if the red Autopilot / Yaw Damper disengage button on the left yoke handle is selected.*

Make a right turn to 234° to join the course between IAH and SKUBA using the **HDG** rotary knob on the **FGC**. Now, complete the items on the **After Takeoff** checklist.

ERJ PANEL PROJECT INTRODUCTORY FLIGHT

AFTER TAKEOFF

LANDING GEAR – Check Landing Gear is **UP** and three white lights in the **EICAS**.

FLAPS – Check Flaps **UP** and a white zero indication in the **EICAS**.

THRUST RATING – Check **CLB** thrust set at top of **EICAS**.

APU – Open the overhead panel. Shut down the APU by pressing the **STOP** button to the left of the **APU MASTER** rotary knob on the overhead **ELECTRICAL** panel. APU % displayed in the **EICAS** will wind down. When APU is indicating less than 10%, select the **OFF** position on the **APU MASTER** rotary knob. Close the overhead panel.

LDG LTS / FA – When passing thru 10,000', open the overhead panel and turn **OFF** the Landing Lights. Move the **NO SMK** cabin sign **OFF** then **On** to notify the cabin crew. Close the overhead panel.

Established on the 234° heading and before intercepting the 204° radial, select the **NAV** button on the **FGC**. Initially, Heading Mode will remain active and display a green “HDG” in the **PFD** and a white “VOR” to the left. When the radial is intercepted, the aircraft will turn and follow the Flight Director VOR course commands. “VOR” on the **PFD** will change from white to green and replace “HDG” indicating NAV Mode has changed from armed to active. Heading Mode is then disengaged. Patiently wait for course intercept.

Once the Autopilot is established on the 204° outbound IAH radial and holding 4000', prepare for the **FMS**. Synchronize the heading bug to the aircraft's current heading by clicking on the center of the **HDG** rotary knob over the “PUSH SYNC” label on the **FGC**.

Using the FMS: In the upper left corner of the **MFD**, NAV information is displayed in green. IAH is the current VOR with miles and time from the VOR displayed below. The aircraft should be established on course. Follow the steps below to use the **FMS**.

- Click on the **HDG** button on the **FGC** to disengage NAV Mode and engage Heading Mode. First, ensure that the heading bug is synchronized to the heading currently flown. If not, use the PUSH SYNC function of the **HDG** rotary knob.
- Select the **FMS** button on the **DCP** on the glareshield just above the **MFD**. Navigation information displayed is now magenta in both the **MFD** and **PFD**, and a white direction line appears in the map plan display area of the **MFD** extending from the aircraft symbol to a magenta star, which is the next waypoint. The waypoint is named SKUBA and is displayed in the top left corner of the **MFD**. Similar information is now present in the **PFD**.
- Select the **NAV** button on the **FGC**. The Autopilot will now follow the flight plan course in the **FMS**. A green “LNAV” annunciator replaces “HDG” in the active lateral mode area of the **PFD**. The magenta course needle provides course sensing to the waypoint in the same manner as a VOR, and the CDI (Course

ERJ PANEL PROJECT INTRODUCTORY FLIGHT

Deviation Indicator) indicates how far off course, to the left or right, the aircraft is to the next waypoint.

NOTE: *LNAV tracking only occurs with the Autopilot engaged.*

- The half circle labeled “50” in the map plan display area of the **MFD** indicates 50 miles and is half of the total range of the area depicted. Use the rotary knob below the menu item labeled **M/P RNG** at the bottom right of the **MFD** to change the range of the map plan display area. Decrease the half range circle to 25, then 10 miles. After SKUBA, reset the range to display each successive magenta waypoint as the flight progresses along the route.
-

Clearance has been received to continue climbing to flight level 220 (FL220), or 22,000’.

Enter 22,000’ as the selected altitude at the top of the Altitude Display using the **ASEL** rotary knob on the **FGC**. Notice that this does not cause an altitude change until a vertical mode is selected, such as FLC, SPD, or VS. Select the **FLC** button on the **FGC**. This will engage a programmed climb mode to 22,000 feet where the initial climb speed is **240** knots below 10,000’. You, however, must maintain thrust for the **240** knots since the Autopilot manages the speed with pitch. Therefore, ensure climb thrust is set. When passing thru 10,000’, the FLC Mode programmed speed increases to **270** knots.

Don’t forget the Landing Lights and cabin crew when passing through 10,000 feet. When above 10,000’, engage the Vertical Speed Mode by selecting the **VS** button on the **FGC** to replace FLC Mode in the climb to 22,000’. Vertical Speed Mode is the preferred vertical mode above 10,000’. Once the **VS** button is selected and the indicator light on the **VS** button turns green, the **SPD** rotary knob to the left of the **VS** button is used to set the selected vertical speed to be flown by the Autopilot. Selected vertical speed is the blue number in a white half rectangle displayed in the **PFD** just below the altimeter setting readout. Set a value that will maintain a climb speed of 290 knots for as long as possible. Start with a value of 2500 feet per minute and adjust as necessary.

NOTE: *On flights requiring extended climbs as high as FL370, hold a vertical speed of 1000 to 500 feet per minute once 290 knots can no longer be maintained.*

Notice a blue dashed line has replaced the selected airspeed readout at the top of the Airspeed Display in the **PFD**.

Select the button labeled **STD** on the bottom right of the **PFD** to set standard altimeter setting of 29.92 or 1013 for flight at, or above FL180, or 18,000’.

Also, notice that the white **bearing needle** in the **PFD** display has appeared and is indicating the bearing to the Palacios VOR (PSX). Switch the standby frequency in NAV2 to the active frequency. When in range of the Corpus Christi VOR the white **bearing needle** will point directly to CRP and DME information for CRP will be displayed at the lower left of the **MFD** in the secondary navigation information area.

The annunciator display LNAV ← VS ASEL in the **PFD** will change to LNAV ← ALT once reaching FL220 indicating altitude capture and hold. When level at FL220, complete the items on the Cruise checklist.

ERJ PANEL PROJECT INTRODUCTORY FLIGHT

CRUISE

THRUST RATING – Select the **CRZ** button on the **Thrust Rating Panel** and confirm the setting at the top of the **EICAS**. Remember, engine thrust must be set manually to establish cruise airspeed. Cruise airspeed indication on the Airspeed Display should be near the red maximum airspeed strip at approximately 320 KIAS. The Mach Indicator below the airspeed tape should indicate a green “M0.70”.

CABIN SIGNS – Open the overhead panel and turn the **FSTN BLTS** cabin sign **OFF**.

Close the **overhead panel** and close the **Thrust Rating Panel** by clicking on the right footrest. Admire the scenery and ask the flight attendant to bring you a cup of coffee.

Once reaching 12.9 NM from HYNES intersection according to the **FMS**, which is 57 NM from the CRP VOR, reduce thrust and begin the descent by changing the selected altitude to 3000' using the **ASEL** rotary knob on the **FGC**. Then, select the **VS** button on the **FGC**. A green “VS” appears in the active vertical mode area of the **PFD** indicating Vertical Speed Mode is engaged. The white “ASEL” indicates Altitude Preselect Mode is armed. This will initiate a descent that uses a vertical speed that you determine.

Use the **SPD** rotary knob on the **FGC** to decrease the selected vertical speed in the Vertical Speed Display to –2500 fpm. Unless otherwise directed by ATC, maintain airspeed in the descent as close to the red maximum airspeed strip as possible. However, reduce airspeed below 250 KIAS before passing thru 10,000 feet. Do not overspeed the aircraft in the descent. Reduce thrust immediately if a “High Speed” aural alert is issued. Use the speed brake to help slow the aircraft if necessary.

NOTE: You can compute the required vertical speed to reach the required altitude at the next waypoint by subtracting current altitude from the required altitude, then divide by the number of minutes till reaching the next waypoint as shown on the MFD or PFD, e.g. $(22,000' - 3,000') \div 7 \text{ mins} = 2,714 \text{ fpm}$. Vertical speed descent rates in normal descent profiles are 1500, 2000, or 2500 fpm. 2000 to 2500 fpm at 420 KIAS approximates a three-degree slope. **The “Times 5” Rule:** Multiply groundspeed by 5 to determine a rate of descent that approximates three degrees ($420 \cdot 5 = 2200 \text{ fpm}$).

Clearance has been received to proceed direct to the Corpus Christi VOR. Change the standby frequency in NAV1 to 115.50 and move it to the active frequency position. Synchronize the selected heading bug to the aircraft's current heading by using the PUSH SYNC function at the center of the **HDG** rotary knob on the **FGC**. Then, engage Heading Mode by selecting the **HDG** button. **FMS** guidance is disengaged. Select the **NAV** button on the **DCP** to return displayed navigational information to the navigation radios. Navigational needles and text should turn green in the **PFD** and **MFD**.

The white **bearing needle** in the **PFD** should be pointing to the Corpus Christi VOR. Use the **HDG** rotary knob to center the selected heading bug on the head of the needle. Change the COM 1 standby frequency to the Corpus Christi ATIS frequency of 126.80

ERJ PANEL PROJECT INTRODUCTORY FLIGHT

and move it to the active frequency position. Take note of the altimeter setting of 30.15 at Corpus Christi and enter the setting into the **PFD** using the **BARO** rotary knob.

Switch the active frequency in COM 1 to standby, open the **overhead panel**, and complete the items on the **In Range** checklist

IN RANGE

CABIN SIGNS / LDG LIGHTS – Turn the **FSTN BLTS** cabin sign **ON**. When passing thru 10,000', turn on the **Landing Lights** and notify the cabin crew again by moving the **NO SMK** cabin sign switch **OFF** then **On**.

ALTIMETERS – Ensure altimeter is set to 30.15 for Corpus Christi Airport.

LANDING DATA / SPEEDS – Refer to the Flaps 45° Landing V Speeds Chart. Set the V speed bugs for a landing weight of 41,000 lbs (37,111 + 3000 landing fuel = 40,111). Sequentially select **MFD** and **SPDS** on the **MFD** menu to initialize the V speeds page. Starting with the V1 speed bug as before, enter the following speeds:

- | | | | |
|----------|--------------|---------|-------------------------|
| • VFS | V1 speed bug | 163 kts | Enroute Climb Speed |
| • Vref45 | VR speed bug | 127 kts | Landing Reference Speed |
| • Vga9 | V2 speed bug | 154 kts | Go-Around Safety Speed |
| • Target | AP speed bug | 137 kts | Landing Target Speed |

After entering the V speeds, select the **RTN** button. Review the Chart below:

Minimum Flap speeds for this approach are:

- | | |
|--------------------|--------------------|
| ○ Clean | 180 knots |
| ○ Flaps 9° | 160 knots |
| ○ Flaps 22° | 140 knots |
| ○ Flaps 45° | 127 knots (Vref45) |

The DH for the ILS Runway 13, 200', should already be set as the RA value in the **PFD**.

APPROACH BRIEF – “After crossing Corpus VOR at 3000 feet, we’ll turn right to intercept the outbound CRP **309°** radial and descend to 2000 feet, then configure the airplane for **flaps 9°** and reduce speed to **180 knots** (minimum clean configuration speed). At **10.0** DME from CRP we’ll turn left to **232°** to intercept the CRP **285°** radial, then a left turn to **164°** to VICKE intersection to intercept the ILS 13. When the glide slope is alive, we’ll select gear down and **flaps 22°** and slow to 140 knots. At the Conor LOM, we’ll select flaps **45°** and start the time for the approach. Decision height is 243 feet or 200 RA. If necessary, we’ll execute a missed approach climbing straight ahead to 500 feet, then a climbing right turn to 2000 feet via heading **130°** to intercept the CRP **169°** radial to POGOE intersection at 16 DME from CRP and hold.”

ERJ PANEL PROJECT INTRODUCTORY FLIGHT

Close the **overhead panel** and configure the **RMU** for arrival into Corpus Christi.

- Set NAV1 standby frequency to 110.30 for the ILS to runway 13.
- Switch the standby frequency in the ADF to the active position. The blue bearing needle will reappear in the **EHSI** indicating the bearing to the CR LOM. An amber “CR” appears below the green DME readout for CRP in the bottom left corner of the **MFD** indicating the CR LOM is detected.
- Set 243.0 in the standby frequency position of the ADF as a DH reminder.
- Set the outbound course of 309° from the CRP VOR in the **EHSI** by using the **CRS1** rotary knob on the **FGC**.

Check heading to confirm on course. Complete the items on the **Approach** checklist.

APPROACH

RADIO MGT UNIT – Ensure the radios are set for the approach.

INBOUND APPR COURSE – The NAV1 standby frequency 110.30 will be switched to the active frequency position and the localizer course of **129°** will be set with the **CRS1** rotary knob **when inbound** to VICKE intersection for the ILS RWY 13 approach.

SPEED BRAKE – Check for a white “CLD” next to the “SPLRS” label in the **EICAS**.

CROSSFEED – Open the overhead panel and ensure that the **XFEED** rotary knob on the **FUEL** panel is in the **OFF** position. Close the overhead panel.

When **5.0** DME from CRP VOR, reduce thrust to slow the aircraft to **200** knots. When **2.0** DME from the CRP VOR, lower the Flaps to **9°** and adjust thrust as necessary to maintain **180** knots. Set N1 to approximately **55%** to achieve **180** knots. Upon arrival at the CRP VOR, follow the steps below to use the Autopilot to fly the briefed approach.

- Set the selected heading to **325°** to intercept the CRP **309°** radial.
- When the aircraft is established on **325°**, select the **NAV** button on the **FGC**.
- Set selected altitude to **2000'** with the **ASEL** rotary knob.
- Select the **VS** button on the **FGC**.
- Set selected vertical speed to **1500** fpm. Reduce thrust to maintain **180** knots.
- Set the selected heading to **232°** at **10.0** DME from CRP.
- Select the **HDG** button on the **FGC**.

ERJ PANEL PROJECT INTRODUCTORY FLIGHT

- Use the **CRS1** rotary knob on the **FGC** to reset the course needle to **285°**.
- When the CDI centers on the CRP **285°** radial, set the selected heading to **164°**.
- Switch the NAV1 standby **ILS frequency** to the active frequency position.
- Reset the course needle to **129°** for the inbound localizer course.
- ATC has issued clearance for the ILS. Select the **APR** button on the **FGC**.
- The Autopilot will capture the localizer on the **164°** heading and fly the approach.
- When the glide slope indicator begins to move, lower the Landing Gear and set the Flaps to **22°**.
- Set the selected airspeed bug to **140** knots with the **SPD** rotary knob on the **FGC** and adjust thrust as necessary to maintain **140** knots.
- When slightly below the glide slope and before intercept, set the Flaps to **45°**.
- Reset the selected airspeed bug to **137** knots, which is Target.
- Check the selected altitude is set to **2000'**, which is Missed Approach altitude.
- Complete the items on the **Landing** checklist.

LANDING

FLIGHT ATTENDANT – Notified. The cabin crew receives two tones automatically when the Landing Gear is lowered.

LANDING GEAR – Check the **EICAS** for the **3 green “DN”** indicator labels.

FLAPS – Check Flaps are set to **22°** or **45°**. Flaps are set to **45°** for this approach.

THRUST RATING – Check the top of the **EICAS** for the **blue “T/O-1”** label.

NOTE: *The T/O-1 thrust rating is automatically set when the aircraft is below 15000 feet and the Landing Gear is down.*

AUTOPILOT / YAW DMPR – Disengage the Autopilot and Yaw Damper **by 200AGL**.

The aircraft should be near or at the Outer Marker at this time. Continue with the approach and landing...

ERJ PANEL PROJECT INTRODUCTORY FLIGHT

- Upon reaching the **CR LOM**, click the **CHR** button on the Clock to start the timer.
- Maintain **137** knots through DH. The Tower has issued clearance to land.
- Click the red Autopilot / Yaw Damper disengage button on the left Yoke handle before the radar altimeter at the bottom of the **EADI** shows **200** AGL.
- Thru DH, slightly reduce thrust to cross 50' above runway threshold at **127** knots.
- Touchdown within the touchdown zone on Runway 13.
- Upon touchdown, press “F1” to set zero thrust.
- Press and hold “F2” to select maximum reverse thrust.
- When airspeed is below **60** knots, release “F2” and apply brakes as necessary.
- Exit clear and to the left at the end of Runway 13 and stop the aircraft.

Approach Notes:

Interpolation of the elapsed times from the CR LOM (FAF) to the Missed Approach Point (MAP) shown at the bottom right of the ILS RWY 13 approach chart produces a time of 1 minute 52 seconds at an airspeed of 140 knots. The Clock can measure elapsed flight time and elapsed time started in the air. Selecting **ET** on the Clock will cycle between the two.

A green “REV” label next to the N1 digital readouts in the **EICAS** indicates reverse thrust.

The spoilers will automatically deploy on touchdown and then retract when speed is below 25 knots.

Check the elapsed flight time on the Clock and record the time. Ground control has issued taxi clearance to the ramp. Open the Top Down view by pressing “SHIFT + J”. Taxi to the terminal using the taxiway parallel to Runway 17 on your right. Steer to the right where the taxiway splits. Complete the items on the **After Landing** checklist.

AFTER LANDING

FLAPS – Select Flaps **UP**.

TRIMS – **Reset** ROLL, YAW, and PITCH trims so they are centered at zero, zero, and in the green band, respectively.

ERJ PANEL PROJECT INTRODUCTORY FLIGHT

TAXI LIGHTS – Open the overhead panel. On the **EXTERIOR LIGHTS** panel, select the **TAXI** switch to **ON**.

EXTERIOR LIGHTS – Continuing to the left, select the **LDG1**, **NOSE**, **LDG2**, and **STROBE** switches to **OFF**.

APU – Click on the **START** position of the **APU MASTER** rotary switch on the **ELECTRICAL** panel to activate the APU. Monitor start progress in the **EICAS** display. Close the overhead panel. Select **SYS** on the **MFD** menu and then the **ELEC** page. Check that a green 28.5 Volts is indicated under the white “APU” label when the APU has stabilized.

When approaching the terminal parking area, open the **overhead panel** and select the **TAXI** switch to **OFF** so the taxi lights will not blind the ramp agent parking the aircraft. Close the **overhead panel** if it restricts the windshield view while parking. Set the parking brake when the aircraft is completely stopped at the terminal building. Select the **T/O** page on the **MFD** and complete the items on the **Shutdown** checklist.

SHUTDOWN

PARKING BRAKE – Check the parking brake is set.

THRUST LEVERS – Bring the thrust levers back to the **Idle** position.

HYDRAULIC PUMPS – Re-open the overhead panel if it was closed when parking. Select both electric hydraulic pump rotary switches to the **OFF** position.

***NOTE:** When the hydraulic pumps are selected off, the Master Caution on the glareshield will flash and one aural chime will be heard. Allow the Master Caution indicator to flash until turning off the Rotating Beacon.*

NOSEWHEEL STEERING – Disengaged. Check the **EICAS** message area for the amber **STEER INOP** text message.

START / STOP SELECTORS – Click on the **STOP** position of each rotary knob to shut down the engines.

ROTATING BEACON – Select the **RED BCN** switch to the **OFF** position. The red door and hatch indicators and boxed red “DOORS OPEN” message will appear on the **T/O** page. Click on the flashing **Master Caution** indicator on the glareshield to cancel the alert.

CABINS SIGNS – Select the **FSTN BELTS** cabin sign to **OFF**.

ERJ PANEL PROJECT INTRODUCTORY FLIGHT

Allow some time for the passengers to disembark and for the ground crew to begin servicing the aircraft. Click the **FD1**, **APR**, and **CPL** buttons on the **FGC** to deactivate the **FGC**. Complete the items on the **Terminating** checklist and secure the aircraft.

TERMINATING

STANDBY ATTITUDE IND – Click on the “PULL TO CAGE” button on the backup **ADI** to cage the gyro. The red “OFF” flag will appear in the instrument face.

FUEL PUMPS – Select the **TANK 1** and **TANK 2** rotary switches on the **FUEL** panel to the **OFF** position. Click on the flashing **Master Caution** indicator on the glareshield to cancel the alert.

GPU – Check that the **GPU** pushbutton shows a lighted “GPU AVAIL” label on the **ELECTRICAL** panel to ensure the GPU is connected.

APU – Click on the **STOP** button to the left of the **APU MASTER** rotary switch to shut down the APU. When APU turbine percentage shown in the **EICAS** is less than 10%, select the **OFF** position on the **APU MASTER** rotary switch.

AVIONICS MSTR / BATTERIES – On the bottom right of the **ELECTRICAL** panel, click on the left **Avionics Master** pushbutton to deactivate the panel displays and radios. The panel displays will remain activated if fsuipc.dll is installed and configured to provide continuous battery power. Select the **OFF** position of the **BATT1** rotary knob on the **ELECTRICAL** panel. Close the overhead panel.

You have completed the Introductory Flight. Consult the additional ERJ Panel Project documents for further information and operations.

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