X-CRAFTS

FLIGHTSIM ADD-ON DESIGN

Embraer ERJ Family by X-CRAFTS
USER MANUAL

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MARKO MAMULA and STEVE WILSON

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1.0 INTRODUCTION

Hello and thank you for purchasing one or more of the EJets Family of Embraer Regional Jet aircraft - the ERJ's. We hope you have as much enjoyment flying your new aircraft as we did creating it and improving it to it's latest version. This manual is applicable to all of the X-Crafts ERJ's which are significantly different from the E175 and E195 EJets.

After reading and studying this manual, if you have any more questions feel free to ask on the forum!

The custom flight management system that's provided with the product - the **Tekton FMS -** has its own manual which you can also find in the Documentation folder. We are also producing a series of tutorial videos about how to use the Tekton FMS and the aircraft. Please visit the EJets Family forum on X-Plane.org for a link to the latest version of these videos.

The ERJ's have both Marko and Steve yet another opportunity to provide engaging flight simulation entertainment and perhaps even a little bit of education to an ever expanding family of aviation enthusiasts.

1.1 INSTALLATION

To install any of the aircraft or the bundled set(s), extract the zipped folder(s) into X-Plane/Aircraft/… in a folder of your choice. We suggest that the folder name contain no non-unicode characters. The folder also must not be a system folder. If you have more than one X-Crafts product, an X-Crafts folder is completely optional.

1.2 COPYRIGHT

All the material contained in this package is exclusive copyright of the X-Crafts and no part of any of the models contained in this package, or any other files within, in part or in whole, may be copied, re-distributed, disassembled, re-packaged or exploited in any way for any commercial purpose without the express permission of the author(s).

The package and its derivatives may be used for non-commercial purposes only. ACF file, 3D files, textures, engine and system sounds, cockpit and documentation and plugins:

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1.3 THE TEAM

Marko Mamula (X-Crafts on the forum) - 3D model, flight model, textures, project manager

Steve Wilson (Steve.Wilson on the forum) - *Tekton FMS* and SASL plugin programmer

Todd Fleck - FMOD sounds, sound design, lighting enhancements and liveries

Alex Dydula - Chief Beta Tester and general all around expert QA analyst

Our Beta Testers - We would also like to thank our legion of beta testers whom have helped make this product what it is and to verify the functionality, catching many bugs along the way so that you don't have to. You fine flight simulation enthusiasts know who you are! And we also thank our many users that have provided constructive criticism, thoughtful suggestions and bug reports of their own over the years.

1.4 DEMO FLIGHT

See the '**../Embraer E1xx vX.X/Documents/Demo flight**' folder for a sample flight that will give you the experience of a complete flight, taking off and landing at Tucson International Airport. Something of a "once around the pattern" flight with just enough waypoints to do the job. Please see chapter 6 for details on operating the aircraft, and the companion FMS manual for instructions on use of the MCDU functions.

1.5 TUTORIAL VIDEOS

Go to the X-Crafts Youtube Channel for many tutorial videos explaining how to use the the aircraft feature as well as the FMS and its functions.
https://www.youtube.com/channel/UCF0S2b-RA156Br5oMtrCF9A/feed?gl=US

1.6 VIEWING OPTIONS

Recommended field of view is 65-70 degrees. Change this in X-Plane under Settings > Rendering Options > Special Viewing Options > Lateral field of view

An X-Plane "QuickLook" is set up under numpad '**0**' for the Tekton FMS MCDU.

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You can also set a custom QuickLook (QL). The steps are as follows:

1. In the 3D cockpit view, set the desired view. Or even an exterior view ...
2. Now press Ctrl 1 (or any other digit from 0 to 9). The number must be on the number pad on the keyboard.
3. Thus stored, you now can see this view by pressing the 1 (without ctrl) on the number pad.
4. Pressing the 1 again, the previous view is restored.
5. These 20 QL's you can now place on different joystick buttons. This can be done as usual in the menu "joystick, keyboard and devices" - "Extra Buttons".
6. The saved views are aircraft specific. They are saved directly in the appropriate directory of the Aircraft, stored as "Aircraft Name_prefs.txt"

   X-Plane offers up to 20 Quick Look's, but you have to assign the storage commands to keys other than the 10 original storage (CTRL + ??) on the number pad.

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2.0 GENERAL

2.1 BACKGROUND

Embraer S.A. is an aircraft company based in São José dos Campos, São Paulo, Brazil. It is the third largest producer of civilian aircraft behind Boeing and Airbus. As of this writing, Boeing and Embraer are in the process of establishing a joint venture to continue to produce commercial airliners, subject to shareholder and Brazilian government approvals.

Embraer has a long history of military and commercial aircraft manufacture. Their first airliner was a small, 18 passenger turboprop known as the EMB 110 Bandeirante, which first flew in April of 1973. This was followed by the 30 passenger EMB 120 Brasilia in 1983.

In 1989, Embraer launched the initial concept for the EMB-145, a stretched version of the EMB 120 that would have carried 45 to 48 passengers. While the planform for this aircraft was quite similar to the EMB 120, it was novel in that it replaced the turboprop engines with podded turbofan engines in the same locations, in front of and slightly above the wing.

Source: Embraer via Wikipedia

The basic aircraft went through an evolutionary phase driven by engine selection and various increases in performance requirements and objectives. A planned first flight in 1991 did not occur. In fact, the spring of 1991 saw the aircraft gain a swept wing and more conventionally located podded jet engines, still on the wings. Wind tunnel testing of this design ultimately led to a re-evaluation in late 1991, and the now very familiar planform of the ERJ-145 was born with a swept wing free of engines, the engines moved to pods on either side of the empennage. The aircraft first flew in August of 1995, and was capable of seating 50 to 55 passengers.

Since 1995, the ERJ-145 has spawned 14 civilian variations - 12 commercial and 2 business jets, and six military versions.

Where many civilian airliners have been stretched to provide new passenger capacities, the ERJ-145 was actually reduced in overall length to produce the most markedly different aircraft in the series, the ERJ-140 and ERJ-135. This reduction for the ERJ-140 was actually driven by the needs of some United States airlines which have agreements with their pilots' union to limit the number of 50 seat

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regional jets that can be flown by partners. The reduction also contributed to the viability of a smaller sized aircraft that would appeal to business owners, leading to the Legacy 600 and 650 aircraft.
The X-Crafts ERJ's model five of these variations: The ERJ-135LR, the ERJ-140LR, the ERJ-145LR, the ERJ-145XR, and the Legacy 650. The ATP type rating for the ERJ-145 series is universal - if a pilot checks out in one variant of ERJ-145 aircraft, it's good for all variations.

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2.2 SPECIFICATIONS

Aircraft:	ERJ-135LR	ERJ-140LR	ERJ-145LR	ERJ-145XR	Legacy 650
Flight Deck Crew	2	2	2	2	2
Passengers	37	44	50	50	14
Powerplant (typical)	2 × Rolls-Royce AE 3007-A1 (7800 lb thrust) or Rolls-Royce AE 3007-A1P (8300 lb thrust)	2 × Rolls-Royce AE 3007-A1 (7800 lb thrust) or Rolls-Royce AE 3007-A1P (8300 lb thrust)	2 × Rolls-Royce AE 3007-A1 (7800 lb thrust) or Rolls-Royce AE 3007-A1P (8300 lb thrust)	2 × Rolls-Royce AE 3007-A1 (7800 lb thrust) or Rolls-Royce AE 3007-A1P (8300 lb thrust)	2 × Rolls-Royce AE 3007-A1E (7,953 lb thrust)
Range	1,750 nm 3,243 km	1,650 nm 3,058 km	1,550 nm 2,873 km	2,000 nm 3,706 km	6,297 km 3,400 nm
Maximum Speed	M0.78	M0.78	M0.78	M0.80	M0.80
Service Ceiling	37,000 ft	37,000 ft	37,000 ft	37,000 ft	41,000 ft
Maximum Takeoff Weight	20,000 kg 44,092 lb	21,100 kg 46,517 lb	22,000 kg 48,501 lb	24,100 kg 53,131 lb	22,500 kg 49,604 lb
Maximum Fuel Load	5,136 kg 11,322 lb	5,136 kg 11,322 lb	5,136 kg 11,322 lb	5,973 kg 13,168 lb	8,242 kg 18,170 lb
Maximum Payload Weight	4,499 kg 9,918 lb	5,292 kg 11,666 lb	5,786 kg 12,755 lb	5,909 kg 13,027 lb	2,356 kg 5,193 lb

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3.0 COCKPIT

3.1 GENERAL

This X-Plane add-on includes an advanced and complete 3D virtual cockpit to emulate the real aircraft's cockpit as closely as possible in the X-Plane flight simulator.

Every attempt was used to make the add-on as easy to use as possible. For example, all clickable areas in the cockpit were made bigger in order to make it easier to click on any button, knob or key on the monitor.

3.2 DARK AND QUIET COCKPIT

Embraer uses a "Dark and quiet" cockpit principle. This means that under normal operations, there are no illuminated buttons, knobs are in the 12-o'clock position, and there are no aural notifications. Generally speaking, if a button is not illuminated, it's considered to be ON. There are a few exceptions: the GPU generator and APU BLEED work the other way around, where they are LIT when they are ON. More about this later in the overhead panel section.

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3.3 GLARESHIELD PANELS

Along the top of the glareshield are five significant control panels, the FGCP (Flight Guidance Control Panel) and two each of DCU (Display Control Unit) and RCP (Radar Control Unit) - one for the pilot (Captain - CA) and one for the copilot (First Officer - FO). The many autoflight modes and functions, along with key controls for navigation and weather/radar displays are engaged using the panels' many buttons and knobs. You must take the time to fully understand how each control effects the aircraft during each phase of flight if you wish to take full advantage of the ERJ's many capabilities.

Most of the pushbuttons have LED's that indicate their current state. Basically if there is a yellow light above or inside the button, it is **armed**. If there is a green light, it is **engaged.** You can also see what modes are engaged on the top part of the PFD (check section 3.6.1). The autopilot must be ON for any of these functions to affect the flight of the aircraft.

3.3.1 LATERAL MODE GUIDANCE

- **FD** - Flight director. This engages the flight director, but *not* the autopilot.
- **HDG** - Enable heading hold mode.
- **NAV** - Autopilot engage VOR/localizer Engage this if you want the plane to follow the flight plan loaded from the FMS, a navaid radio signal or fly an ILS approach.
- **APR** - Autopilot approach mode. This will engage the NAV and at the same time glide slope (GS) indications on the PFD if a glide slope signal is present.
- **BANK** - Lock the bank to max 15 degrees.
- **AP** - Engages autopilot servos so that the flight computer flies the aircraft. If it is not engaged, you are flying manually and the plane will not follow any selected autopilot mode. If the FD is not on, AP will engage the FD and yaw damper (YD) automatically.
- **CPL** - Flight Director source selector. Normally this would switch between the pilot/copilot's FD source. This button doesn't do anything and its function is not implemented in this release version.
- **YD** - Yaw damper.
- **FD2** - This function is also not implemented in this release version.

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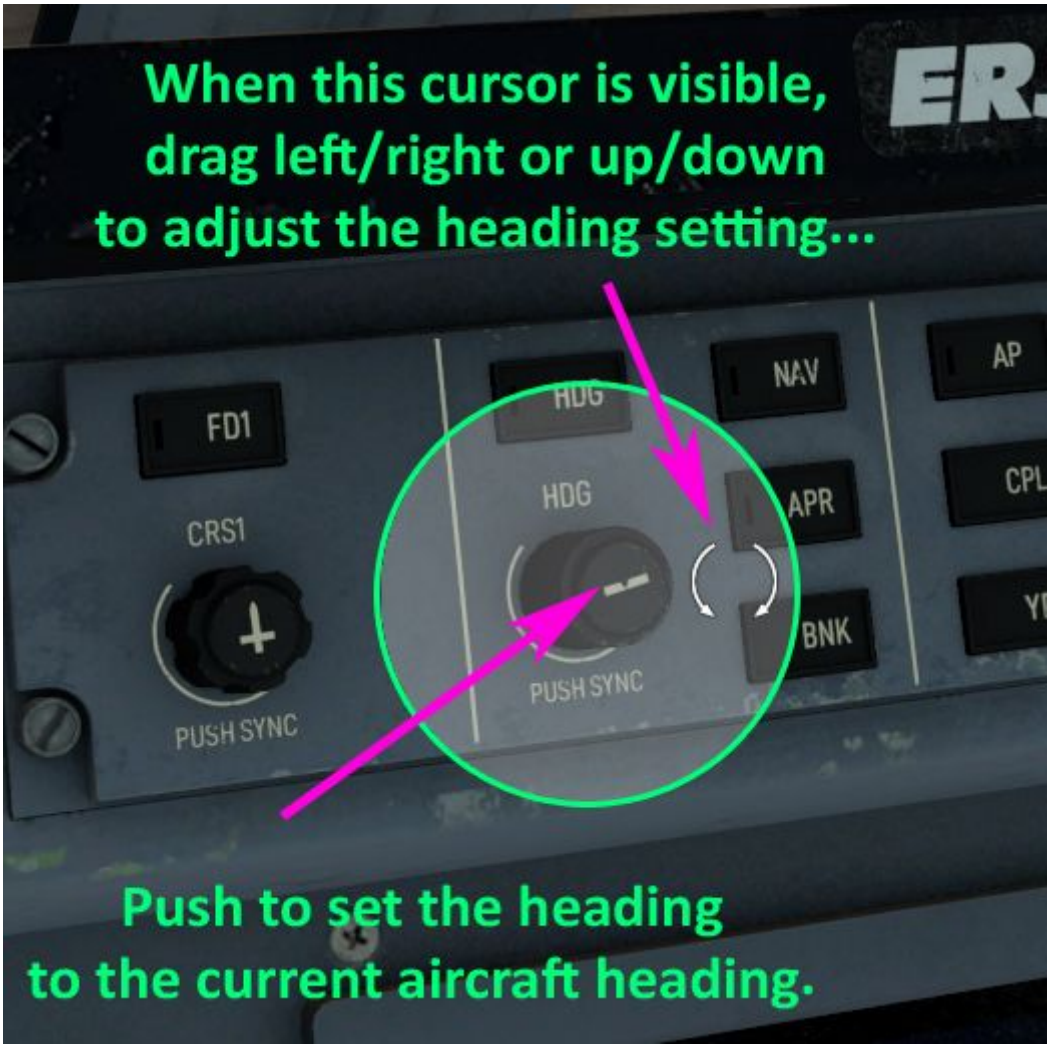
3.3.2 HDG KNOB

The heading knob functions by moving the cursor into the general area of the knob. When you see the circular arrows, you can hold down the left mouse button and then movements of the mouse left or right, up or down will change the current heading setting.

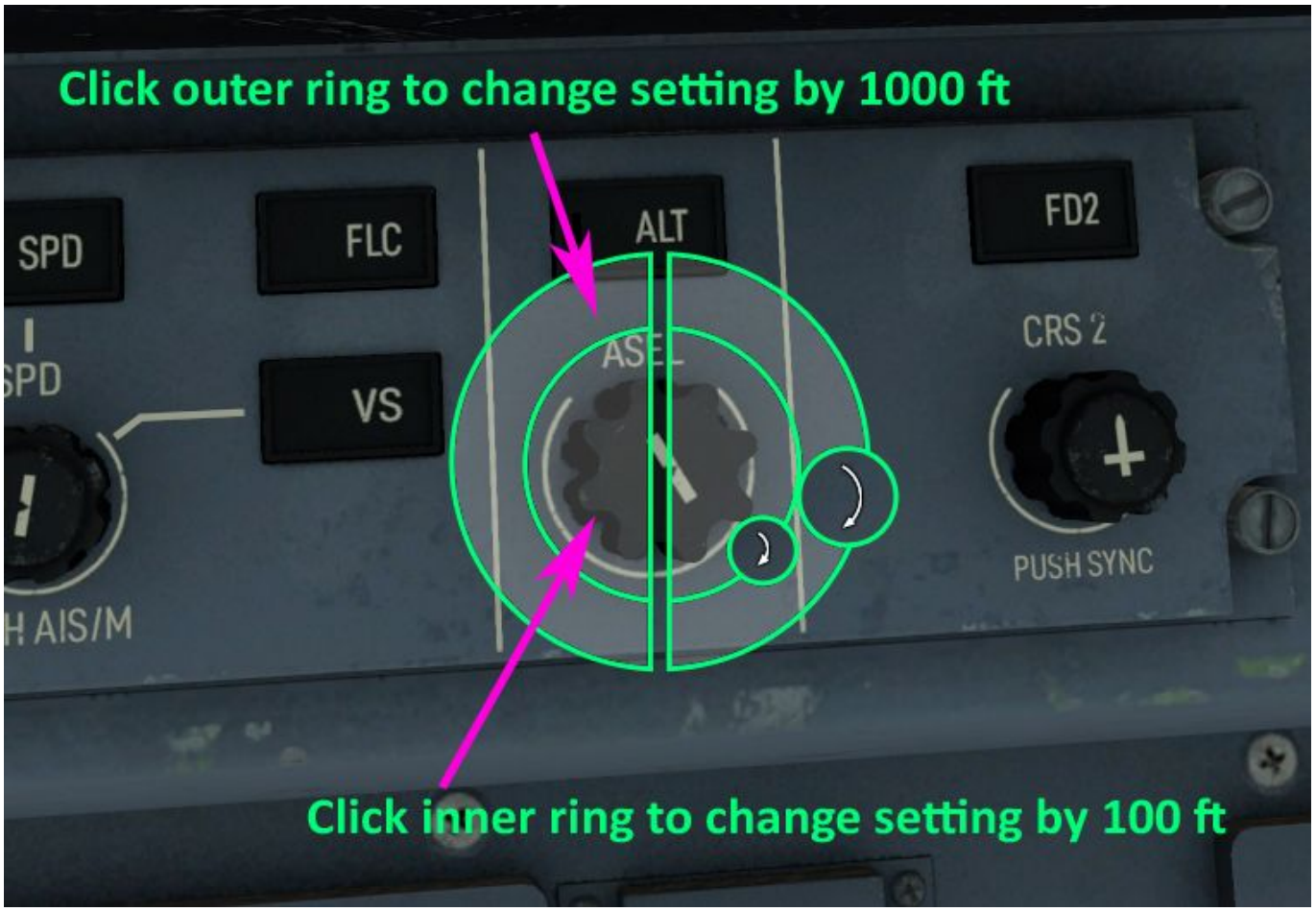
The heading can also be altered digitally using the AUTOPILOT page of the FMS.

This style of cursor and knob control will be found on various other knobs in the aircraft, and they operate in a similar manner.



3.3.3 ALT KNOB

The ALT knob has two options for adjustment. The inner circle changes the value by 100 ft per mouse click and the outer circle changes the value by 1000 ft per click. The altitude setting can also be adjusted using the FMS AUTOPILOT page.



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3.3.4 VERTICAL MODE GUIDANCE

When you select any of the three vertical modes, SPD, FLC or VS, the selector knob will then adjust the appropriate control value, be it altitude or airspeed.

- **SPD** - Airspeed controlled by aircraft attitude. Set a speed and the aircraft will adjust its attitude to either go slower or faster as needed. If you increase thrust at the same time, the aircraft will climb. If you decrease thrust, it will descend.

- **FLC** - Flight Level Change. This is an automated means of increasing or decreasing altitude while either maintaining a predetermined airspeed or a predetermined rate of descent. If the altitude set into the autopilot is higher, you will climb. If lower, you will descend. It's very important to maintain good throttle control and airspeed monitoring when using FLC. You have to be sure to give the aircraft enough thrust to climb at the rate set by FLC. This is 240 KIAS below 10,000 ft, increasing to 270 KIAS above 12,000 and Mach 0.56 above FL 180. Conversely, when descending you will need to reduce thrust so that the aircraft can descend safely at 2000 FPM from any altitude above 12,000 feet, reducing to 1000 FPM at or belove 10,000 feet.
- **V/S** - Vertical speed. Set the desired rate of climb or descent and adjust thrust accordingly.
- **ALT** - Altitude hold and select/ If you click on the ALT button twice, it will turn green and it will hold the current altitude.

HIDDEN AUTOTHROTTLE

The ERJs don't have autothrottle, but one was added it for development convenience. You can engage it by clicking on the top left screw of the guidance panel.

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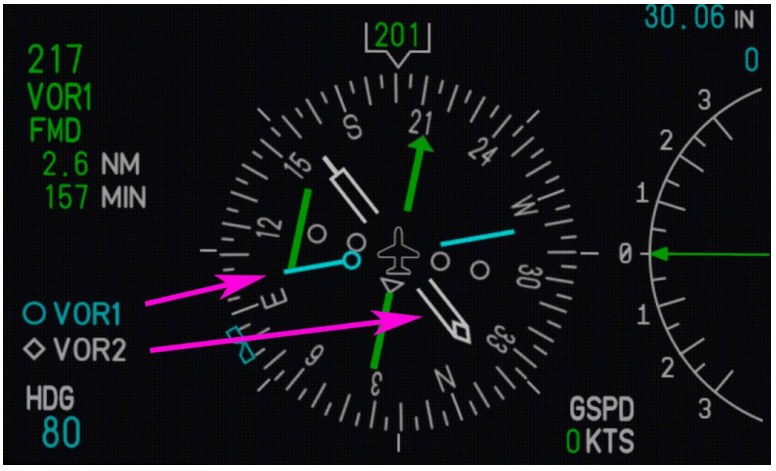
3.3.5 DISPLAY CONTROL UNIT (DCU)

- **FMS/WX:** Cycles between full map and PLAN mode map (centered on a waypoint)
- **GSPD/TTG:** Cycles between ground speed and time-to-go. NOT IMPLEMENTED IN THIS RELEASE VERSION
- **ET:** ELAPSED TIME - NOT IMPLEMENTED IN THIS RELEASE VERSION. The chronometer can be used for ET instead.
- **NAV** - cycles between NAV1/NAV2 as navigation guidance source. Overrides FMS.
- **FMS** - Selects FMS as the navigation guidance source. Overrides NAV 1 or NAV 2 if selected.
- **RA/TST - Radio Altimeter (RA)** minimums selector knob. Sets the radio altimeter decision height
- **BRG KNOBS - HSI bearing source button**:
    - CIRCLE (O): indicates VOR1, NAV1. Color: CYAN
    - DIAMOND (◊): indicates VOR2, NAV2. Color: WHITE
    - Each selection shows separate bearing indicators on the HSI. This is only a DISPLAY function. There is no interaction with the autopilot on the DCU except for the NAV and FMS buttons as already described.



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3.3.6 RADAR CONTROL PANEL

The up and down arrows on the RCP control the radar range. The TERR and VSD buttons activate and deactivate the optional terrain radar and vertical situation display. The VSD is extremely useful in controlling the descent of the ERJ's upon arrival at your destination since VNAV is not available.

3.3.7 BAROMETRIC UNITS TOGGLE

By clicking on the IN/HPA button on the bottom of the PFD frame, you can switch between indication units - inches of mercury and hectopascals.

The knob on the far right adjusts the barometric setting in the Kollsman window of the PFD. The STD button selects the preset for a "standard day:" either 29.92 inches of mercury or 1013 hectopascals.

3.3.8 ENGAGING THE AUTOPILOT

- Choose a source using the Display Control Unit (DCU). If you wish to challenge yourself and use VOR navigation, or if you need to fly a coupled approach to an airport using a localizer or ILS approach, select either NAV radio and dial in the correct frequency for the navaid. IF YOU WANT TO FLY A LOADED FLIGHT PLAN you must select FMS.
- Engage the FD and then the AP. When the light turns green, the autopilot servos are on.
- Once AP is on and the flight plan is loaded, press NAV on the Flight Guidance Control Panel (FGCP) to follow the flight plan loaded in the FMS. For ILS press APP. This will automatically engage NAVand GS (glideslope) if available.

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IMPORTANT! Remember that you have to manually adjust your throttles at all times in the ERJ's!

If you're used to larger airliners equipped with autothrottles, it is easy to forget this and overspeed, causing the aircraft to unexpectedly pitch up and down as the AP is trying alternately to slow the aircraft down and to descend back to the commanded altitude.

The ERJ-145 and it's siblings are light for airliners and are more sensitive to control inputs and thrust. Be sure to set the correct Thrust Rating Selection using the FMS (TRS is accessed via PERF page 1).

If you choose to use the hidden autothrottle, be sure to engage it before reaching your desired altitude. Otherwise, the plane will start porpoising as described above once it reaches the altitude entered in the autopilot.

Please visit this website (http://xplane.wikia.com/wiki/Autopilot) for a detailed explanation of all autopilot modes and functions in X-Plane.

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3.4 OVERHEAD PANEL

As stated previously, Embraer generally uses the dark and quiet cockpit principle in their airliners, meaning that if a button is dark, it means it is in the correct condition for normal flight. For the vast majority of the controls, this means that the function is ON. If it is LIT, it is warning the pilot that the function is OFF.

Many of the buttons and switches on the overhead panel are left in an ON state in between flights. Based on guidance from active and past ERJ pilots, these have been pre-configured as used in normal operations, just like the real aircraft. You will find out that setting up the overhead panels for flight is very straightforward.

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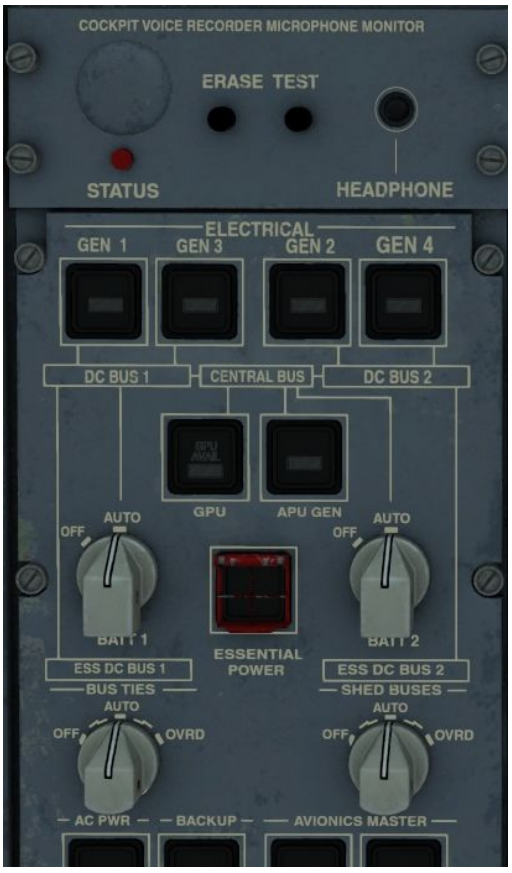
3.4.1 ELECTRICAL

The E-Jet electrical system is fully automated and under normal operations, no pilot action is required. Two electrical networks work independently from one another for electrical fault isolation purposes. In the event of a power source fault, bus ties automatically connect between the networks with no significant operational or workload needed.



COCKPIT VOICE RECORDER: Not functional.

GPU BUTTON: Connects (pressed) or disconnects (released) the GPU to/from the electrical system.

- **GPU AVAIL** inscription illuminates when operating GPU is physically connected to aircraft; does not indicate good power.
- The Inscription is darkened when the button is pressed & GPU connected to electrical network. This function has priority over all batteries and generators.
- There is a striped bar in the button when pressed and connectivity to the GPU is established. An exception to the dark cockpit rule.

NOTE: After selecting GPU on the Options menu (see section 4.1), the GPU is connected, but not providing power to the aircraft. The GPU Gen button on the overhead panel will go to **AVAIL**. After clicking on it it will go to **IN USE**. At this point the GPU is providing AC power to the aircraft.

APU GENERATOR: Connects or disconnects a 28 volt DC, 400 Amp APU Starter-Generator.

- BATT 2 is used to start the APU.
- A striped bar is present in the button when released.

BATTERIES 1 & 2: These two knobs connect the electrical systems to the aircraft's two batteries.

- When batteries are switched to ON, only the EICAS, CA side FMS, RMUs (radio panels) and the standard six instruments will be activated. It takes over 30 seconds for all systems to go through their power up sequence, just as it is in the real ERJ's.

BUS TIES (functional) and **SHED BUS**(not functional)**:** These controls connect the 2 main busses so that one bus can back up the other in the event of a supply failure. "Shed Busses" is an automated bus tie manager that prioritizes and reduces load automatically if failures accumulate. There are several busses on the actual aircraft that must be continuously managed.

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3.4.1 ELECTRICAL (Continued)

AC POWER & BACKUP: These two buttons enable the inverters that convert AC power to DC.

AVIONICS: These buttons enable the power supply to all avionics systems. When pressed, it turns the PFD and MFD on as well as the copilot side FMS. It takes approximately 30 seconds for all the sections of the screens to load, as in the actual aircraft..

EMERG LT: This switch needs to be in the ARMED or ON position during flight. Enables emergency lighting in the event that it is needed.

OVHD PNL LT: This is a rheostat control for the overhead panel lights.

3.4.2 FIRE PROTECTION

In the event an engine fire occurs an annunciator will show up on the EICAS and the pverhead fire extinguisher levers will illuminate.

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- Pull down (click on) the appropriate fire extinguisher handle should an engine catch fire.

3.4.3 FUEL

XFEED: Crossfeed selector knob. If one fuel tank gets low, turn the crossfeed valve to that side to draw fuel from the opposite wing to restore balance to the aircraft.

PUMP SEL: Select which pump is going to be used of three per engine.

AC PUMP PWR: Supplies power to the AC fuel pumps.

ICU - INTERPHONE CONTROL UNIT

Only the **ATTD CALL** button is functional in this release version. Summons the flight attendant to the cockpit with a pleasing “ding” sound in the main cabin.

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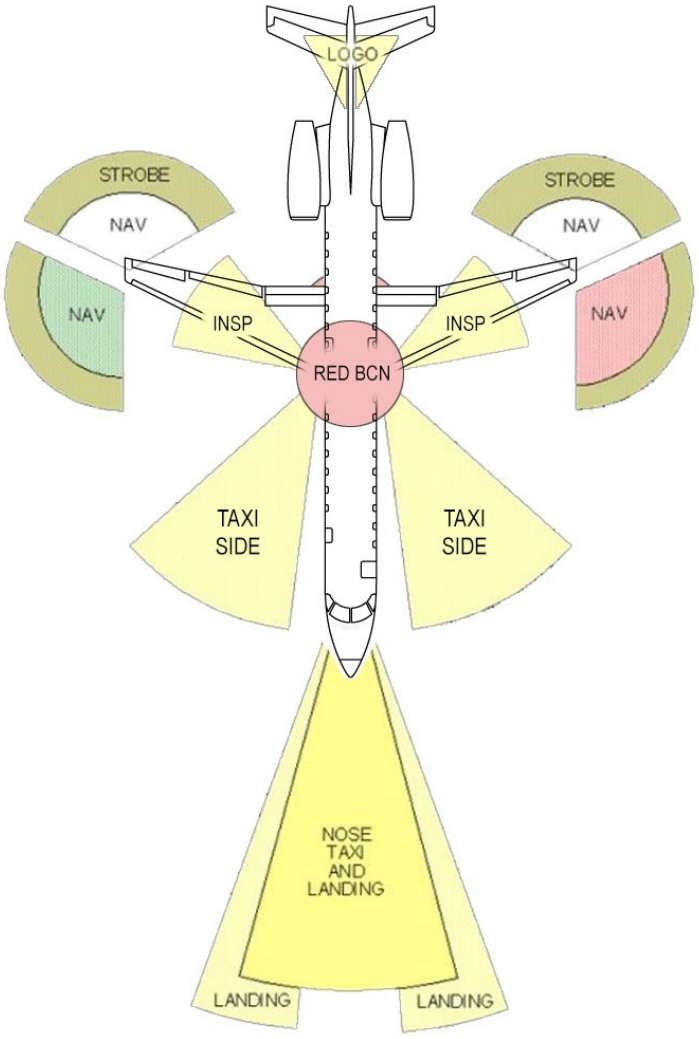
3.4.4 EXTERIOR and INTERIOR LIGHTS

EXTERIOR: Use the diagram provided for locations of external lights. Self-explanatory. **INSP** stands for inspection lights on the wings.



Self explanatory as well for the most part. The “STERILE LIGHT” at the cockpit entrance is used to indicate that the cockpit is in a STERILE condition during critical phases of flight, and that entry to the cockpit is forbidden. WINDSHIELD WIPERS are used as one might expect. Rain effects are not modeled in this release of the aircraft.

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3.4.5 AUXILIARY POWER UNIT (APU)

The APU is a gas turbine engine located in the airplane tail cone. It provides electrical and pneumatic power while the engines are not operating. It consumes around 310 pounds of fuel per hour and draws from the LEFT fuel tank. The APU can be started in flight up to 30,000 feet.

The APU MASTER knob has the following functions:

- STOP: turns the APU off.
- ON: keeps the APU running.
- START: starts the APU operation.

NOTE: You can observe the APU state on the MFD electrical page or EICAS APU N1 indicator.

After turning the switch to ON, a yellow box will start flashing around the 0%.

Correct procedure is to wait until the yellow box stops flashing, which will indicate the APU is ready to be started. Then you can turn the knob to the START position and hold it briefly, which will begins the APU startup process.

In the actual aircraft, correct procedure is to use the STOP button to turn off the APU. Once it has spooled down sufficiently, you can then turn the APU MASTER to the off position.

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POWERPLANT PANEL

IGNITION

OFF: De-energizes ignition system

AUTO: Active FADECs control ignition system automatically

ON: Commands the FADEC system to continuously activate both ignition channels A&B. (Not simulated in this release version).

FADEC (Full Authority Digital Engine Control)

For the purposes of this product, X-Plane's FADEC functions are continuously engaged.

TAKEOFF DATA

These controls are not operational in this release version as well. In the actual aircraft they are used to have FADEC to analyze environmental conditions along with FMS inputs to establish the correct settings for various parts of the engines.

As a separate function, pilots are also able to make an appropriate THRUST RATING SELECTION (TRS) using an selection set accessed via the PERF 1 page. In real life, this would also provide instructions to the FADEC system to establish desired performance for the current phase of flight - takeoff, climb, cruise or descent. Takeoff or go-around thrust is normally selected via the TO/GA buttons on the throttle quadrant handles.

START / STOP

These two covered knobs are used to place the engines in the RUN state as well as to engage the starters when either the GPU or APU are connected to the aircraft. Start the engines using the procedure detailed in the ENGINE START checklists accessed via the pop-out tab labeled "CHECKLIST." You can access the checklists and other utilities by moving the mouse cursor to the lower left side of your X-Plane window.

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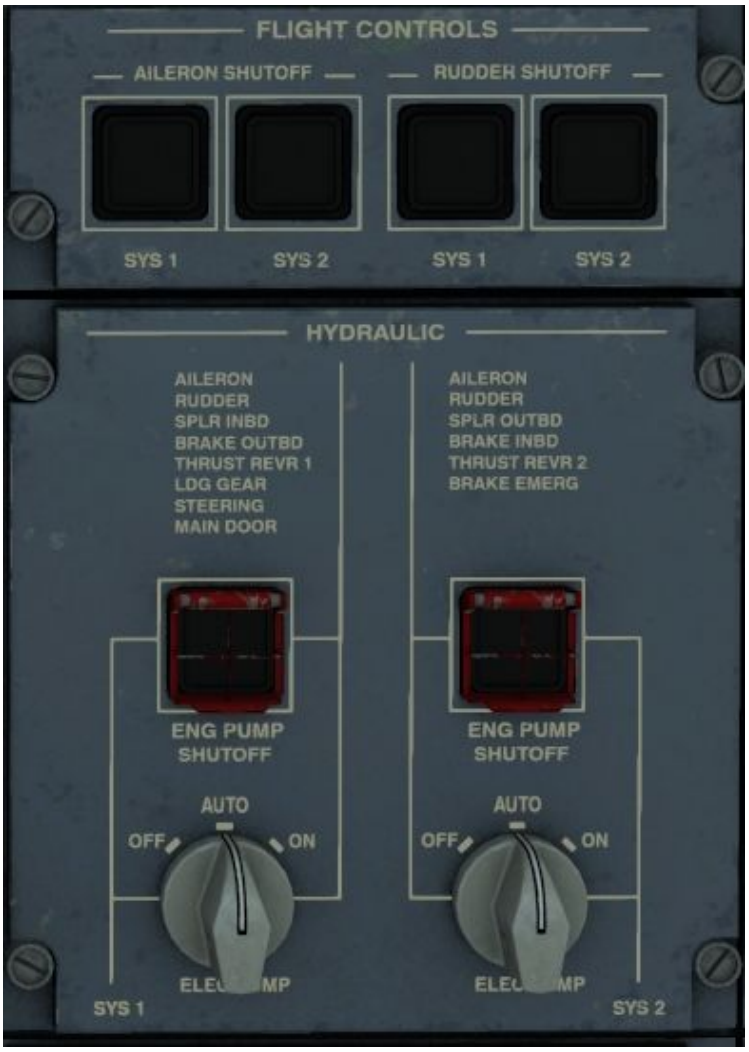
FLIGHT CONTROLS SHUTOFF PANEL

None of these functions are simulated in this release version.



3.4.6 HYDRAULIC PANEL

ELEC PUMP (SYS 1 and SYS 2)

Two pumps provide static pressure for the hydraulic systems. When running, engines provide the pressure necessary to drive the hydraulic systems.

The normal state for these controls is "AUTO." The shutoff controls are not simulated in this release version.

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3.4.7 ICE PROTECTION

This panel controls the various heaters and sensors used to keep the aircraft relatively ice free in flight.

Button toggles are provided for:

ENG AIR INLET
WING
STAB (Stabilizers)
WINDSHIELD 1/2 (Left and right)
SENSORS.

All of these can be turned on and off separately.

When ON (dark) the functions are automatic.

OVERRIDE: This knob controls three states for ICE detection.

ENG - Engines only.
AUTO - Normal Operation as needed.
ALL - All detection enabled.

ENG will manually open the ENG AIR INLET heat duct.

ALL will manually open the ENG, WING and STAB heating ducts.

TEST is not implemented in this version release.

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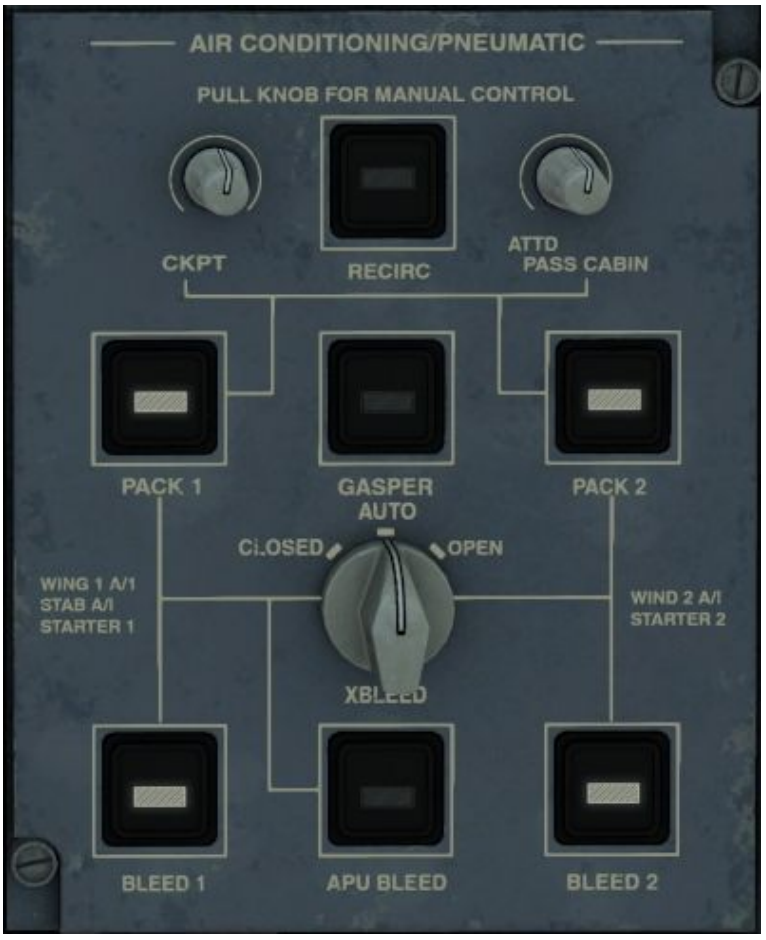
3.4.8 AIR CONDITIONING/PNEUMATIC PANEL



The pair of control knobs at the top of this panel manually manage the temperatures in the cockpit and cabin when pulled out to engage the function.

RECIRC - Controls both recirculation fans. On the ground, during hot soak days (continuous high ambient temperatures while the aircraft is not moving for a long time), these must be OFF. During cold soak days must be ON.

PACKS - Opens (dark) or closes (illuminated) the air conditioner pack regulators.

GASPER - Supplies overhead passenger controlled cooling vent ducts, as well as ventilation for the oxygen cylinder compartment, relay boxes, and the aft electrical compartment

BLEED 1&2 - Controls the engine bleeds. Bleed air is used for engine start, the environmental control system, pressurization, & ice protection.

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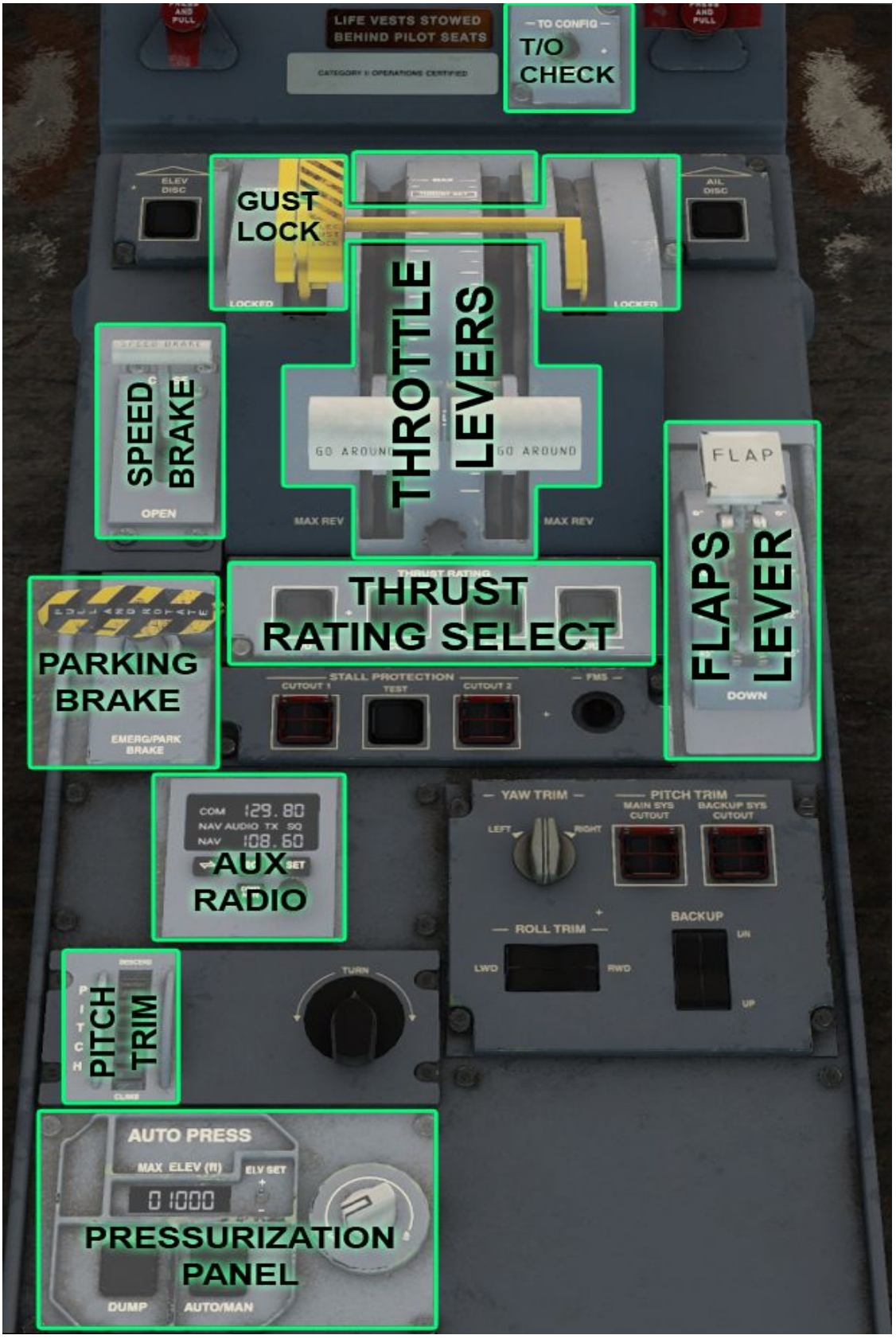
3.5 PEDESTAL

3.5.1 OVERVIEW



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Note: ***FMS MCDU PANELS*** *There are 2 FMS units installed with this product, our custom Tekton FMS and the default X-Plane FMS that approximates a more conventional unit, however without aircraft-specific features. Please see the Tekton FMS manual in the ERJ's documentation folder, or the Laminar Research FMS manual in the* ***X-Plane / Instructions*** *folder for more information.*

3.5.2 FLAP LEVER

The flaps lever may be moved using the mouse or the keyboard flaps commands.

NOTE: The 18° flap position is NOT USED in the real jet, therefore it is disabled in this add-on and cannot be selected.

Flaps position selection is a choice driven by many factors and complex charts when the professionals are doing the flying. Simply put for the casual flight sim pilot: the shorter the runway, and the heavier the aircraft, the higher the flap setting you will want to use. Using less flaps allows for better acceleration due to decreased drag. Flap position also changes your V-speeds.

You can find the available takeoff flaps settings on the FMS on page PERF 1, except for the ERJ-135 and the Legacy 650, where the only setting for takeoff is flaps 9. Approach flaps speed are found on FMS page PERF 3.

3.5.3 SPEEDBRAKE LEVER

Deploys the multi-function spoilers. Spoilers deploy the same angle as a response to the speedbrake lever position. The maximum deploy angle on the ground is 60° and 30° in the air.
To set the speedbrake to 'armed' on landing, press the speedbrake key shortcut ("3" key) or push the lever forward.

3.5.4 THRUST RATING PANEL

The thrust rating panel allows you to quickly select a different thrust rating, or limiter, depending upon the current mode of flight. Available settings include T/O (takeoff), CON (continuous) CLB (climb), and CRZ (cruise). Most are self explanatory, except for CON, which is the maximum continuous thrust setting that the aircraft can be operated at without time limit.

3.5.5 STALL PROTECTION

This panel is not functional in this release version.

3.5.6 BACKUP RADIO PANEL

This is a backup radio panel used for tuning COM2 and NAV2 frequencies in case the primary RMU units fail.

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3.5.7 PITCH TRIM PANEL

Used for controlling the pitch trim setting of the aircraft. Similar in function to the hat switch on a yoke or joystick.

3.5.8 T/O CHECK

After clicking on this button, you will be notified if everything is set for the Take off. If there are any items not set properly, you will hear an audible alert specific to the problem (check of brakes, flaps, trim and speedbrakes)

3.5.9 PRESSURIZATION

The pressurization of the cabin is automatic and can't be controlled by the user. The knob allows for Max Elevation selection

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3.6 MAIN PANEL

The main panel consists of three screens that make up the Electronic Flight Instruments System (EFIS). On the Left is the Primary Flight Display (PFD), middle the Multi-Function Display (MFD), and to the right is the Engine Indication and Crew Alerting System (EICAS).

3.6.1 PFD - PRIMARY FLIGHT DISPLAY

The upper half of the primary flight display (PFD) provides the pilot with information required to fly the aircraft such as the attitude indication, speed and altitude tapes. Above the attitude indicator is the Flight Mode Annunciation (FMA). This sub-display indicates the autopilot modes that are active and armed. The lower half of the PFD is used for aircraft navigation. Displayed are a compass rose with VOR and DME overlays, navigation source mode indication along with other key data displays as detailed below.

1 - Selected airspeed

2 - Actual aircraft airspeed

3 - Actual aircraft airspeed in mach number

4 - Autopilot source

5 - OBS needles, controlled by the DCU

6 - Selected autopilot heading, indicated on the compass by the heading bug

7 - Selected altitude readout based on autopilot setting on the Guidance Panel

8 - Current altitude

9 - Current barometer setting

10 - Vertical speed set with the autopilot and vertical speed readout in feet per minute

11 - Groundspeed indication

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3.6.2 MFD - MULTI-FUNCTION DISPLAY

The MFD presents MAP and PLAN navigation formats and various systems synoptic formats selectable by keys on the lower bezel of the display.

The synoptic system pages provide a visual representation of the selected system's functions and parameters. Radar range is controllable using a knob at the lower right corner.

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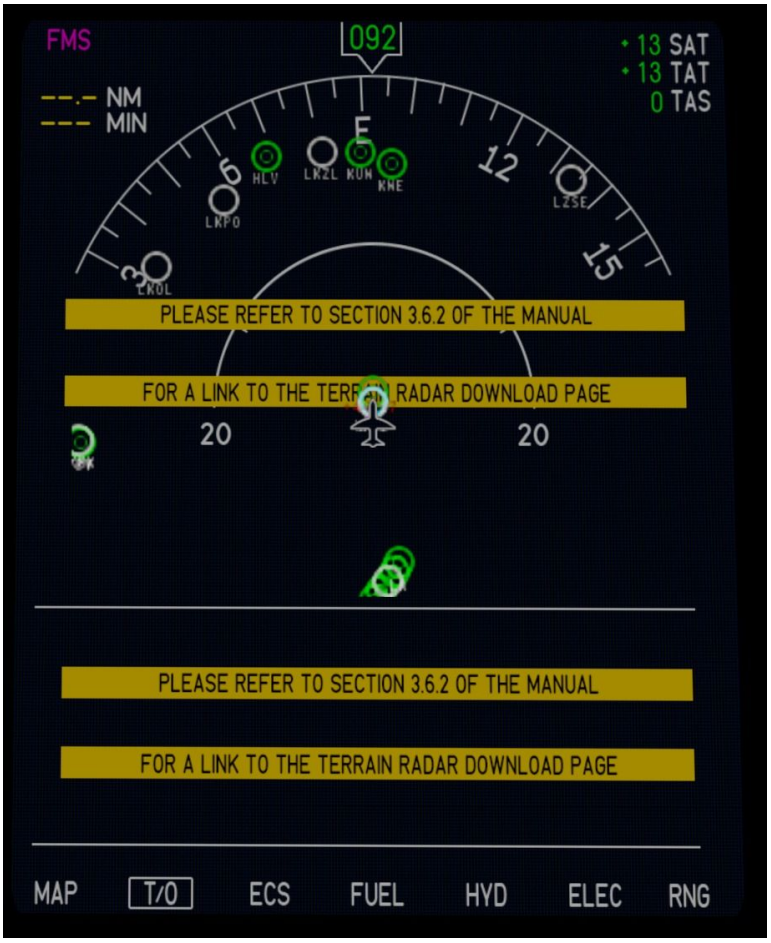
3.6.2.1 OPTIONAL TERRAIN MAP

It is possible to add terrain mapping to the MFD via a third party plugin. If you click on the TERR or VSD buttons of the RCP without the plugin installed, you will see the notification shown below. The plugin is available on the X-Plane.org flight sim download section: Terrain Radar LINK.



Technical support information for this plugin is also provided via the link. We only make this function available through the EJets for your convenience and enjoyment. It is not an X-Crafts product, use at your own risk, etc.. If the link does not work, cut and paste the following into your browser:

https://forums.x-plane.org/index.php?/files/file/37864-terrain-radar-vertical-situation-display/

Disclaimers aside, it's pretty interesting and useful when in use. When the plugin is properly installed in the X-Plane\Aircraft\Embraer E175 v2.x XP11\plugins or Embraer E195 v2.x XP11\plugins folder, depending on the aircraft, instead of the friendly notification, you'll see the control selections on the left.

When the terrain plugin is starting up, you'll see a test pattern and version number. This disappears after a few seconds. An example display can be seen on the next page.

When using the terrain radar, you'll probably want to manage, or "declutter" your map display by using the MAP button. In the example the WPT icons - navigation fixes - have been de-selected.

The terrain is shown using a green to red color scale, with red being the highest and black or green being fairly low terrain. Mind your altitude flying over the red, and pay close attention to your charts and radio altitude indicator.

When selected, the Vertical Situation Display, or "VSD," gives a side-on view to your flight and a depiction of upcoming terrain in green. There is also a white line that extends forward from the aircraft to indicate the predicted flight path.

Here we see the aircraft in a gentle climb on the VSD and mountainous terrain to the northeast and some significant hills to the west. Might want to climb a bit more eagerly…!

The terrain is only displayed in the two quadrants in front of the aircraft.

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3.6.3 EICAS (ENGINE INDICATION AND CREW ALERTING SYSTEM)

The upper screen displays engine thrust and caution/warning alerts. The lower half summaries fuel, secondary engine readouts, APU, cabin pressure, gear, flaps, trim, and gear status.

The EICAS includes the following information:

- Engine parameters
- FADEC limits/modes indicators
- Fuel quantity
- Oil parameters
- Landing gear status
- Slat/flap status
- APU parameters
- Pressurization parameters
- Control trims status
- Caution messages
- Warning messages
- Failure messages
- Takeoff configuration messages
- Thrust rating indicators

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3.6.4 RMU RADIO MANAGEMENT UNITS

There are 2 RMUs, the unit on Captain's (CA) side (top image) is primarily used for selecting NAV1 and COM1 radio frequencies, and the unit on the First Officer's (FO) side (bottom image) is usually used for selecting NAV2/COM2, but they are both independent and can be used for selecting either the "1" radios or the "2" radios.

Upper Display Buttons (L1 to L6 and R1 to R6):

L2, R2 and R4 are used to select the frequency to be changed. L1, R1 and R3 are used to swap the active and standby frequencies. You can only change the standby frequencies.

L3 selects the transponder code field for editing.

L4 cycles through the transponder modes. TA/RA is normally used to send both the transponder code as well as aircraft altitude.

The TCAS display echos the current map range. You cannot change the mode or the range using the RMU. This refers to a special TCAS map that is displayed for the real aircraft - not implemented in the current version of the product.

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Lower Keypad Buttons (active):

1/2 BUTTON - You can switch between CA or FO displays with the 1/2 button.

ID BUTTON - transponder ident - transmit special mode to allow ATC to identify your aircraft easily on their radar.

SQ - Selects the transponder for entry of the ATC directed squawk code.

TUNE Knob:

There are parts to this knob - an outer and an inner knob. These are used to change the displayed frequencies in the standby (green) fields as well as the transponder code. For VHF frequencies, the outer ring changes the values to the left of the decimal point, and the inner knob changes the values to the right of the decimal. For ADF values, the outer ring changes 100's, and the knob changes 10's and 1's. The left two digits of the transponder code are changed with the outer ring, and the right two digits with the inner knob.

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3.6.5 CLOCK AND CHRONOMETER

The “ET” button cycles through start, stop and reset functions for Elapsed Time.

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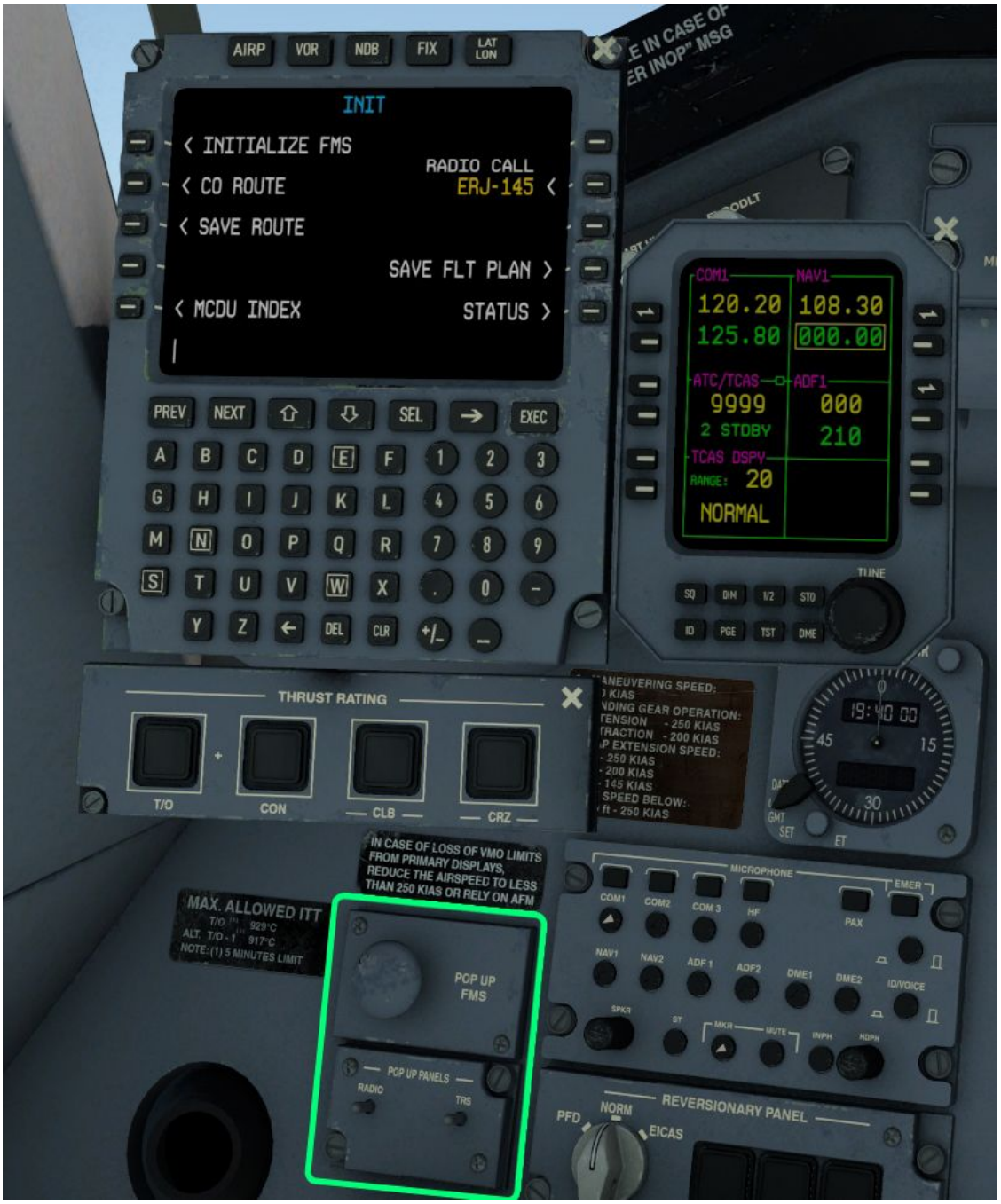
3.6.6 POP-UP PANELS

Pop-up panels are included so that thew RMU, FMS and Thrust Rating Panel can be operated in forward view.



The manipulators for bringing up the pop up panels are located on the bottom left of the main panel, immediately to the left of the audio panel..

3.6.7 ENLARGING THE MAIN PANEL DISPLAYS

Each of the main panel screens (PFD, MFD, EICAS) can be enlarged and brought closer to the pilots nominal point of view by placing the mouse pointer over the display using a right-mouse-click. To return the screen to the original size, right-mouse-click over the screen once again.

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3.6.8 AUDIO SELECTOR

There are three sets of controls on this panel that are functional, and serve the purpose of turning communication, navigation or ADF radios' audio on or off. When the audio for a specific radio is ON, a small white wedge shape is illuminated in the center of the selector button. In a future version, this will be used as a volume control as well, with the indicator representing the current level.

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3.6.9 REVERSIONARY PANEL

- Swaps the displays between the 3 modes.
- ADS, AHRS and SG buttons are not simulated in this release version.

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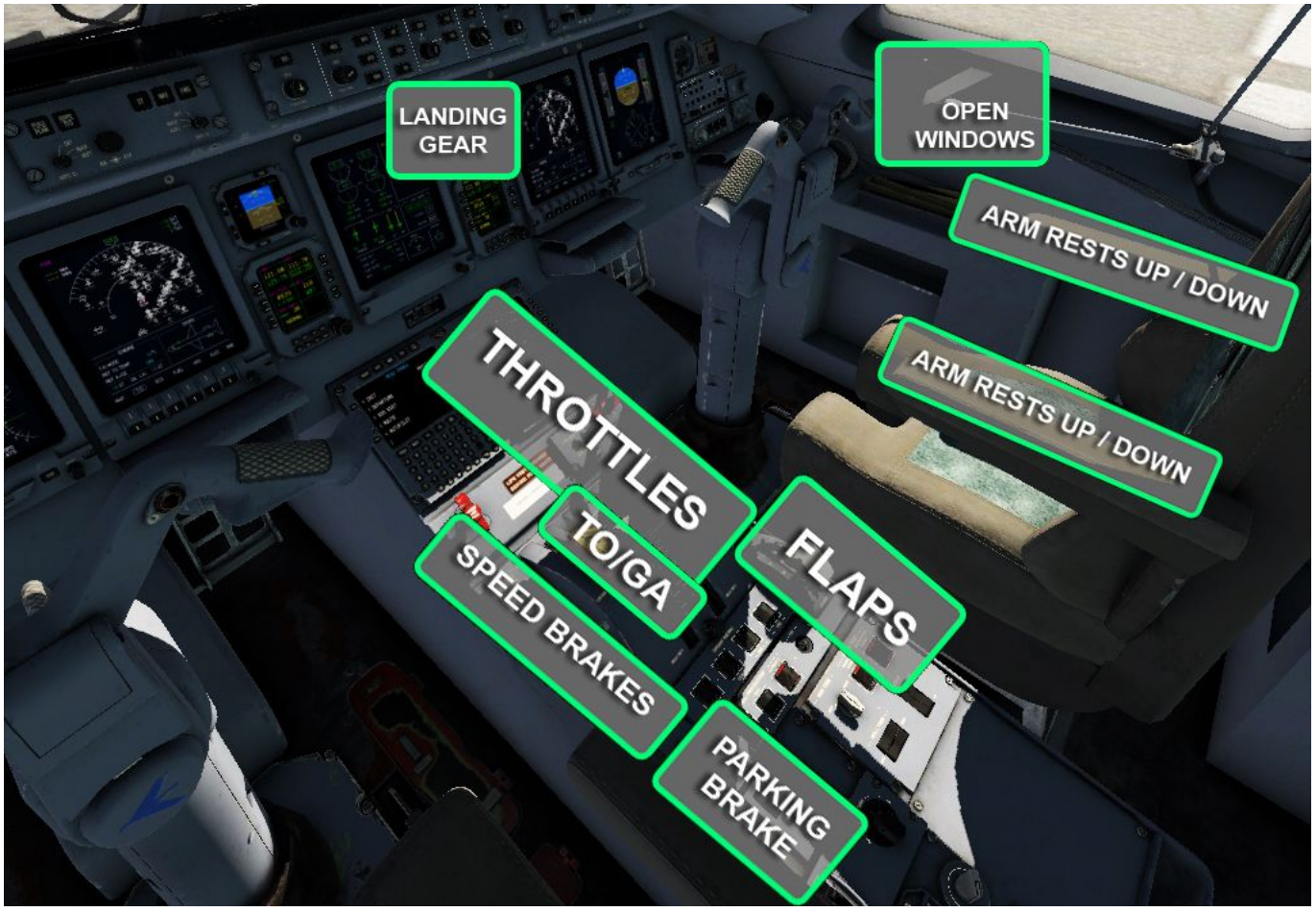
3.7 SPECIAL COCKPIT CLICKABLE AREAS

3.7.1 HANDLES AND MANIPULATORS

The picture below shows where the click spots are for various manipulators.



NOTES:

Cockpit windows can only be opened while the aircraft is not moving and the gear lever can't be used while the aircraft is on the ground.

TO/GA buttons are on each side of the white throttle handles.

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3.7.2 HIDE YOKE FUNCTION

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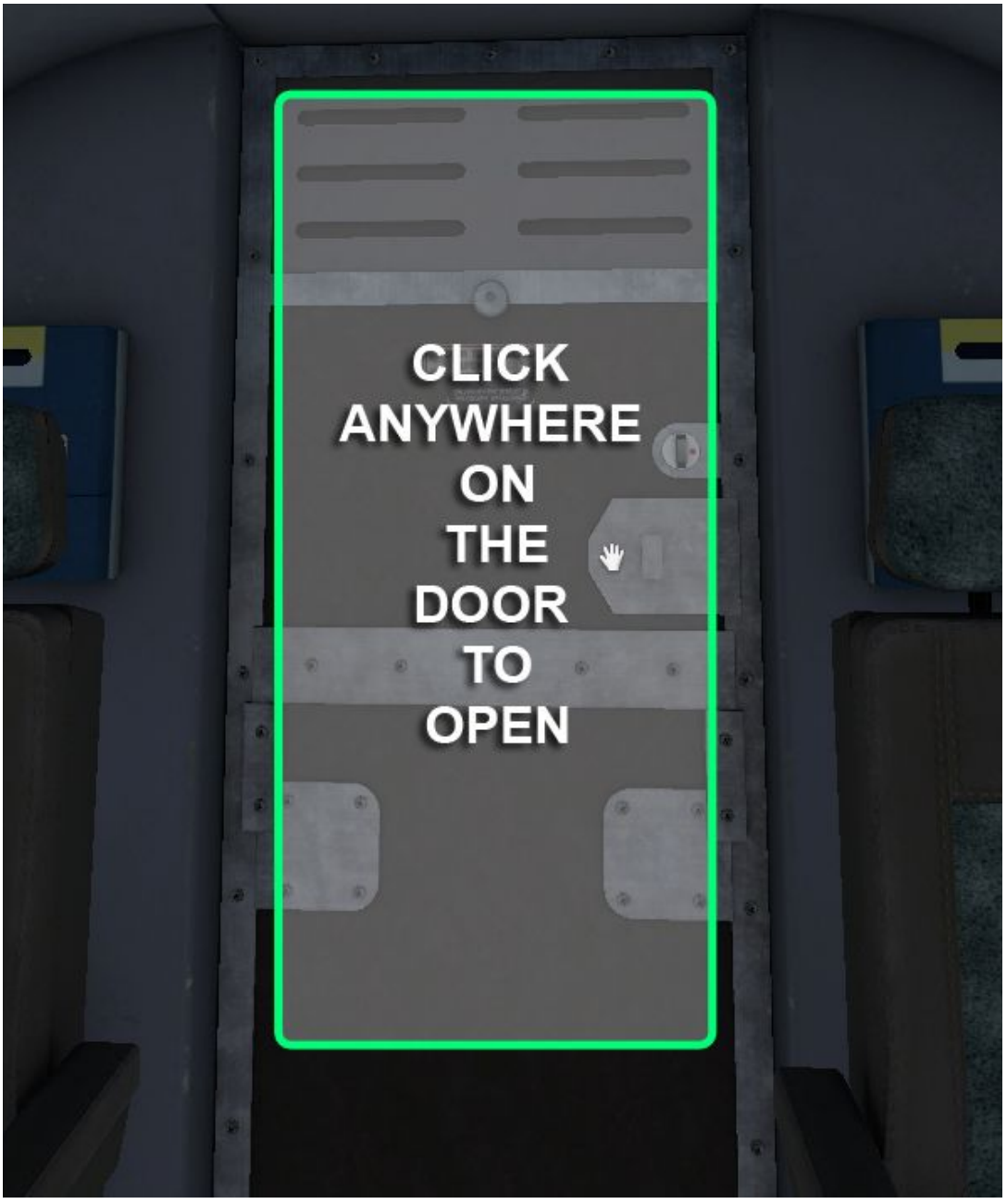
3.7.3 COCKPIT DOOR

Click anywhere on the cockpit door to open or close it. Be sure to observe the precautions labeled on the door.



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3.7.4 DISABLING WINDSHIELD AND SCREEN REFLECTIONS

3.8 SIDE PANEL - COCKPIT LIGHTING

Cockpit lighting works exactly as on the real jet. Lighting can be controlled from the 2 light panels on the left and right of the glareshield. The left panel controls CA's side of the panel lights, the right side panel controls the FO's side panel lights as labeled.
The knobs are axis drag-able. Click on the knob and drag left or right to change the knob value.

4.0 OPERATIONS UTILITIES

4.1 MENU TABS

This product has a pop-up menu where you can control the options menu, the FAQ pages, the pop-up FMS and aircraft checklists.

Once the mouse is less than 50 pixels away from the left side of your screen, and 360 pixels from the bottom (720 for 4K monitors), 4 tabs will appear to provide access to these functions.

The options MENU controls doors, availability of the Ground Power Unit (GPU), safety equipment and engine covers.

4.2 GROUND MENU OPTIONS

IMPORTANT: In order for the ground objects and GPU to work, you **must set the brakes on.** Once you release the brakes and the aircraft moves, the GPU and ground objects will disappear and all the doors will close automatically.

The options selection is disabled and will not be available after the aircraft has moved.

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The menu is very straightforward. Just click on the door to open/close it The squares on the menu in the picture below indicate the click areas of the buttons.

The mouse click zones are shown here. In addition to controlling the doors, you can toggle the presence of ground equipment and activate the GPU, or remove the “remove before flight” engine covers. You will be warned if you try to add the engine covers while the engines are running!

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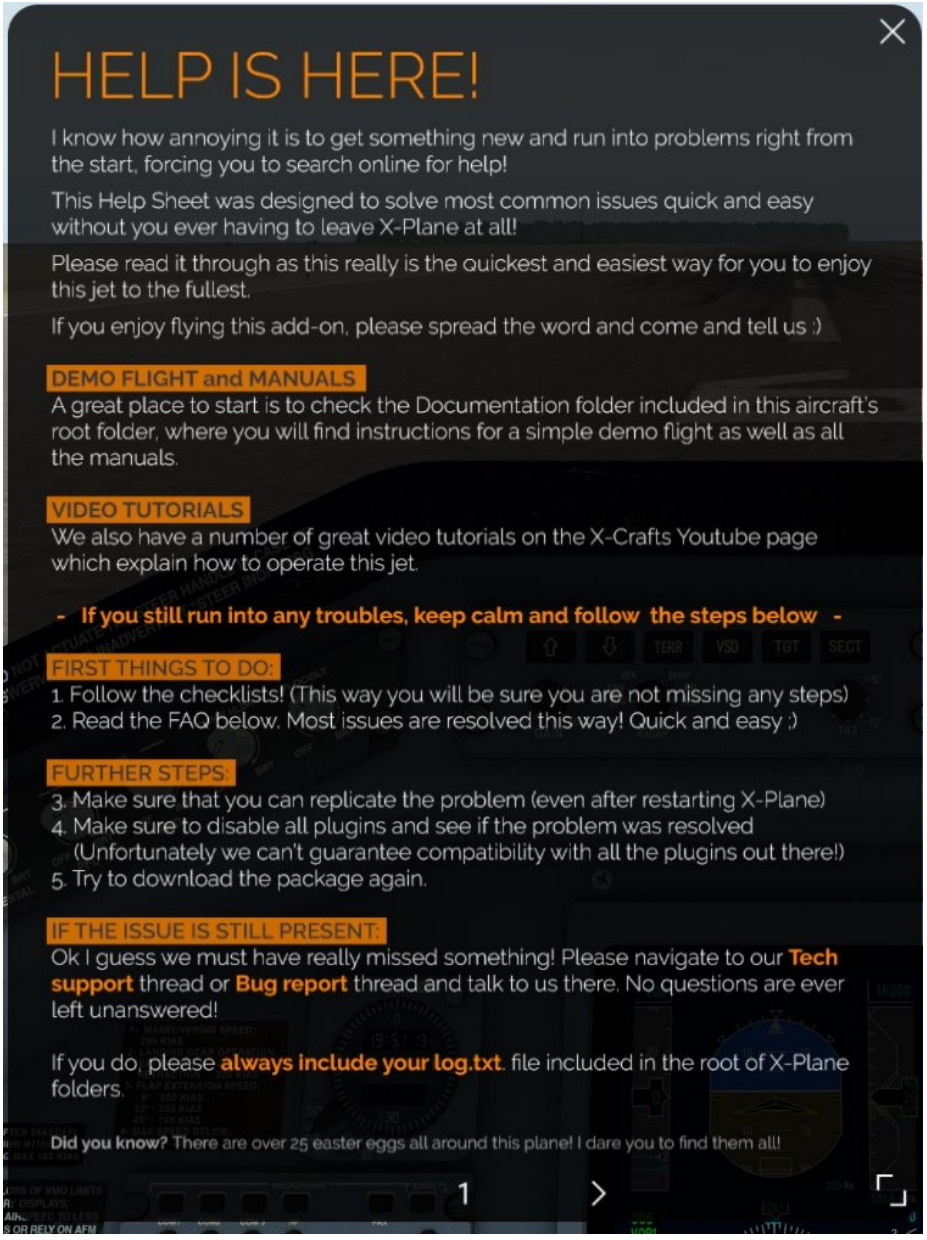
4.3 FREQUENTLY ASKED QUESTIONS

Help is indeed here! A FAQ for operating the aircraft is provided for easy access during flight if you find yourself unable to recall how a particular function or feature works. Many resources are referenced.

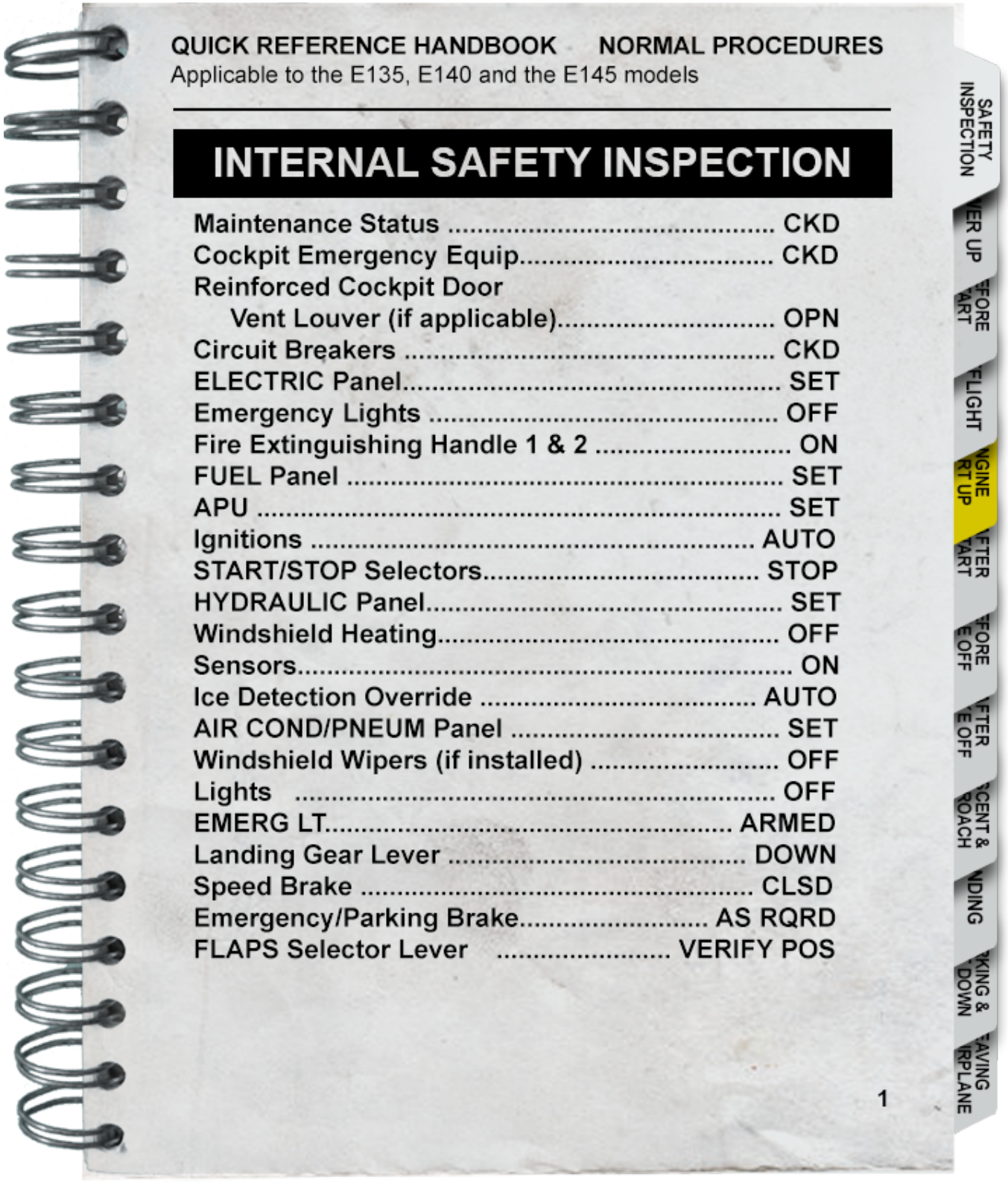


4.4 FMS POPUP

A popup utility for the Tekton FMS is available that provides exactly the same utility functions as are available on the center console. A separate manual for the use of the FMS is provided in the documentation folder.

4.5 CHECKLISTS

A set of aircraft checklists is provided that were heavily influenced by real world ERJ series documents.



QUICK REFERENCE HANDBOOK NORMAL PROCEDURES

Applicable to the E135, E140 and the E145 models

INTERNAL SAFETY INSPECTION

Maintenance Status ..... CKD
Cockpit Emergency Equip..... CKD
Reinforced Cockpit Door
Vent Louver (if applicable)..... OPN
Circuit Breakers ..... CKD
ELECTRIC Panel..... SET
Emergency Lights ..... OFF
Fire Extinguishing Handle 1 & 2 ..... ON
FUEL Panel ..... SET
APU ..... SET
Ignitions ..... AUTO
START/STOP Selectors..... STOP
HYDRAULIC Panel..... SET
Windshield Heating..... OFF
Sensors..... ON
Ice Detection Override ..... AUTO
AIR COND/PNEUM Panel ..... SET
Windshield Wipers (if installed) ..... OFF
Lights ..... OFF
EMERG LT..... ARMED
Landing Gear Lever ..... DOWN
Speed Brake ..... CLSD
Emergency/Parking Brake..... AS RQRD
FLAPS Selector Lever ..... VERIFY POS

1

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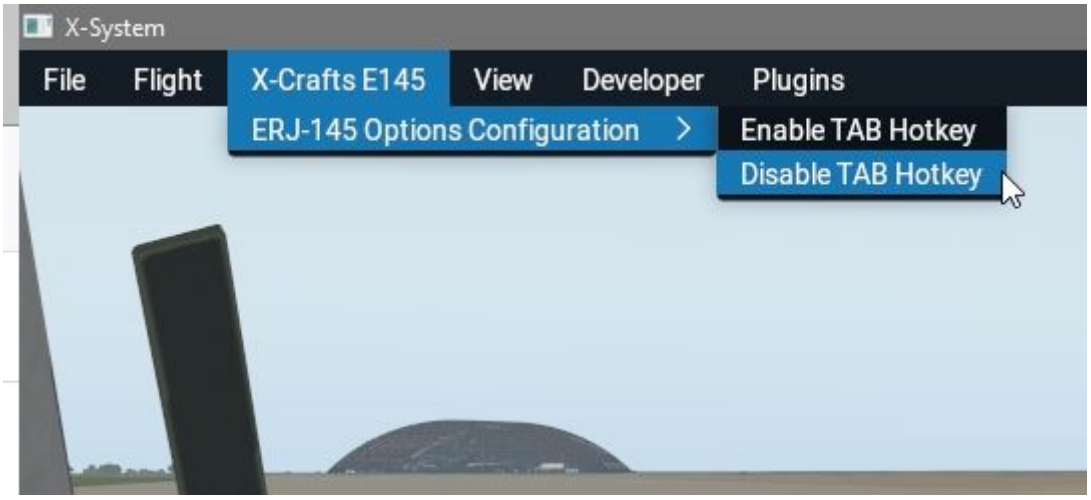
4.6 OPTIONS CONFIGURATION

At present, the only option available for selection via the X-Crafts pull down menu is to enable or disable the use of the TAB hot key to enable or disable Direct Keyboard Entry (DKE). DKE is discussed in the Tekton FMS manual. This permits users of online ATC clients to use the TAB key for communications and other functions.



The last used configuration is saved for your next flight.

5.0 AIRCRAFT OPERATION

5.1 CHECKLIST USE

This is a good place to remind you that there are a series of checklists for the all phases of the flight that are available to the immediate left of the X-Plane window by moving your mouse cursor to within 50 pixels of the left side. The checklists are available on the “CHECKLISTS” tab. This is what should guide your activity in the cockpit, not this manual. The checklists are resizeable for convenience and easier reading on 4K monitors.

Starting any commercial airliner is a complex task. Here are the basics. Note that you have the ability to employ a Ground Power Unit (GPU) in step 7 instead of the APU. The GPU can be connected to the aircraft by using the “MENU” tab menu, also available by moving your mouse cursor to within 50 pixels of the left side of your X-Plane window.

There are no checklists that will guide you for the overall operation, so here’s a quick summary of the order in which you can do things in the cockpit to take maximum advantage of the EJets functions. Some users may have variations on this organization - that’s up to you, as long as all of the steps are safely covered. Be aware that omitting any control instruction can and will provide unexpected behavior when you least expect it, especially when it comes to expecting that the autopilot will work, or worse, when you expect to be able to breathe at altitude and find the world slowly ….going….black.

This summary starts the minute that you arrive in the cockpit from the X-Plane flight configuration page. It does not detail radio usage, so realize that there may be interplay with ATC throughout, especially if you’re dealing with a highly authentic ATC service such as Pilot Edge.

1. Prepare the simulation. Using the Options available from the MENU tab, open the necessary doors, deploy your ground equipment and enable the pushback if you intend to use the tug provided with the aircraft. We’ll assume you’re using this for the rest of this summary.
2. Follow all pre-start checklist procedures. We do not skip these checklists as some of their functions are important preparations for later checklists.
3. If you’re going to use the GPU, be sure it’s selected from the MENU for Options.
4. Establish aircraft power via either the APU or GPU start methods according to the checklist. The checklist available from the side tabs combines either method, but the steps are broken out further later in this section for training clarity.
5. Program the FMS, starting on the PERF 1 page. Re-open the Load Planner and enter the values for fuel, payload and MAC%. Then enter your flight plan as described in the enhanced checklists below. More detail on the FMS is available in the separate FMS Manual provided with the EJets.
6. At this point it’s appropriate to close the cabin doors and the cargo bay hatches since you’re about to start the engines.
7. Continue the appropriate START checklist from this point until it is complete.
8. Remove all ground equipment, both using the MENU options as well as any third party ground equipment you have deployed.

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9. Execute your PUSHBACK from either the X-Plane or third party pushback services and follow the ground crew's instructions.
10. After the pushback tug has parked and you have ground control clearance, proceed to the runway and have fun… but don't forget the rest of the checklists. These will follow you all through the flight. They are there to keep you out of trouble, to ensure the aircraft operates as you would expect, and most importantly to keep your virtual self and your virtual crew and your virtual passengers… alive.

5.1.1 POWER ON

When battery one is turned on, there are only a limited number of displays active, including the backup attitude indicator. Displays (going from left to right) backup attitude indicator, RMU's and EICAS are powered. The MCDU on the captain's side is powered as well. The rest of the displays will turn on after battery 2 and the two avionics systems are enabled. Displays go through a step by step power up sequence - they don't come on all at once.

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5.2 ENGINE START

These are the *essential steps* from the checklists. Be sure to review all items that are required in the order demanded by the checklist for proper safety of flight. Many controls are already set in the positions that they will need to be. In the real world, what you'd be doing is verifying that the previous flight crew left the cockpit correctly configured. That's not always the case. However, when the ERJ Family aircraft start up, we automatically get the cockpit ready for you as it would be in the real world, as was taught to the development team by the qualified ERJ pilots on our beta test team.

1. BATT 1 & 2: ON

    a. If GPU POWER is AVAIL, you can use it to assist the APU startup.

2. APU BLEED: ON (This button acts opposite to the cold and dark concept. It is ON when illuminated.)
3. FUEL PUMP POWER: ON (WING TK1 & WING TK 2)

4. APU MASTER: ON. (EICAS indication will read as OFF until APU starts to spool up to speed.)

5. APU MASTER: START (3 seconds is enough, then release.) Check EICAS readout.

6. Wait until APU reaches 100% on EICAS APU indicator

7. Now complete FMS preparations.

   At this point you have set the aircraft up sufficiently to complete your tasks in the FMS MCDU.

   This part is not necessary if all you're going to do is take off and sight-see. On the other hand, if you're going to try to emulate a passenger carrying flight, you'll probably have completed your load planning and have some numbers to enter.

   This is summarized in the FMS manual as well, but here are a few pointers for the order in which to do certain things to take greatest advantage of the latest FMS features.

   a) Navigate to PERF 1 and enter the total fuel quantity..
   b) Enter the passenger count and aircraft cargo weight as well as the MAC percentage.
   c) Navigate to PERF 2 and enter your cruise airspeed, initial cruise altitude and final cruise altitude. The FMS will alert you to enter your departure airport at this point.
   d) Navigate to DEPARTURE - make your entry selections.
   e) Navigate to ARRIVAL - select at least the runway and the first procedural element of the STAR. You can enter the complete arrival, transition and approach if you are not anticipating any changes assigned by ATC.
   f) Either load your route file (company flight plan) or manually enter waypoints and airways. This part is optional as the entry of a departure and an arrival is all that's really necessary for short, regional hops.
   g) Verify your SID, ROUTE and ENTRY waypoint lists are correct, with the correct speeds and altitudes. Edit as needed.
   h) Navigate to the INIT page and select INITIALIZE.
   i) Then return to the MCDU index and press the INIT button, and then the EXEC button. Your flight plan is now loaded, and you can then navigate to the PROGRESS 1 page, and then to FLT PLAN to verify the loaded flight plan.
   j) Navigate to the AUTOPILOT page to make any configuration settings you would like to make here. This gives you a digital means of entering data that you would otherwise adjust using the knobs on the FGCP.
   k) Navigate back to PROGRESS. This completes the FMS / MCDU tasks, and leaves the MCDU screen prepared to monitor the flight waypoint sequence.

8. IGNITION: Confirm AUTO.

9. Flip open the cover over engine No. 2 (Right)

10. Click-hold the "Start" knob for engine No. 2 for 5 to 10 seconds. Leave in RUN. Close cover.

11. Uncover switch and start engine No. 1 (Left)

12. Click-hold the "Start" knob for engine No. 1 for 5 to 10 seconds. Leave in RUN. Close cover.

13. APU BLEED: OFF (light goes out)

14. APU: STOP BUTTON (**not** the knob).

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15. PACKS 1 & 2: ON

16. ENG BLEED 1 & 2: ON

Steps 15 and 16 are essential if you do not wish to black out due to lack of pressurization. X-Plane simulates this by slowly dimming your monitor screen(s) to black after you've gotten too high to get enough oxygen when you breathe - usually over 14,000 feet MSL or so. By the time you pass FL180, half of the atmosphere of our planet is below you.

6.0 V-SPEEDS

The V-Speed tables for all ERJ's are incorporated into the FMS PERFORMANCE pages 1 and 3 for ease of use during flight, and the values presented update automatically based on entries made on either of these two FMS pages.

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