



KING AIR 350 MANUAL

**STUDY LEVEL FLIGHT SIMULATION OF
THE LEGENDARY KING AIR 350 BY
AIRFOILLABS.**

Manual version 1.0.

Please do not use this manual for real flight training or operations.

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ABOUT NEW KING AIR 350 PRODUCT.

The Airfoillabs Team is presenting a long awaited King Air 350 for X-Plane 11 as well as new XJet plugin system.

This project is ground-braking for several reasons:

1. It represents one of the most sophisticated **Study Sim Level** experience in flight simulation world.
2. The product is based on our new technology **XJet**. XJet is a new plugin system for X-Plane 11 that provides licensing, software distribution, automatic updates as well as full integration in X-Plane 11 via the newest X-Plane SDK. It works on Windows, Mac and Linux. The cool think is that it integrates also *Aircraft Systems Logic Tools* enabling us for example to simulate realistically very complex electrical systems that X-Plane is not able to simulate. One of the very exciting features is also the *Interactive Checklist System* that is able to control the aircraft automatically with camera focusing and audio specs.
3. Based on our experience from previous development we have focused in every possible detail to make the aircraft as much “X-Plane 11 default” as possible, in a very positive sense. It is **Very Easy To Use** and very complex at the same time. **Both Gamers and Fanatic Flight Simmers will be satisfied**. If you wish you can push one button and fly the aircraft and if you want to study hard you can immerse deeply into aircraft systems.





Beechcraft King Air 350.

was introduced to the market in 1984, at the time under name “Super King Air 300”. It was created based on the Model 200. The new model 300 had a modified airframe and more powerful engines with redesigned cowlings. Later on Beechcraft started modifying the 300 Model by stretching the fuselage by close to three feet, two cabin windows on each side were added, and also famous winglets. This type was introduced in 1990 and is now known as King Air 350. Besides the changes to the fuselage the 350 was given a higher MTOW of 15,000 lb. From 1998 Beechcraft implemented the UltraQuiet active noise canceling system as standard on all King Air 350s. In 2003, the 350 avionics were upgraded. Nevertheless our model represents the type just before 2003. The decision was taken based on subjective esthetics aspects - we just love living and breathing analog aircraft :). The Beast is equipped with two PT6A-60A engines, producing each 1,050 SHP up to 25.000 feet. It has a normal cruise speed of 311 knots, a range of 1,550 nautical miles, a climb rate of 2,700 feet per minute, and requires 3,217 feet of runway to takeoff and 3,161 to land.

For Every Simmer ? Yes.

- It is a STUDY SIM level aircraft.
- But you don't have to be intimidated by the complexity of the systems - You are always just one click from the sky. If you are a deep learner and enthusiast you can plunge yourself and study the complicated systems in detail. All this is possible down to our super friendly interface logic.
- Stopping the aircraft, starting the engines, it was never easier. But if you like a specific state of the aircraft you can choose for example the Before Taxi state or Save and Load your own state.

User Interface.

- What you need is always reachable quickly. Main Menu appears on the left side when you are close to the left edge.
- Camera Views appears in the left Bottom Corner when you are there.
- Cold&Dark, Before Engine Start, Before Taxi and Before Takeoff states are available.
- 2D Panels: The practicality is overwhelming. You can very comfortably manage different aircraft systems that are modeled in detail also in 3D, but it is so much easier, especially during busy flight phases. All windows are detachable and can be placed anywhere.
- Ground Services: Manage your ground services quickly and easily. You can certainly go outside and touch and manipulate all too, if you don't hurry.
- Weight & Balance: Tens of pages in the real Aircraft Manual are transformed to algorithms and graphics that permits you to play with your fuel and weights limits. Everything is very well graphically arranged.
- Settings: All is stretched to minimum option so that you don't have to spend time going through settings rather than flying the aircraft. What we can, we are implementing directly in X-Plane.
- The Aircraft Handbook will appear in the right bottom corner. Sections: Aircraft Specs and Limits, Checklists, Performance.
- Automated Checklists: The Checklists can be set as fully automated with speech, hints and messages. You can look and learn and next time you can put the automation down a notch and try it for yourself. By the way the Speech System represents 768 separate audible sentences.
- Performance - Hundreds of real world performance pages are transformed manually to programming language to calculate Takeoff and Landing speeds and distances.
- Walk feature - You can walk everywhere, inside and outside of the aircraft where collision zones are programmed. You can climb stairs and there is 1G force simulation. The walking interferes with X-plane terrain too.

PBR 3D Model.

- Extraordinary Ultra HD details both in interior and exterior. Every rivet, every sign, every screw, every light, every instrument inside and outside is modeled to the highest fidelity. And photorealistic engines.
- Ultra realistic cockpit details, glasses, dirt, scratches.
- Ice on wings, windows, rain effects, wipers and more.
- High Optimization Method - to save performance all details were designed in separate overlay objects to enhance 3D detail and economize on texture size.
- 18 amazing, hand painted Liveries with artistic touch. All liveries are based on real paint schemes.

3D FMOD sound.

- 924 sound events and snapshots in total. Real recording from 350 was used, too.
- The principle is that all you can touch and move is provided by manually and meticulously edited sound samples.
- Enhanced Multi Layered Engine Sound Design meets realism and complexity. These details are taking into account: Location, Propeller, Propeller Pitch, PT-6 engine (no propeller) On, PT-6 windmilling, Starters, Igniters - all modeled separately to cover all real world situations.
- Realistic cockpit sounds are modeled to such details as Bus Ties Relays (electrically operated switches), Ticks in the audio system, electrical discharges during igniters, etc.
- Ground Movements, Tire rumble based on surface, Cockpit vibrations based on G-Forces, breaks squeaking, skidding, Impacts based on G-Forces.
- When manipulating with aircraft in the exterior everything is provided by a sound: caps, latches, remove before flight objects, doors, electrical towing, refueling etc.
- Pilot/Copilot Callouts indicating V speeds and other details during takeoff and landing phase.
- Ambiances - you feel, when you are outside, real wind sounds based on X-Plane 11 weather system, outside precipitation.

Aircraft Systems Simulation.

- Electrical System: Custom made system for simulating complex electrical DC and AC behavior in details with electrically operated relays, load distribution per component, inverters, sensors and more. The load of the system influences even how bright the annunciators lights are. Simulated buses: Battery Bus, Center Bus, Dual Fed Bus, Left Gen Bus, Right Gen Bus, Tripple Fed Bus, Left AC Bus, Right AC Bus, Avionics buses 1, 2 and 3.
- Lighting: All lights in Cockpit, Cabin and Exterior, described in the real aircraft manual are operational and connected to correct buses.
- Master Warning System And Annunciators Logic with dimming.



- Fuel System: Realistic layout of the fuel cells with boost pumps, transfer pumps, crossfeed system, firewall fuel valves, vents and drains for manual Fuel Check in exterior preflight.
- Auxiliary Power Unit simulation with engine start, realistic electrical behavior.
- Engine: Custom made simulation of Alpha, Beta(Ground Fine) and Reverse regimes. X-Plane Commands modified to match real behavior. Inertial separator simulation. Custom Feathering system. Custom Autofeather system and test logic based on real aircraft. Simulation of Primary Governor, Overspeed Governor, Fuel Topping Governor. Low Pitch Stop and Test simulation.
- Rudder Boost logic and Pitch Trim system logic based on Manual.
- Fire Protection: Engine Fire System detection replica with FW Valves logic and Fire Extinguisher.
- Pneumatics: Custom logic matching the real system dependencies to environmental controls, pressurization vacuum system, gyros suction.
- Ice and Rain Protection: Engine Inlet Lip Heat, Inertial Separators, auto-ignition system, windshield anti-ice, wipers, propeller deice system, pitot heat, surface deice boots simulation.
- Pressurization: Cabin Pressure Control systems with testing logic simulated.
- Hydraulic Power System.
- Avionics: all systems are modeled as close as possible to the real instruments. Radio instruments (COM 1, COM 2, NAV 1, NAV 2, ADF, Transponder) all modes available with memory function and simple testing sequence. Avionics power and gyro initial spin-up replica. All digital displays graphics and logic based on real aircraft data. EADI (Primary Pilots Display), EHSI (Pilots HSI/Map), MFD (Main Map Display), EHSI Copilot. Weather radar simulation. The provided FMS is X-Plane 11 FMS, therefore the aircraft uses standard navigation database integrated in X-Plane. Autopilot Modes Logic and interconnections are custom made to match the real one.
- Aircraft performance is tuned to match speeds in real performance tables.



Liveries.



Factory Livery



ADAC Ambulanz-Service



Ambulance Service Wales



Blank Livery



FAA



FCS



Japan Coast Guard



Kystverket Sundt Air



Mexico Navy



NOAA



Royal Navy Air Force



Starship Air Ambulance



Swiss Air Force



Titan Airways



Wheels up



Wheels Up Breast Cancer Support



Wheels up Heart Support



Wheels Up Ovarian Cancer Support

02

HARDWARE AND SOFTWARE REQUIREMENTS. DOWNLOAD, INSTALLATION, ACTIVATION.

Hardware and Software Requirements.

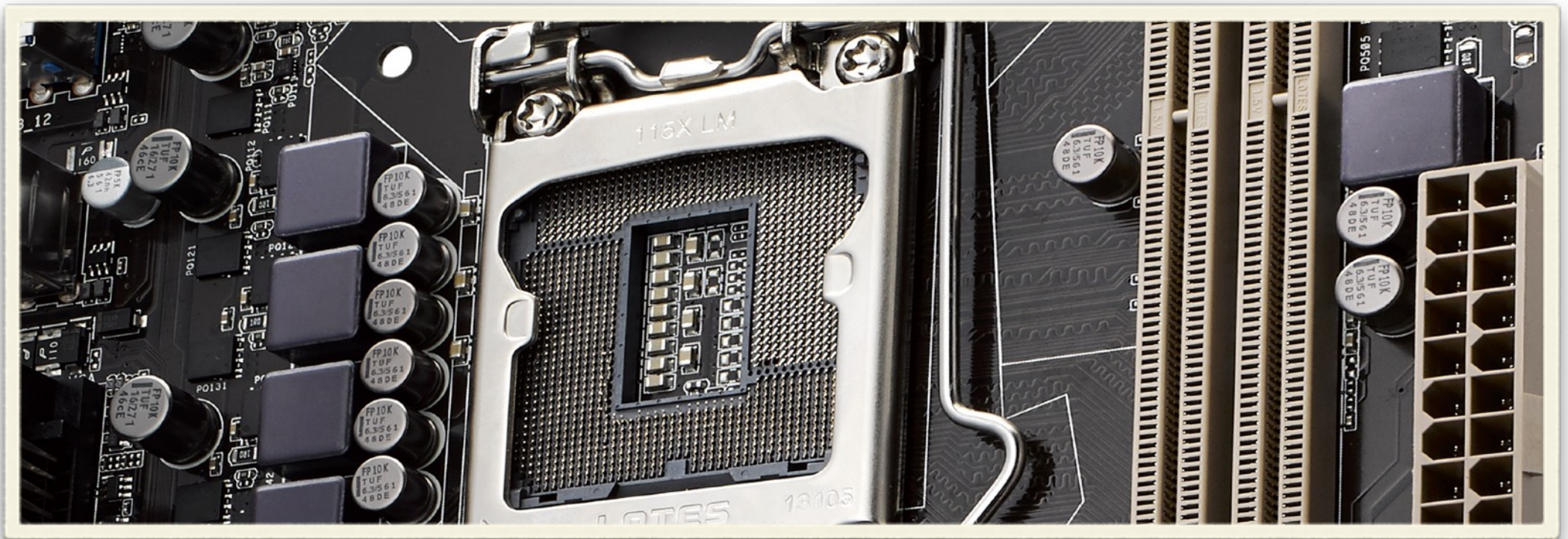
X-Plane 11.30+

Internet connection required.

Windows, Mac or Linux. Java SE Runtime Environment 8 is required only for Linux.

4Gb VRAM Minimum, 8Gb+ VRAM Recommended

Download Size: 800 Mb. Disc space needed: 2.75 Gb



Download, Installation, Autoupdate, Activation.

Download.

Our products consists always of 2 parts, **XJet plugin** and **Aircraft or Scenery**. XJet plugin contains **Product Manager** app that can be run inside X-Plane 11 or as a Standalone App.

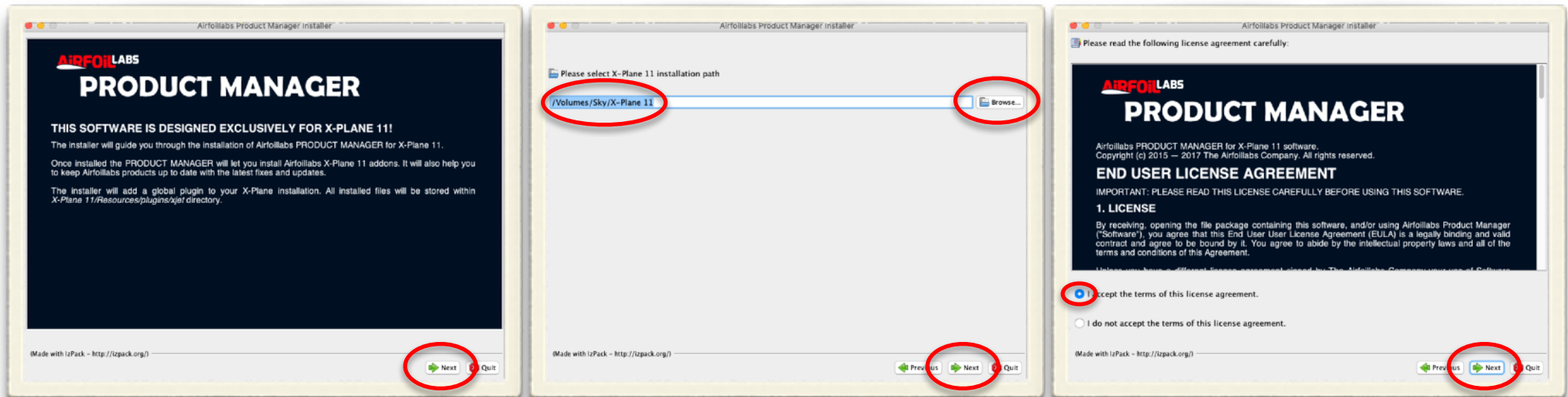
First step is to download Product Manager Installer. You can download it via x-plane.org store, after you login to your account and you select your purchased products history and a specific Airfoillabs aircraft or scenery.

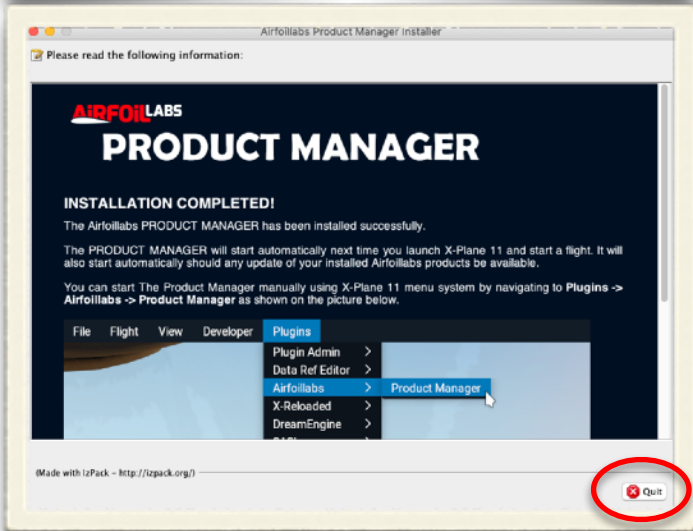
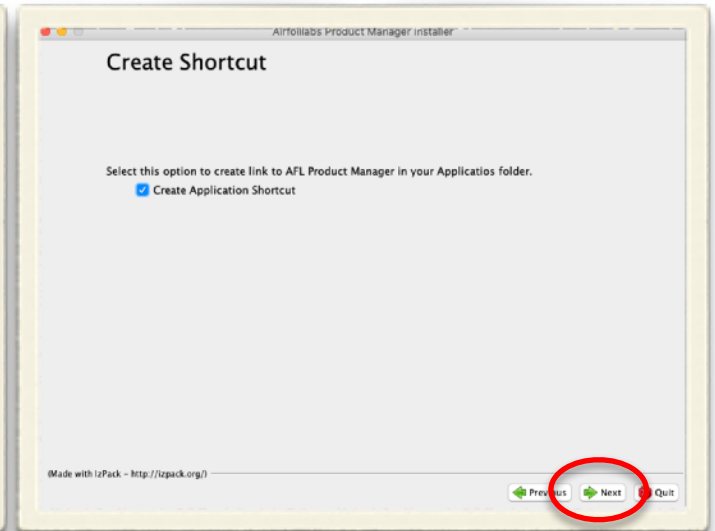
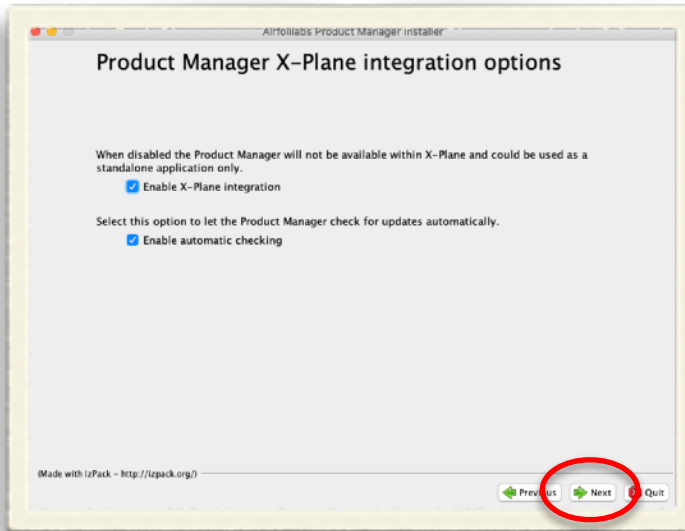
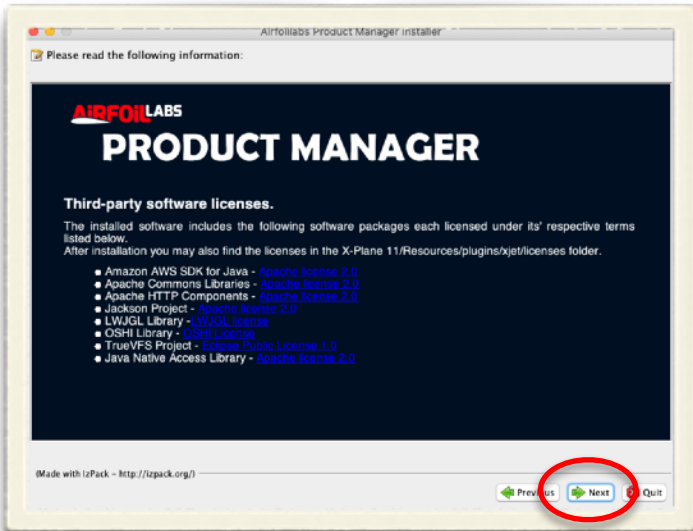
Windows: There is an installer application available.

Mac: There is an installer app. We provide also a **XJet+MacOSX+Bundle.zip** file if you don't want to use installer app and alter Mac security setting. In case you want to use the zip file please unzip it and copy the resulting "xjet" folder into "X-Plane 11/Resources/plugins/".

Linux: Specifically for Linux you will need to have **Java SE Runtime Environment 8** installed. The installer app is available.

Install Product manager. Please make sure X-Plane 11 is not running.



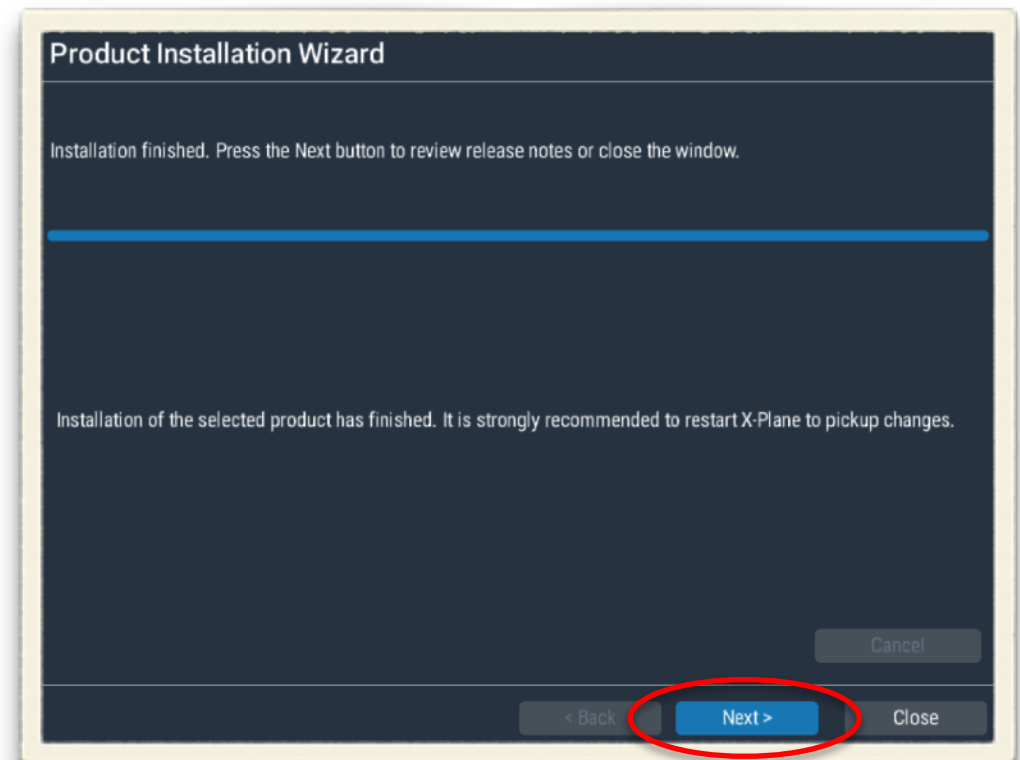
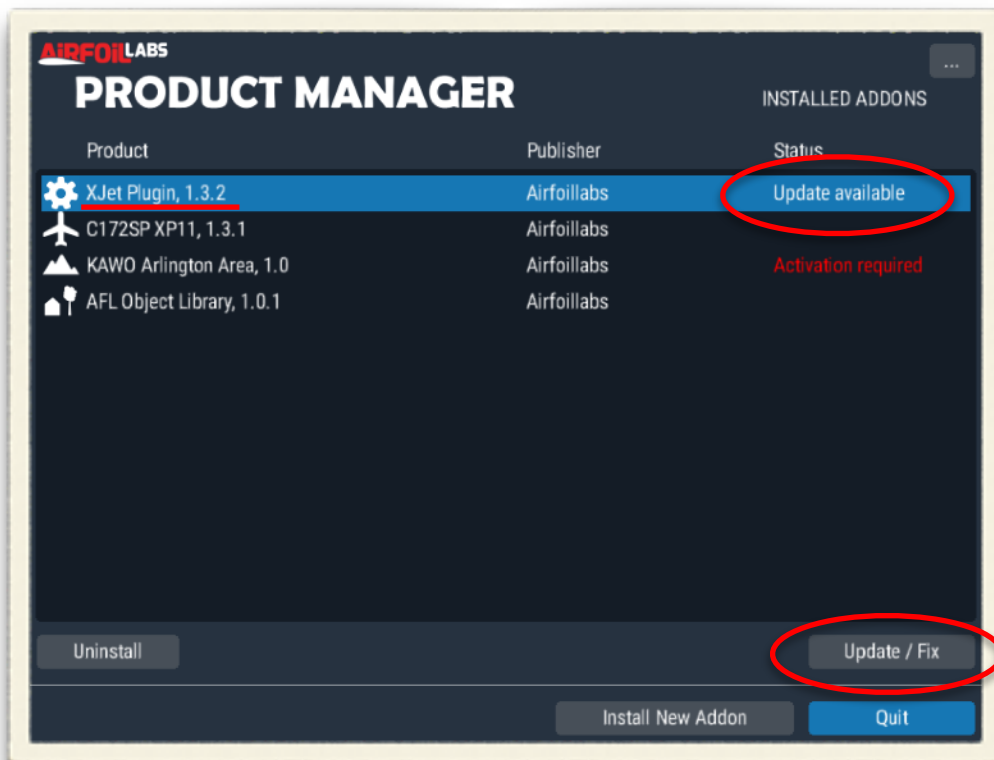


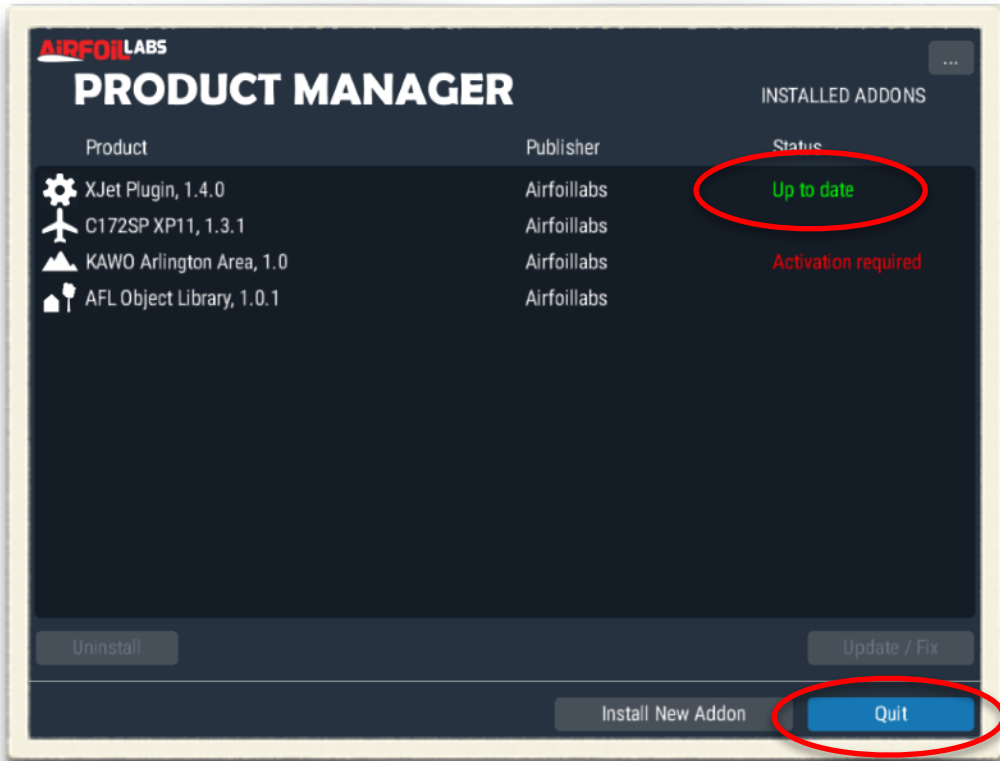
After the Product Manager installation has finished, you can launch the Product Manager inside X-Plane or as a standalone app.

Product Manager.

Once you open Product Manager in X-Plane 11 (Plugins > Airfoillabs > Product Manager) or as a standalone app you can see what is needed to be updated. First check if the XJet plugin is up to date. If not update it.

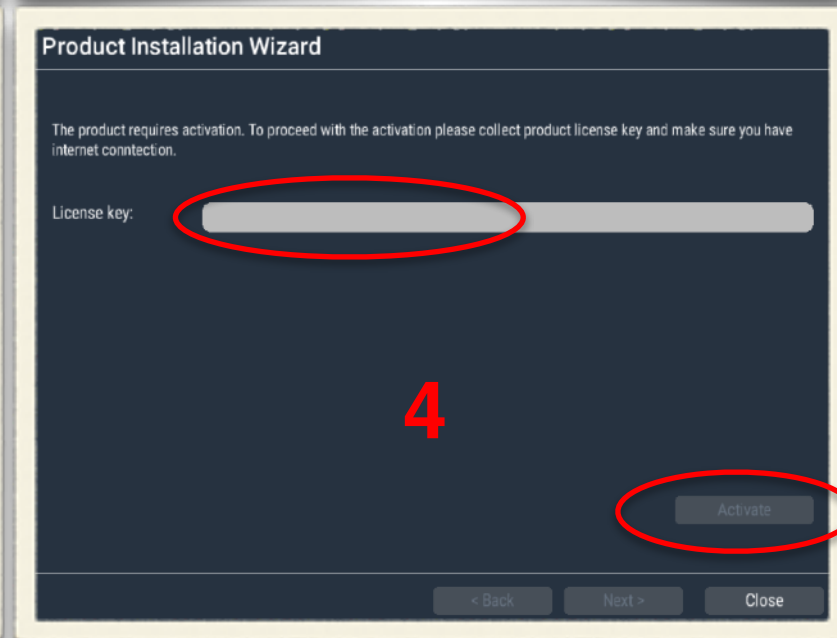
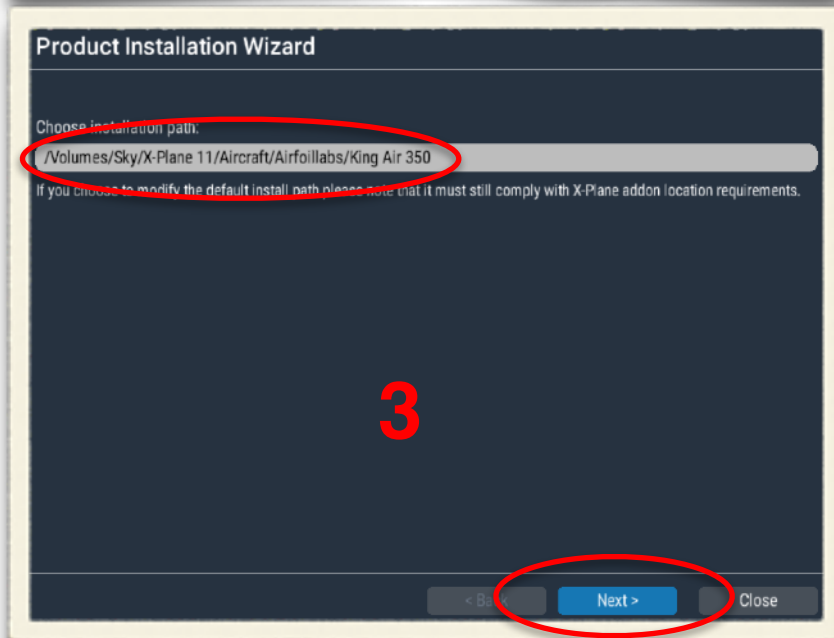
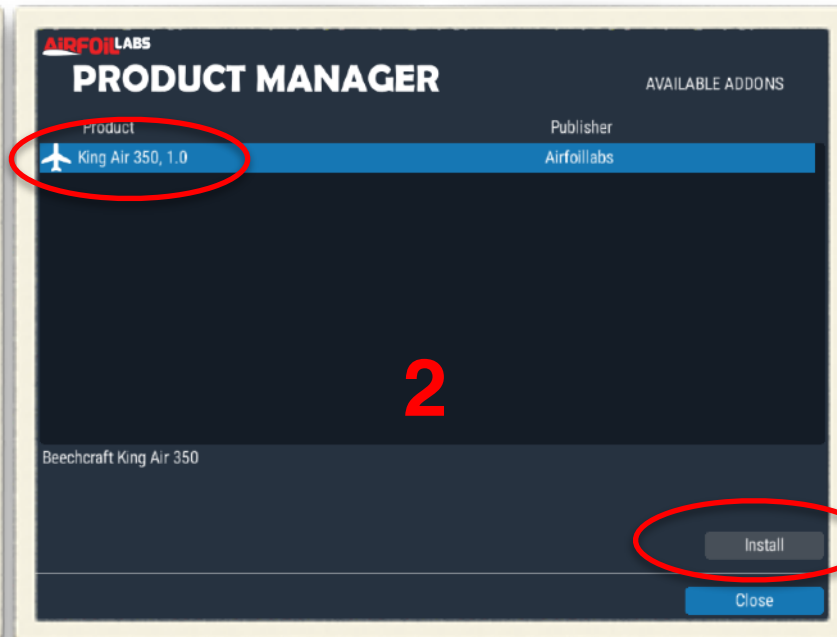
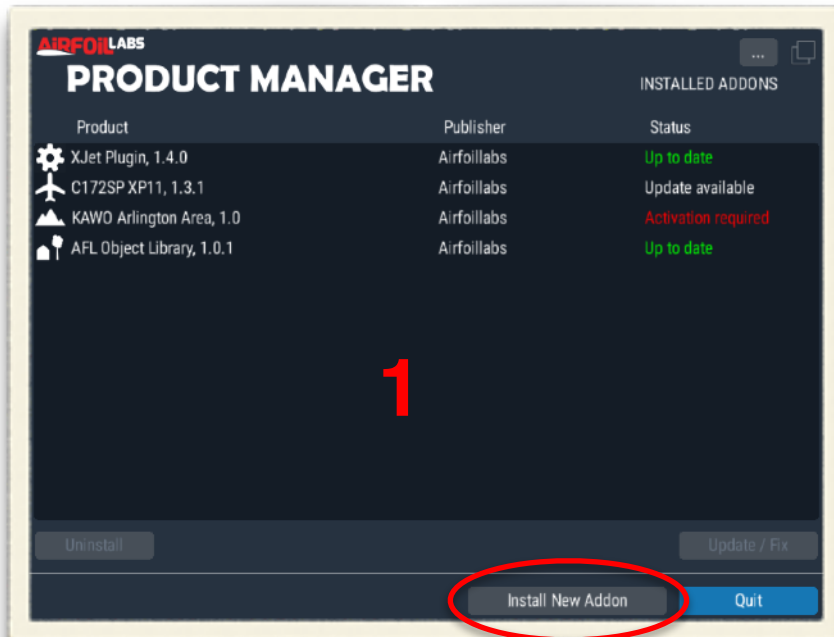
Note: In case of Windows and in case you run the Product Manager to update the plugin XJet itself, we recommend to launch it as a stand alone app. The reason is that if the autoupdater wants to update the plugin itself (XJet) it is not able to do it during the time X-Plane 11 is running (because at the same time X-Plane is using it). For products updates (aircraft, scenery) you are free to decide if you want to use a standalone app or app inside X-Plane 11.

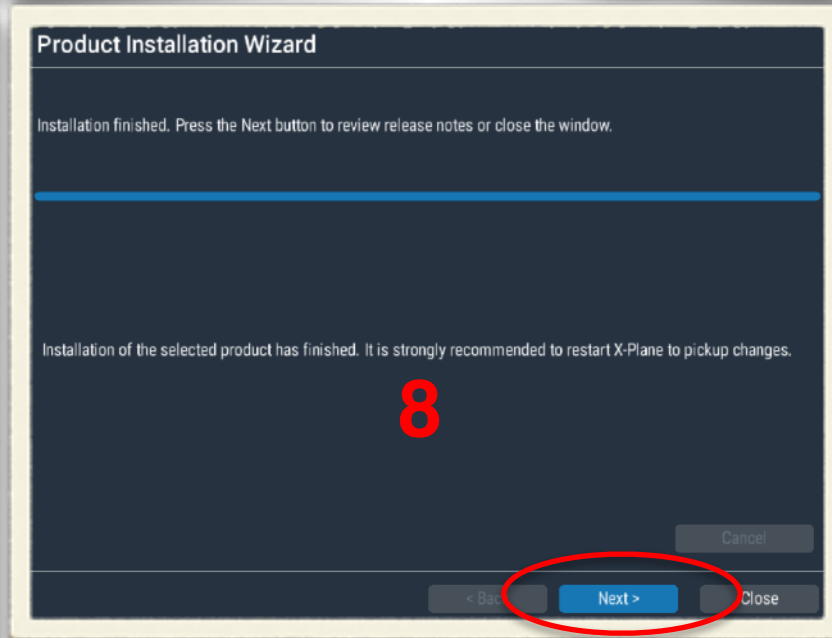
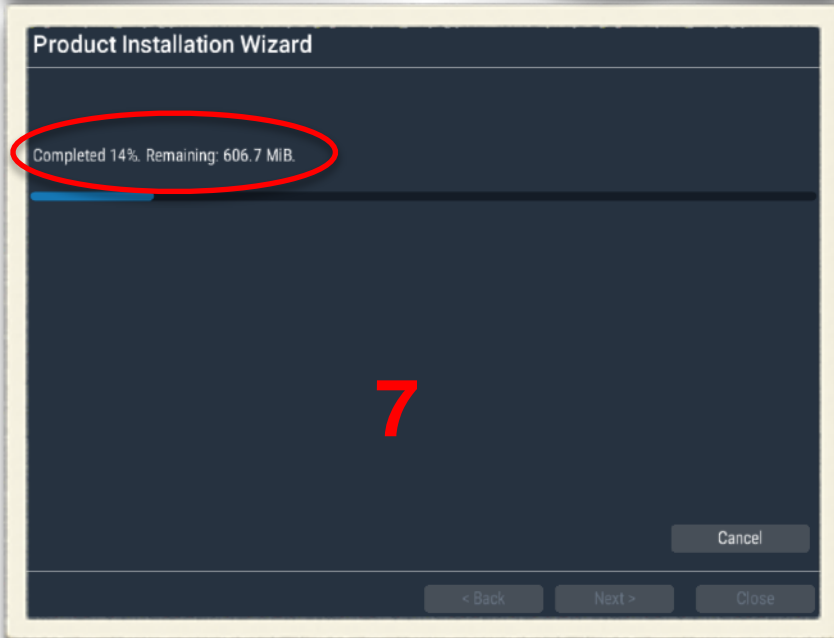
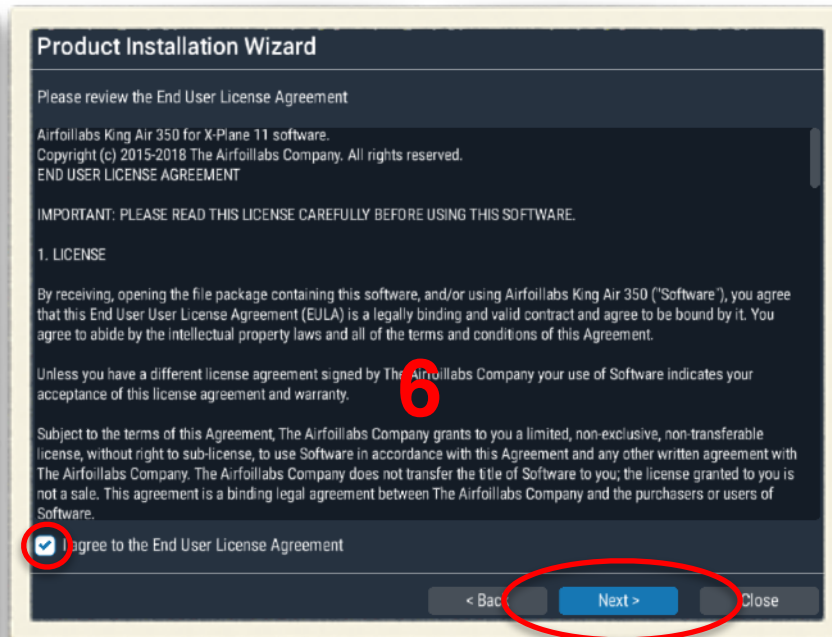
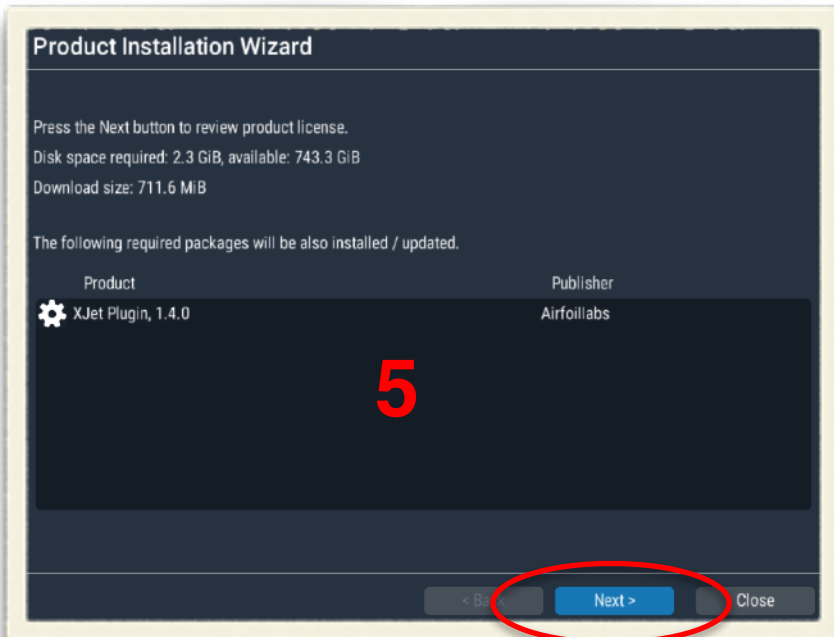


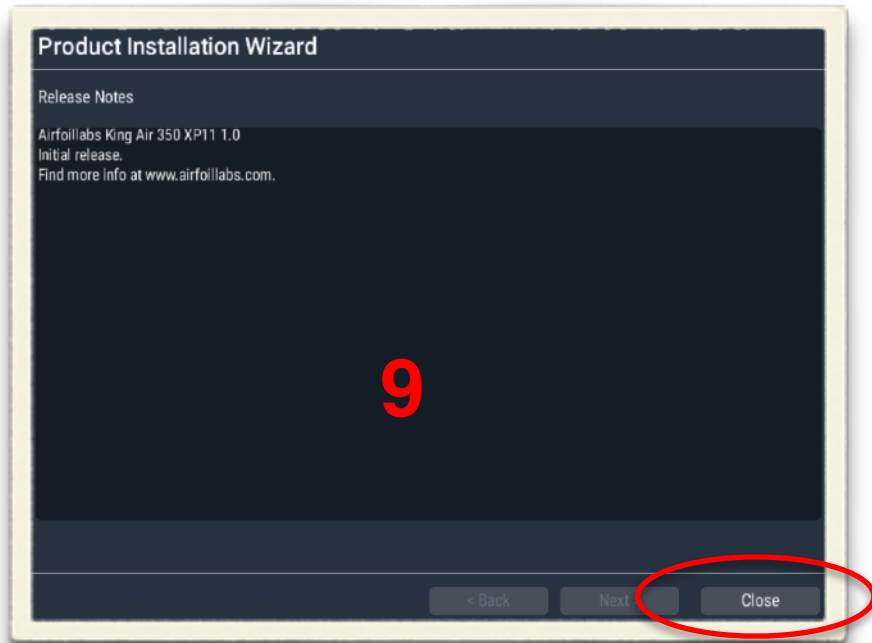


After the update of XJet has finished, Quit the product manager and restart X-Plane to continue with Aircraft or Scenery installation.

Installing Aircraft / Scenery.







After Product Installation we strongly recommend X-Plane restart.



The main user interface has three main menus. **The Main Menu** on the left side of the screen, **The Camera Menu** in the left bottom corner and **The Aircraft Handbook Menu** in the right bottom corner. If you move your mouse into displayed trigger zones the appropriate menus will appear.



Main Menu.

1. Aircraft States Menu Group.

It permits to load instantly the aircraft to the selected state. If you want for example to fly without any delay, select the Before Takeoff State (5.) Engines will be running and all systems ready for takeoff.

2. Cold and Dark aircraft state.
3. Before Engine Start aircraft state.
4. Before Taxi aircraft state (Engines are running).
5. Before Takeoff aircraft state.

6. 2d Panels Menu Group.

2d panels will make your flights much more easier. Each panel is a separate X-Plane 11 window, that can be closed or detached. For EADI (11.), EHSI (12.) and MFD (13.) 2D Panels, there is also another way to open or close them. It is by clicking on regions displayed on the screenshot.

7. Pilot - Autopilot and Displays Control Panels.
8. Copilot - Autopilot and Displays Control Panels.
9. Throttle Quadrant Panel.
10. Pressurization Control Panel.
11. EADI (Electronic Attitude Director Indicator).
12. EHSI (Electronic Horizontal Situation Indicator).
13. MFD (Multifunction Display).



2D Displays Toggle regions.

14. Ground Services Menu Group.

You can manage all ground services comfortably and quickly from your pilot seat and prepare the aircraft for the phase you plan. Icons change color to Green in case the service is "ON". During aircraft movement the whole Ground Services Menu Group bar will appear gray and it will not be possible to select any ground services.

15. GPU (Ground Power Unit) is providing 28 Volts DC current. By clicking on the icon several things will happen: GPU will appear, external power receptacle door will open, cables will connect and GPU will start itself.

16. Fuel Truck. In case you want manually refuel the aircraft you can click on this icon and fuel truck will be available. After that you can go outside and open caps, ground the aircraft, and refuel.

17. RBF (Remove Before Flight Elements). This will toggle all protective covers.

18. Chocks.

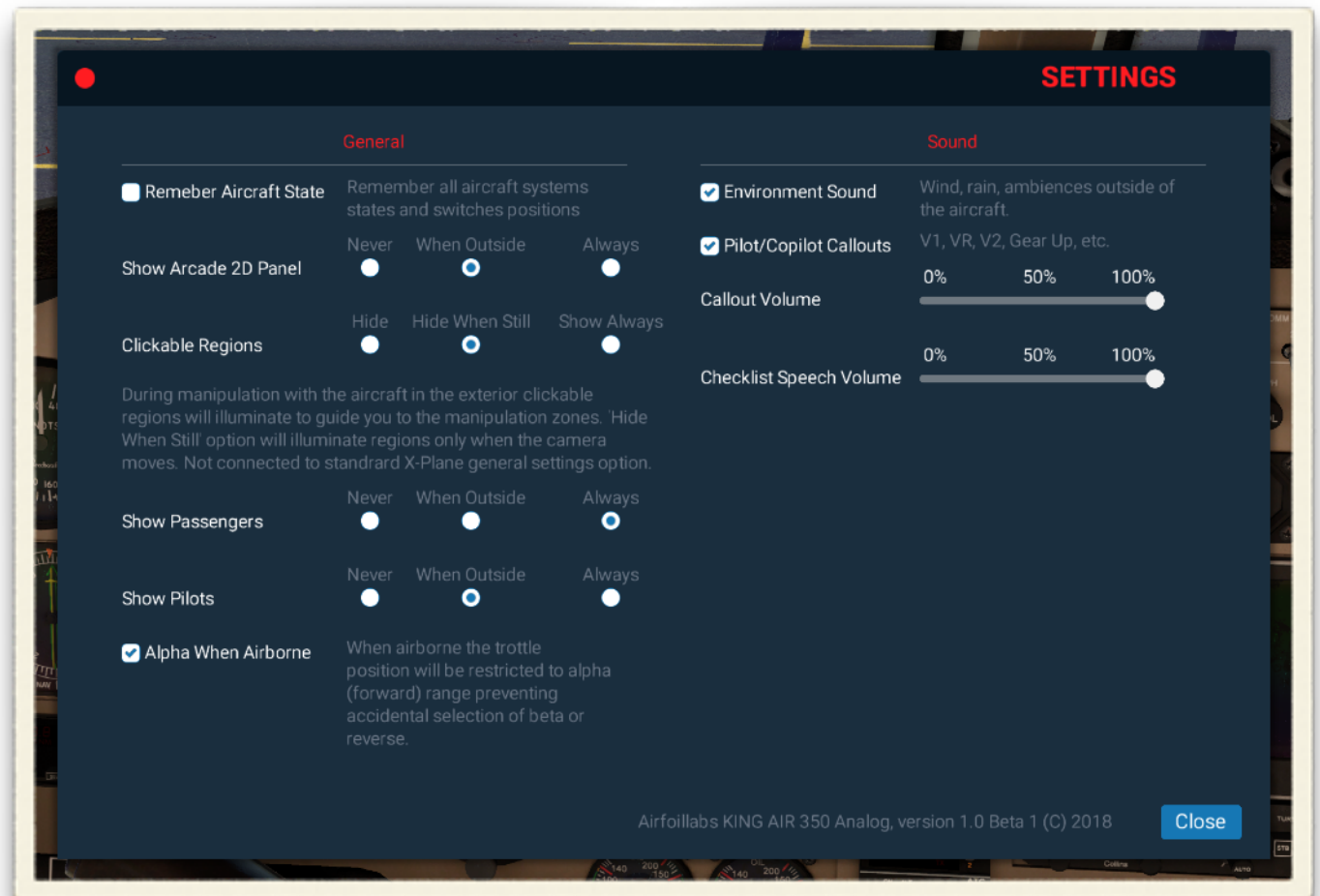
19. Ropes fixing aircraft to the ground.

20. Door. Quick way to open and close the cabin door.

21. Steps. Displays and Hides steps needed for manual refueling.

22. Weight & Balance.

23. Settings.



Settings Panel.



2D Panels.

WEIGHT & BALANCE

<p>Maximum Ramp Weight 15,100 lbs</p> <p>Maximum Take-off Weight 15,000 lbs</p> <p>Maximum Landing Weight 15,000 lbs</p> <p>Maximum Zero Fuel Weight 12,500 lbs</p> <p>Maximum Fuel Weight 3,611 lbs</p> <p>Maximum Baggage Comp. Weight 550 lbs</p> <p>Select Units <input checked="" type="radio"/> lbs/gal <input type="radio"/> kg/l</p>	<p>Empty Weight 9,570 lbs</p> <p>Total Passengers Weight 816 lbs</p> <p>Total Baggage Weight 249 lbs</p> <p>Total Fuel Qty / Weight 393 gal / 2,646 lbs</p> <p>Zero Fuel Weight 10,972 lbs</p> <p>Total Weight 13,618 lbs</p>	
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Empty 1/2 Full

LEFT AUX 51 lbs

Empty 1/2 Full

MAIN LEFT 1,272 lbs

189 gal

8 gal

1/4 2/4 3/4 Full

Load Fuel Preset

Empty 1/2 Full

51 lbs **RIGHT AUX**

Empty 1/2 Full

1,272 lbs **MAIN RIGHT**

189 gal

8 gal

Crew Only 2/4 3/4 Full

Load Weight Preset

MOMENT LIMITS VS WEIGHT (POUNDS)

The graph plots Weight in Pounds (Y-axis, 9,000 to 15,000) against Center of Gravity in inches aft of datum (X-axis, 191.4 to 208.0). A red boundary defines the allowable weight and CG range. Two points are marked: 'Gross Weight' (red 'X') at approximately 13,618 lbs and 208.0 inches, and 'Zero Fuel Weight' (blue 'X') at approximately 10,972 lbs and 208.0 inches. A horizontal red line indicates the 'MAX ZERO FUEL WEIGHT' at approximately 12,500 lbs. The top boundary is labeled 'MAX TAKE-OFF & LANDING WEIGHT'.

WEIGHT ~ POUNDS

CENTER OF GRAVITY ~ INCHES AFT OF DATUM

Close Apply

Weight & Balance.

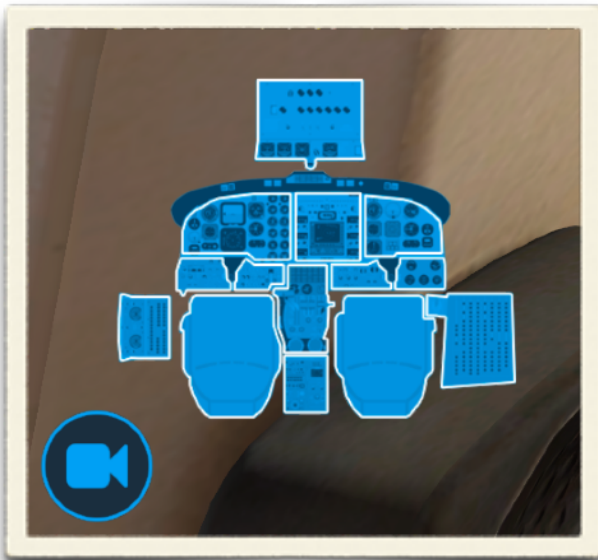
Camera Menu.

When you move the mouse to the left bottom corner camera icon and options appear. By clicking on the camera icon you can toggle between 2 view selection modes: Cockpit Mode, Aircraft Mode.

Cockpit Mode.

By clicking on the appropriate panel or seat the camera will focus to the selected region.

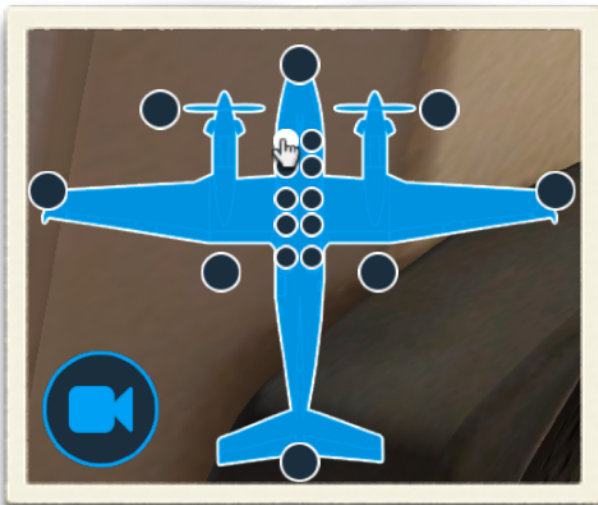
Views selection available: Seats (standard Pilot/Copilot view forward), Fuel Control Panel, Pilots's Instrument Panel, Pilot's Left Subpanel, Pilot's Right Subpanel, Avionics Panel, Throttle Quadrant Panel, Center Pedestal Panel, Copilot's Instrument Panel, Copilot's Left Subpanel, Copilot's Right Subpanel. Circuit Braker Panel, Overhead Panel.



Cockpit Mode views selection.

Aircraft Mode.

Aircraft Mode views represents a broader camera locations. Click on the circles to move the camera to the selected view.



Aircraft Mode views selection.

Walk Functionality and Objects Manipulations.

So ho to manipulate with objects outside of the aircraft? The camera should be set as “*Internal - Forward with 3-D Panel*” not as “*External*”. Now you can click on whatever is possible. Please make sure you review our **Settings Panel > General section > Clickable Regions** where you can set different behavior of trigger zones represented with green color transparent objects.

How to control your camera in “Internal” mode ? You have 2 options:

1. You can use our Camera Menu/Aircraft menu and select an external view and then move the camera with standard X-Plane camera commands.
2. You can use our **simulated walk** functionality.

*We recommend to assign our **custom command** to a joystick button or keyboard:*

*Command: KA350/camera/walkForward, Description: "**Walk forward.**"*

*Command: KA350/camera/walkBackward, Description: "**Walk backward.**"*

*Command: KA350/camera/walkLeft, Description: "**Walk left.**"*

*Command: KA350/camera/walkRight, Description: "**Walk right.**"*

*Command: KA350/camera/crouch Description: "**Crouch toggle.**"*



To aim the direction of the walk, hold Walk Forward command and hold right mouse button and move mouse to desired direction. Whenever you hold a command for walking the walk system logic with 1G kicks in. When you don't use the commands it just works as a standard X-Plane Camera system. So in case you would like to use other camera plugins for X-Plane 11, or custom monitor setup, it should be OK if you don't use those commands.

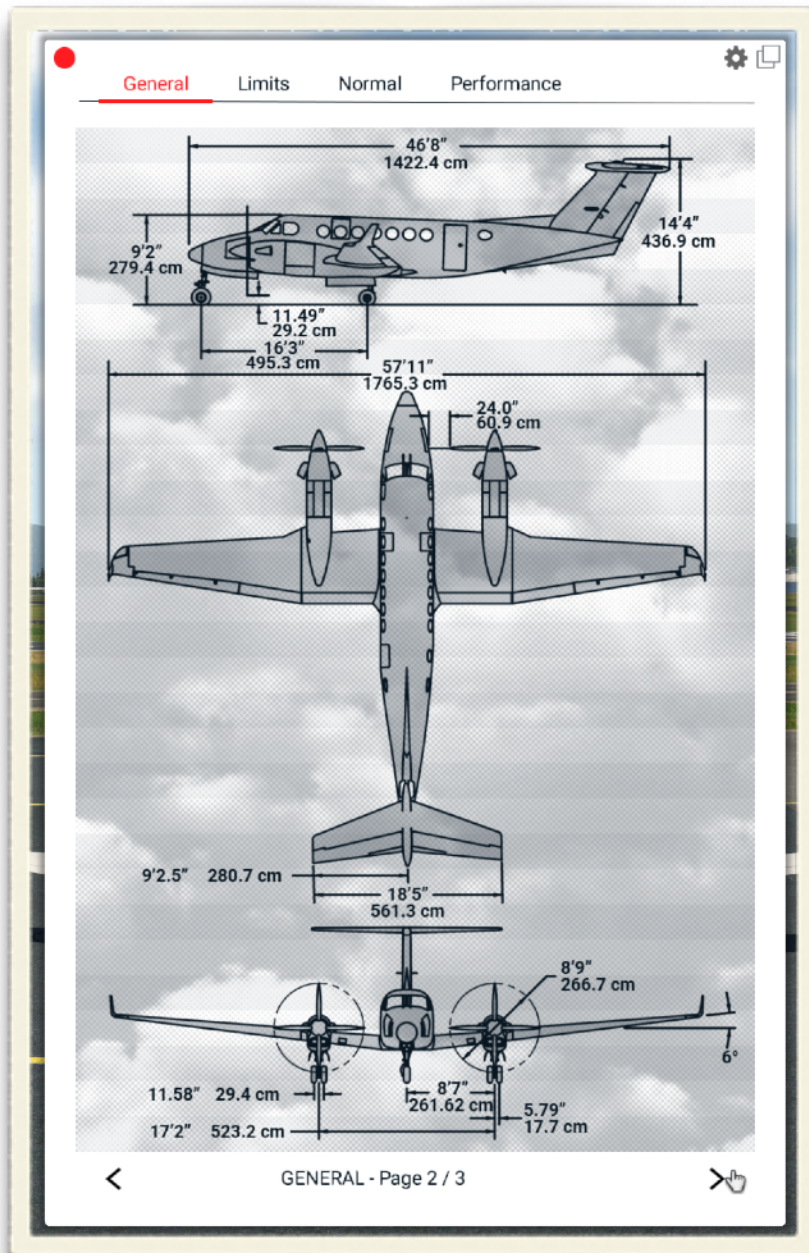
Note: If you enter the aircraft and walk up the stairs, just before the entrance, you should use toggle Crouch Key Command to get in. Once inside you can use toggle Crouch Key Command again to stand up inside the cabin. However your head view will be lower as the cabin is smaller. You can select any seat in the cabin or cockpit with your mouse, there are commands (arrow down) that will automatically sit you in the selected place.



Aircraft Handbook.

This handbook is very powerful tool for standard operation of our 350. If you are a beginner we strongly recommend to look at it. It has 5 main sections:

1. General - Few pages where you will find basic aircraft dimensions information.
2. Limits - If you are unfamiliar with the aircraft we suggest to go through some important aircraft limitations.
3. Normal - it means normal checklists. This is the most extensive part of the handbook. It contains all the normal checklists with optional automations.
4. Performance - Takeoff and Landing Calculations concerning speeds and runway length.
5. By clicking on the gear wheel in the right top corner, you will access the Preferences of the handbook. They are mostly related to checklist automation options.



General Section.

General Limits Normal Performance

AIR TEMPERATURE

Sea Level to 25,000 ft Pressure Altitude	ISA + 37C
Above 25,000 ft Pressure Altitude	ISA + 31C

AIRSPED LIMITATIONS

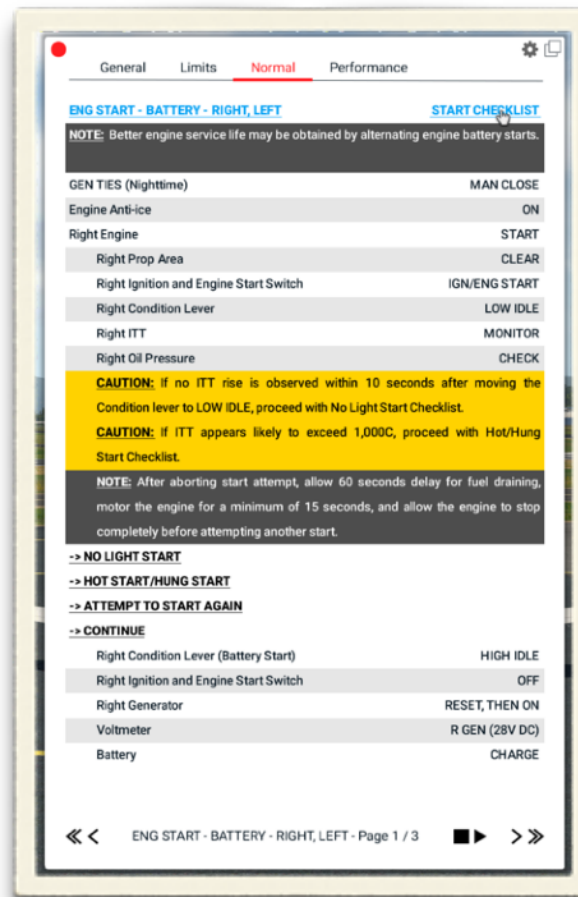
Maneuvering Speed (VA)	184 KIAS
Maximum Flap Ext. Speed (VFE)	
Approach	202 KIAS
Full Down	158 KIAS
Maximum Gear Op. Speed (VLO)	
Extension	184 KIAS
Retraction	166 KIAS
Maximum Gear Extended Speed (VLE)	184 KIAS
Air Minimum Control Speed (VMCA) Prop. Feathered	
Flaps Up	94 KIAS
Flaps Approach	93 KIAS
Maximum Operating Speed (VMO)	
Sea Level to 21,000 ft	263 KIAS
21,000 ft to 35,000 ft	263-194 KIAS (0.58 M)
Two-Engine Best Angle-of-Climb (VX)	125 KIAS
Two-Engine Best Rate-of-Climb (VY)	140 KIAS
Cruise Climb	
Sea Level to 10,000 ft	170 KIAS
10,000 to 15,000 ft	160 KIAS
15,000 to 20,000 ft	150 KIAS
20,000 to 25,000 ft	140 KIAS
25,000 to 30,000 ft	130 KIAS
30,000 to 35,000 ft	120 KIAS
Maneuvering Speed (VA)	184 KIAS

Limits - Page 1 / 4

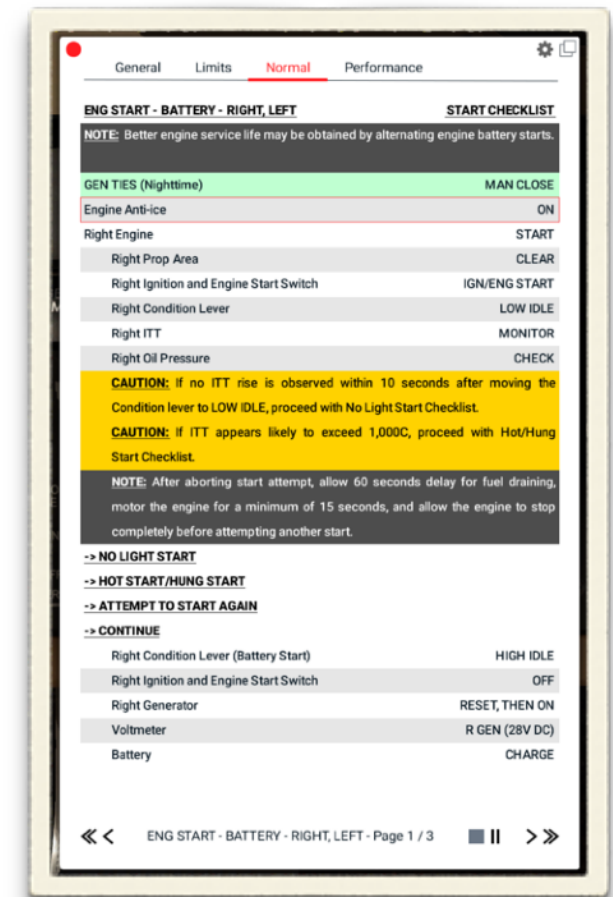
Limits Section.



Checklist Content Page.



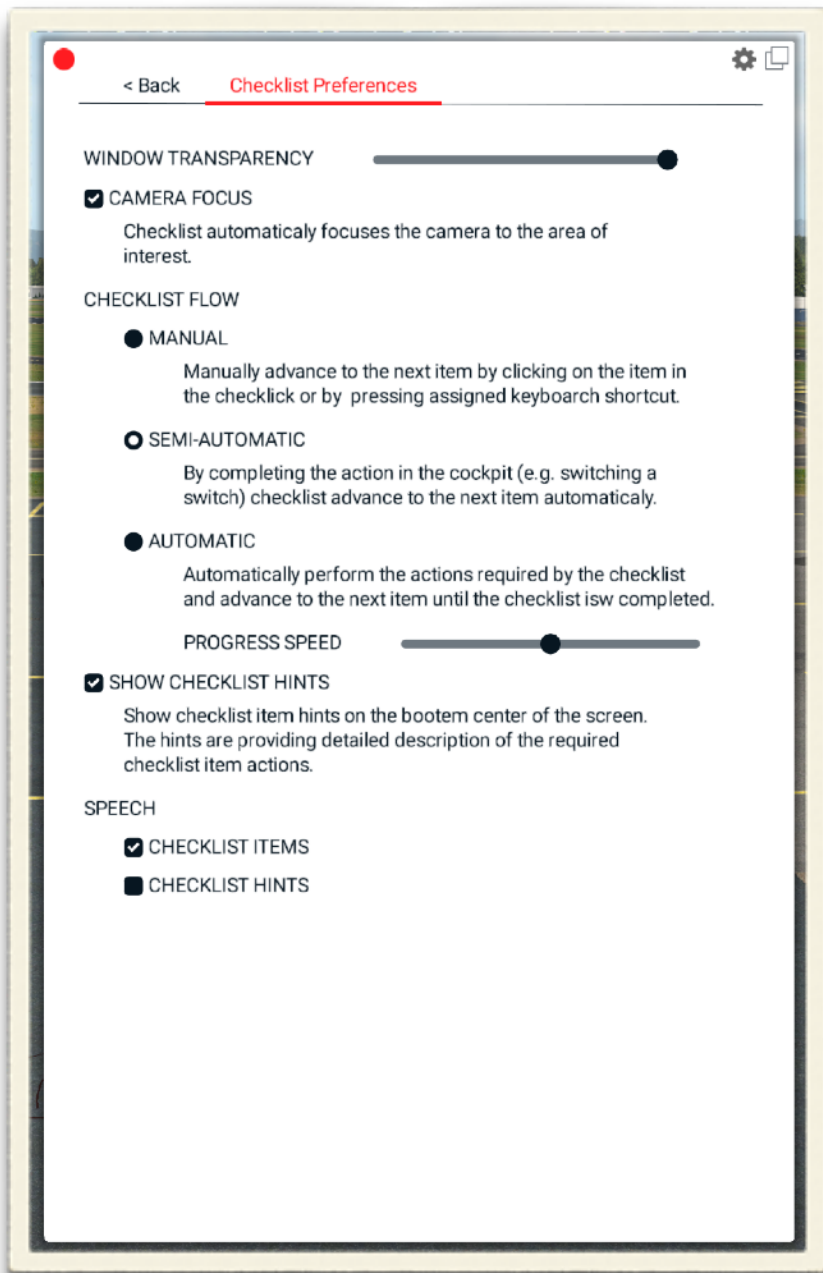
Starting selected checklist.



Playing selected checklist.

Checklist.

The initial page of the checklist section is the main content page, where you can select the checklist of your choice. Then clicking on START CHECKLIST it will start (in the mode that is selected in checklist preferences). Item completed is marked by green color and actual item has red frame. You can always pause or stop the checklist with icons on the bottom status line right from the center text.



Checklist Preferences.

Checklist Preferences.

WINDOW TRANSPARENCY - the transparency of the checklist can be set to your likings. It could be an advantage to see what actually instruments shows behind the checklist.

CAMERA FOCUS - When a specific checklist is played and this option is checked the camera will move to the appropriate panel so that you don't have to look for a specific switch.

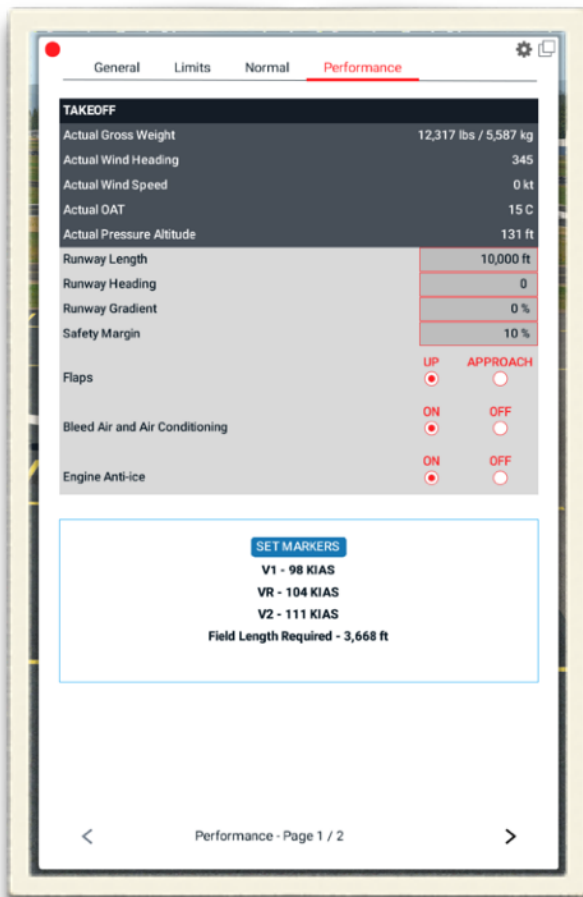
CHECKLIST FLOW - MANUAL - You do all by yourself and when the item is done, you advance to the next item by clicking on the red-framed actual item.

CHECKLIST FLOW - SEMI-AUTOMATIC - The same as MANUAL except that the advance to the next item is triggered by clicking on the appropriate switch/instrument. In case the item action represents something that cannot be triggered by manipulating switch/instrument in the 3d cockpit, it will be necessary to click on the red-framed actual item to advance to the next item.

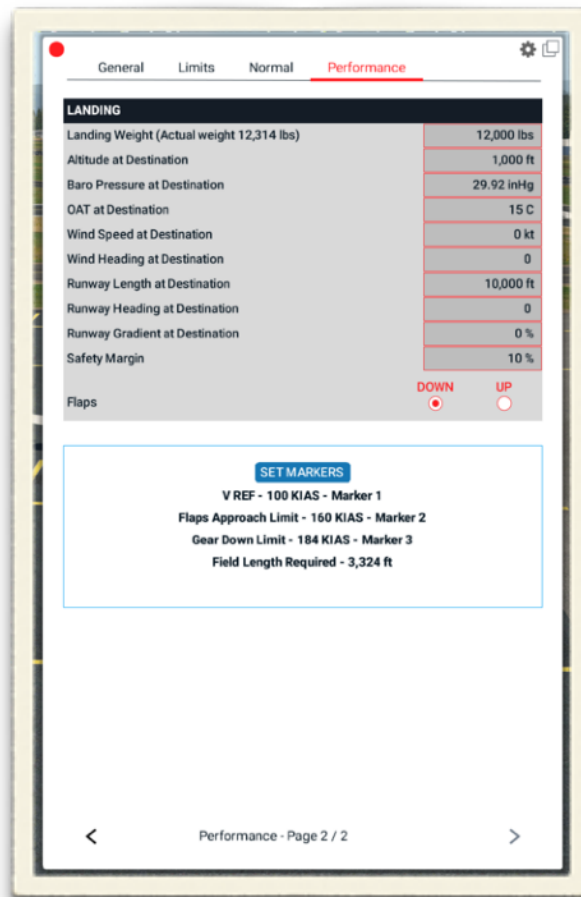
CHECKLIST FLOW - AUTOMATIC - Item actions are completed automatically and checklist advance is automatic too. That means switches/instruments are switched automatically. In case the item action represents something that logically cannot be done automatically, it will be necessary to click on the red-framed actual item to advance to the next item.

Note: Not all checklists have SEMI-AUTOMATIC and AUTOMATIC functionality. The checklists that not have this auto functionality are mostly those related to the phase when the aircraft is in the air and it is up to the Pilot to decide when and what to do. The purpose is not to provide an AI feature.

CHECKLIST HINTS - are additional explanations and guides, not contained in the checklists texts, that are displayed on the bottom of the screen in yellow color.



TAKEOFF performance page.



LANDING performance page.

Performance pages.

TAKEOFF.

All the fields that have darker blue background color are filled automatically with X-Plane data. All the red framed fields and red radio buttons needs to be filled by pilot. The resulting V speeds can be set on Pilot's and Copilot's airspeed indicators by clicking on SET MARKERS button. If the required field length is higher than the runway length, you will be alerted by a red color message.

LANDING.

All the fields marked by red frame needs to be filled as well as red radio buttons. Vref, Flaps Approach Limit, Gear Down limit and Field Length Required will be the results of this calculation. In case of insufficient runway length red alert will be displayed.

THROTTLE QUADRANT.

Manual Pitch Trim Down Trigger Zone.

Actual pitch trim setting.

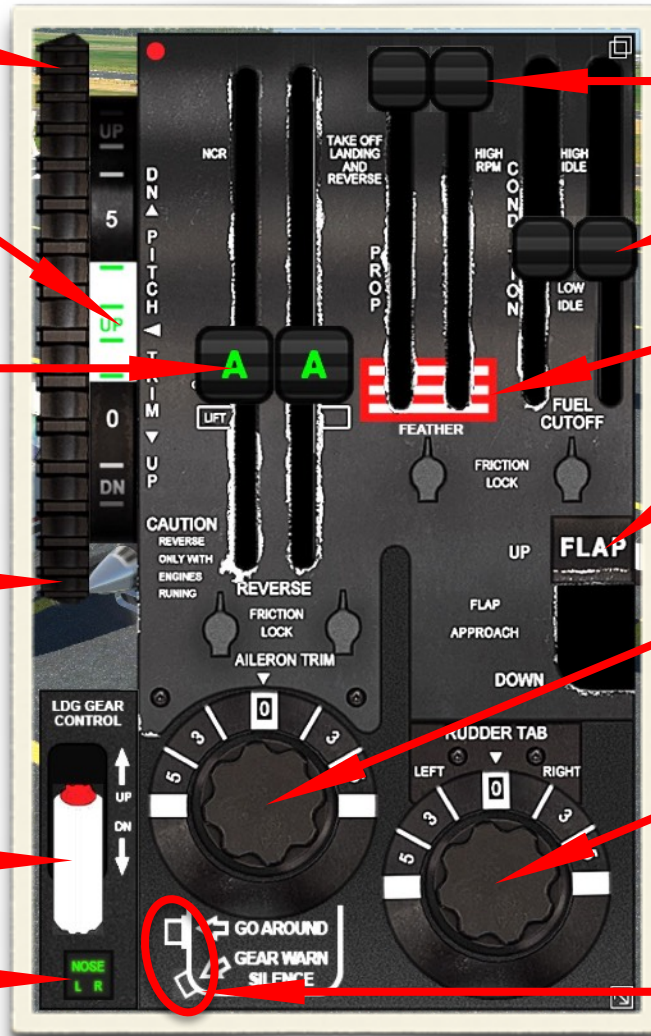
Power Levers with mode annunciators:

- A (green) - alpha - **forward**
- B (amber) - beta - **ground fine**
- R (red) - **reverse**

Manual Pitch Trim Up Trigger Zone.

Gear Lever.

Gear Down Annunciator.



Propeller Levers to set RPM.

Condition Levers to set Fuel Cutoff / Low Idle / High Idle.

Feathering region.

Flaps Lever.

Aileron Trim.

Rudder Trim.

Go Around and Gear Warn Silence push buttons. Normally located on 3D left thrust lever, for better accessibility implemented also in 2d panel.

Throttle Quadrant 2D panel.

Power Levers.

They control engine power in three regions: forward thrust, ground fine, and reverse. The power levers are using the gas generator N1 governor and different propeller governors. When the levers are lifted over the IDLE gate and pulled back into the ground fine range, they hold engine power at the selected idle speed and control propeller blade angle. The ground fine range is normally used for taxi. When the levers are lifted over the ground fine gate into the reverse range, they control engine power and propeller blade angle.

Propeller Levers.

The propeller levers have standard functionality - they demand specific RPM for takeoff and cruise flight phase. The normal governing range is 1,450 to 1,700 rpm. King Air 350 has manual and automatic propeller feathering systems. To feather a propeller manually, pull the propeller lever back past the friction detent into the red and white striped section of the throttle quadrant. To un-feather, push the lever back into the governing range. The propellers go to the feathered position when the engines shut down because of the loss of oil pressure in the propeller hub.

ENGINE OPERATING LIMITS						
Operating Condition	Torque (ft-lbs)	Max ITT °C	Gas Generator RPM % N1	Prop RPM N2	Oil Pressure (OSI)	Oil Temp °C
Starting	-	1000	-	-	0 to 200	-40 (min)
Idle	-	750	62 (min)	1050 (min)	60 (min)	-40 to +110
Takeoff	100	820	104	1700	90 to 135	0 to 110
Max Cont	100	820	104	1700	90 to 135	0 to 110
Cruise Climb		785	104	1700	90 to 135	0 to 110
Max Cruise		820	104	1700	90 to 135	0 to 110
Max Reverse	-	760	-	1650	90 to 135	0 to 99
Transient	156	850	104	1870	200	0 to 110

Engine Limitations.

Condition Levers.

They have three positions: FUEL CUTOFF, LOW IDLE, and HI IDLE. At FUEL CUTOFF position, fuel flow to the engines is cut off. At LOW IDLE, engine speed N1 is a minimum of 62%, at HI IDLE it is 70%. The levers can be set between these two values for any proportional speed between 62% and 70% N1 speed.

Governors.

Primary Governor.

The primary governor is setting the propeller RPM between 1450 and 1700. It is controlling the RPM by adjusting the oil supply to the propeller mechanism. Maximum Aircraft Range Power and Recommended Cruise Power is 1500 RPM.

Overspeed Governor.

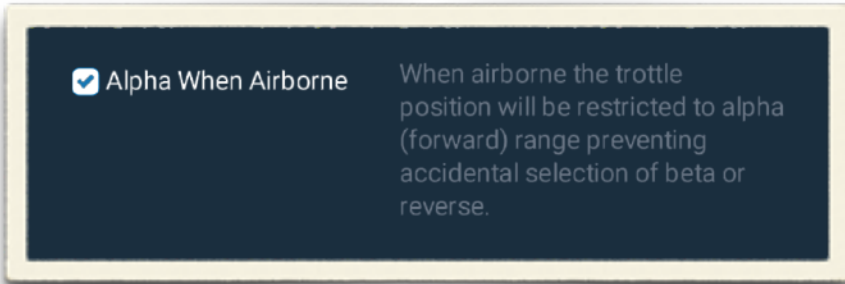


This governor is providing propeller overspeed protection in case of a primary governor failure. The overspeed governor propeller speed is set at 1768 RPM. The operation of the overspeed governor is very similar to the primary governor, except two differences. The pilot cannot select a particular speed, as with the primary governor and the overspeed governor can only reduce oil pressure to the propeller dome. For pre-takeoff check purposes, the set point of this governor can be rescheduled down to roughly 1565 RPM using the governor test switch (GOV) on the pilot's left sub-panel.

Fuel Topping Governor.

In case the primary or/and overspeed governors are not able to control the RPM, the fuel topping governor kicks in when the thrust is at 106% selected RPM.

Key Commands & Joystick Setting for engine.



We focused on making the most compatible system, demanding as little customization as possible from the user, so basically you can use whatever you are used to, however there are some small details changed described in this chapter.

Please check one important option in our SETTINGS menu displayed on the screenshot. When checked it will not permit you to go to beta or reverse when the aircraft is airborne. It influences key commands as well as joystick throttle.

Key Commands.

We have slightly changed the behavior of some standard X-Plane 11 commands. That means if you are using key commands for throttle control, propeller control and condition control you don't have to change any key assignments. Just for your information here is a list of standard X-Plane 11 key commands that were slightly changed so that you could manage the engine more easily:

sim/engines/thrust_reverse_toggle

* *sim/engines/beta_toggle*

* *sim/engines/throttle_up*

* *sim/engines/throttle_down*

* *sim/engines/throttle_up_1*

* *sim/engines/throttle_up_2*

* *sim/engines/throttle_down_1*

* *sim/engines/throttle_down_2*

sim/engines/prop_down

sim/engines/prop_down_1

sim/engines/prop_down_2

sim/engines/prop_up_1

sim/engines/prop_up_2

Toggle thrust reversers.

Toggle Beta prop.

Throttle up a bit.

Throttle down a bit.

Throttle up a bit for engine #1.

Throttle up a bit for engine #2.

Throttle down a bit for engine #1.

Throttle down a bit for engine #2.

Prop coarse a bit.

Prop down a bit for engine #1.

Prop down a bit for engine #2.

Prop up a bit for engine #1.

Prop up a bit for engine #2.

The commands marked with * have the most significant changes. We have introduced “stops” on the edge of alpha, beta and reverse regimes. Example (aircraft on the ground), you hold throttle_up key BRIEFLY to slightly increase forward power then you HOLD throttle_down key for a LONGER TIME. The result is that the throttle stops on Idle position. If you release throttle_down key and push and HOLD it again for LONGER TIME, it goes to beta now at stops at the edge of beta and reverse. If you release throttle_down key again and push and HOLD for LONGER TIME, it goes to reverse at stops at maximum reverse thrust. It works the same way on the way back from reverse through beta to alpha regimes.

Concerning the *beta_toggle* key command the difference is only that if you push the key it goes to minimal beta and not maximal beta. This helps to control the aircraft more smoothly.

Joystick Settings for engine control.

Users are free to use any standard X-Plane 11 setting.

Usually if you don't have a sophisticated joystick throttle quadrant you can use toggle key commands for setting beta or reverse regime (mentioned above) where you always control the power with full throttle axis range. This method is perfectly compatible with our logic.

In case you have a more advanced joystick throttle quadrant and you want to edit custom curves for your axis where you set beta and reverse regimes you can do it, it works with our systems, too.

King 350 is equipped with a complete IFR avionics package, including weather radar, compass system, audio systems and dual flight instrumentation.



Avionics Panel.



Pilot's Main Avionics Instruments.

Copilot's Electronic Horizontal Situation Indicator (Copilot's EHSI)

Copilot's Radio Magnetic Indicator - RMI

Radio Altitude Indicator

Copilots EHSI source selection.



Right Gyro Slaving Meter

Copilot's Main Avionics Instruments.

Pilot's EHSI Course Heading Panel.

Pilot's EHSI Display Control Panel.

Autopilot Flight Control Panel.

Autopilot Controller Panel.

Copilot's EHSI Display Control Panel.

Integrated X-Plane 11 FMS

EADI and EFIS Power and Test Panel.



Center Pedestal Avionics Instruments.

Avionics Power.



All avionics components can be turned on and off with AVIONICS MASTER PWR switch.

There are 3 avionics buses that provide DC power to various avionics components.

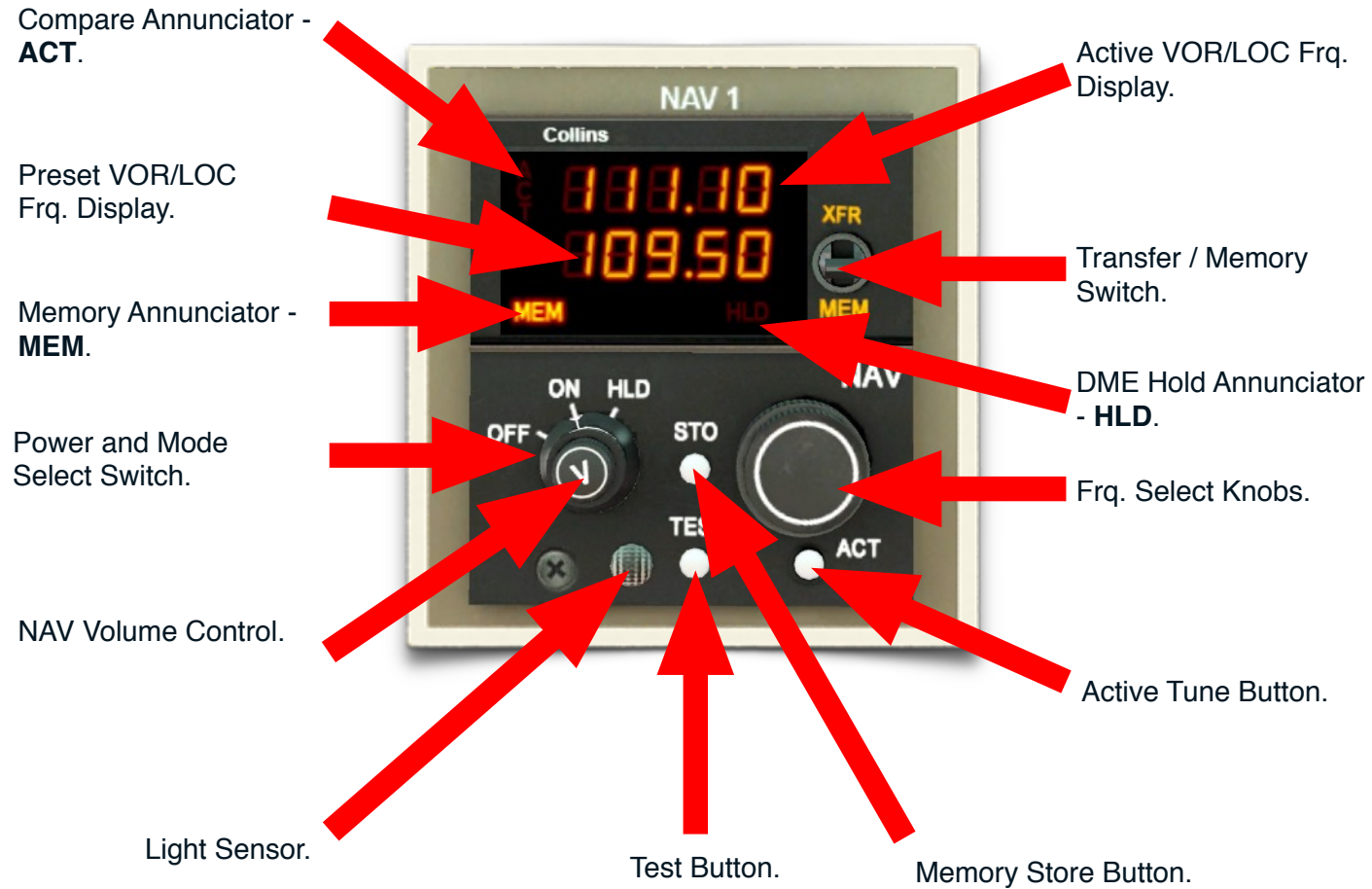
In case of a malfunction there are several rules:

- Components numbered as 1 (COM 1, NAV 1,...) are fed by the No. 1 Avionics Bus, which is fed from the electrical system TRIPLE-FED bus. There for in case of a dual generator failure they would continue to operate on what is left of the battery power.
- Components numbered as 2 (COM 2, NAV 2, ...) are fed by No. 2 Avionics bus which is fed by the left generator bus.
- The rest of the components are fed by the No. 3 Avionics bus, which is fed by the right generator bus.

Therefore in case triple-fed bus, right and left generator buses are powered all Avionics buses should work.

There is a general rule that the Ground Power Unit should be connected to run avionics systems on the ground otherwise battery will drain in a short period of time.

Navigation Radio Instruments.



MEM annunciator - The MEM annunciator illuminates whenever a frequency is displayed in the lower window.

HLD annunciator - The HLD annunciator indicates that the DME is held to the active frequency at time of selection. The upper window displays the NAV frequency and the lower window displays the DME hold frequency. Tuning of active frequencies can take place during this time.

Power switch ON/OFF position - switches system power.

Power switch HLD position - The HLD position allows the NAV frequency to be changed but holds the DME to the current active NAV frequency.

XFR switch - When moved to the XFR position, the preset frequency is transferred up to the active display and the NAV/DME retunes. The previously active frequency becomes the new preset frequency and is displayed in the lower window.

MEM switch - When this switch is moved to the MEM position, one of the four stacked memory frequencies is loaded into the preset display. Successive pushes cycle the four memory frequencies through the display.

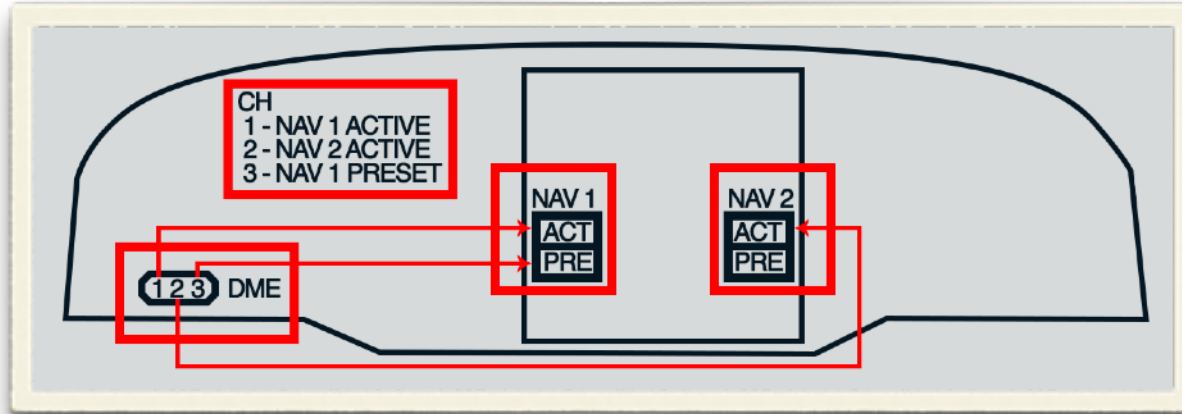
Frq. Select Knobs - Two concentric knobs select the preset or active frequency displays. The larger knob changes the two digits to the left of the decimal point in 1-MHz steps. The smaller knob changes the two digits to the right of the decimal point in 0.05-MHz steps. Frequencies roll over at the upper and lower limits. The two frequency select knobs are independent of each other such that the upper and lower limit rollover of the 0.1-MHz digit will not cause the 1.0-MHz digit to change.

ACT Button - Push the ACT button to enable the frequency select knobs to directly retune Active Frq. and DME. The bottom window will display dashes and the upper window will continue to display the active frequency. Push the ACT button a second time to return the control to the normal 2-display active/preset mode of operation.

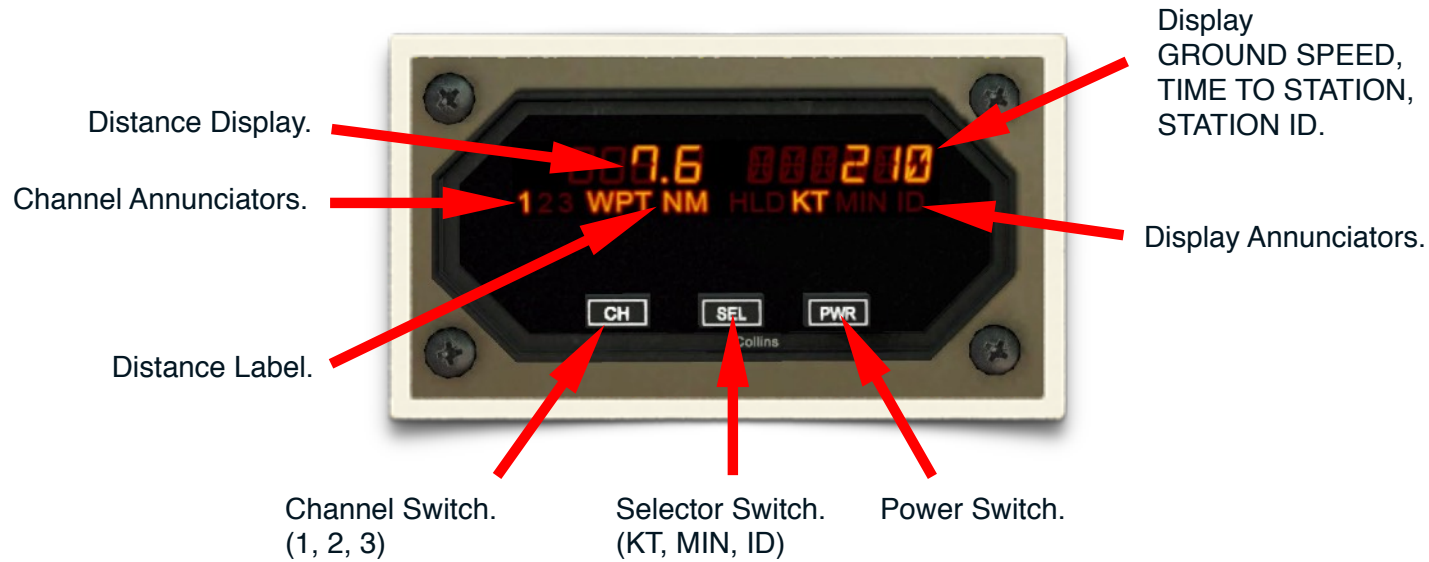
STO button - The STO button allows up to four preset frequencies to be selected and entered into the memory. To store a frequency, simply toggle the MEM switch until the upper window displays the desired channel number (CH 1 through CH 4), rotate the frequency select knobs until the lower window displays the frequency to be stored, and push the STO button. After few seconds, the control will return to the normal two-display tune/preset mode of operation.

TEST Button - Push the TEST button to initiate the radio self test. The self test routine requires few seconds to be completed. During the test 4 dash lines are displayed in the top active frq. display. In case test is successful two Zeros are displayed in the bottom preset frq. display.

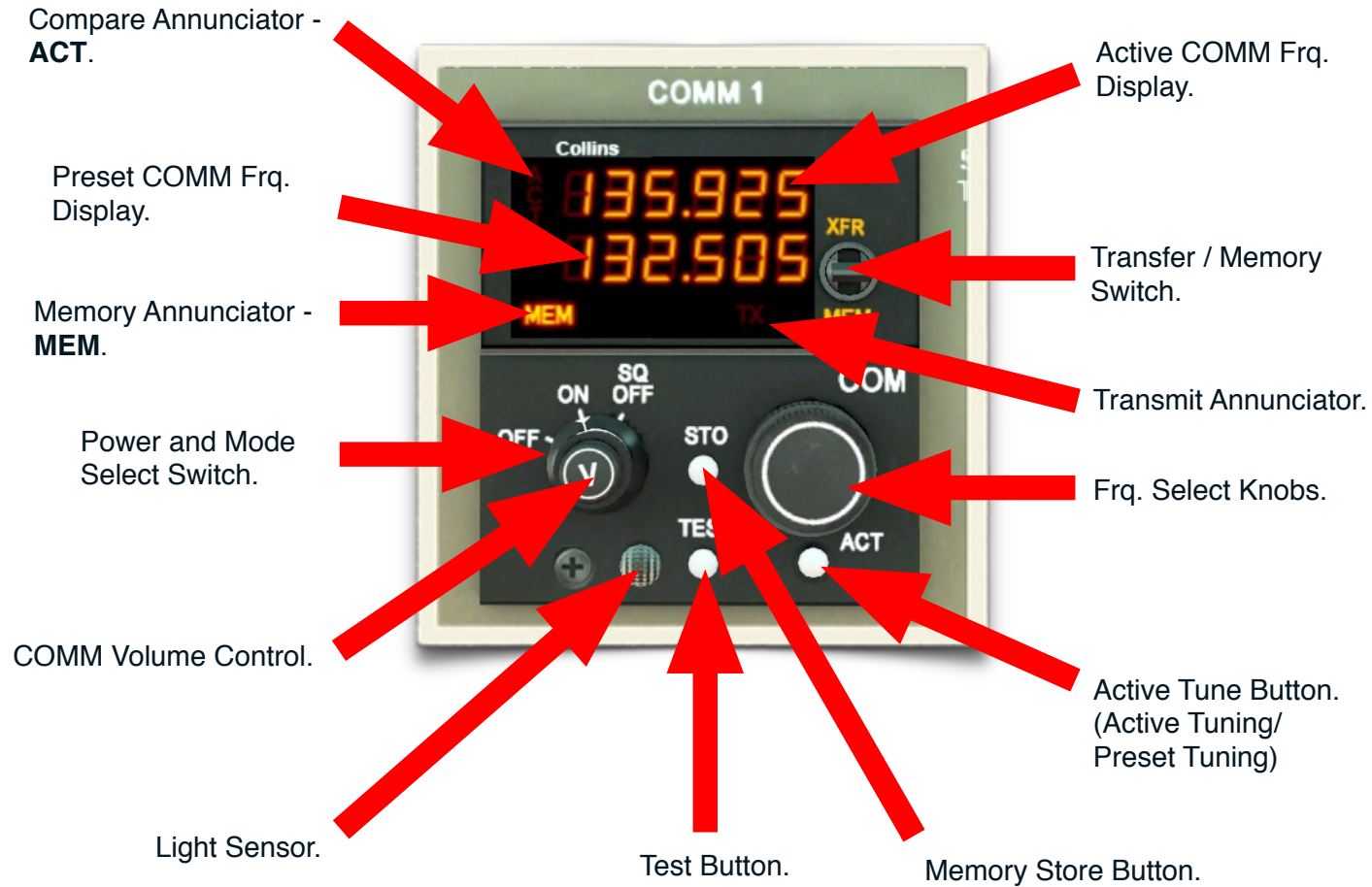
Distance Measuring Equipment.



Channels Interconnections of DME instrument.



Communication Radio Instruments.



MEM annunciator - The MEM annunciator illuminates whenever a frequency is displayed in the lower window.

TX annunciator - annunciator illuminates whenever the instrument is transmitting.

Power switch ON/OFF position - switches system power on or off.

XFR switch - When moved to the XFR position, the preset frequency is transferred up to the active display and the instrument retunes. The previously active frequency becomes the new preset frequency and is displayed in the lower window.

MEM switch - When this switch is moved to the MEM position, one of the six stacked memory frequencies is loaded into the preset display. Successive pushes cycle the six memory frequencies through the display.

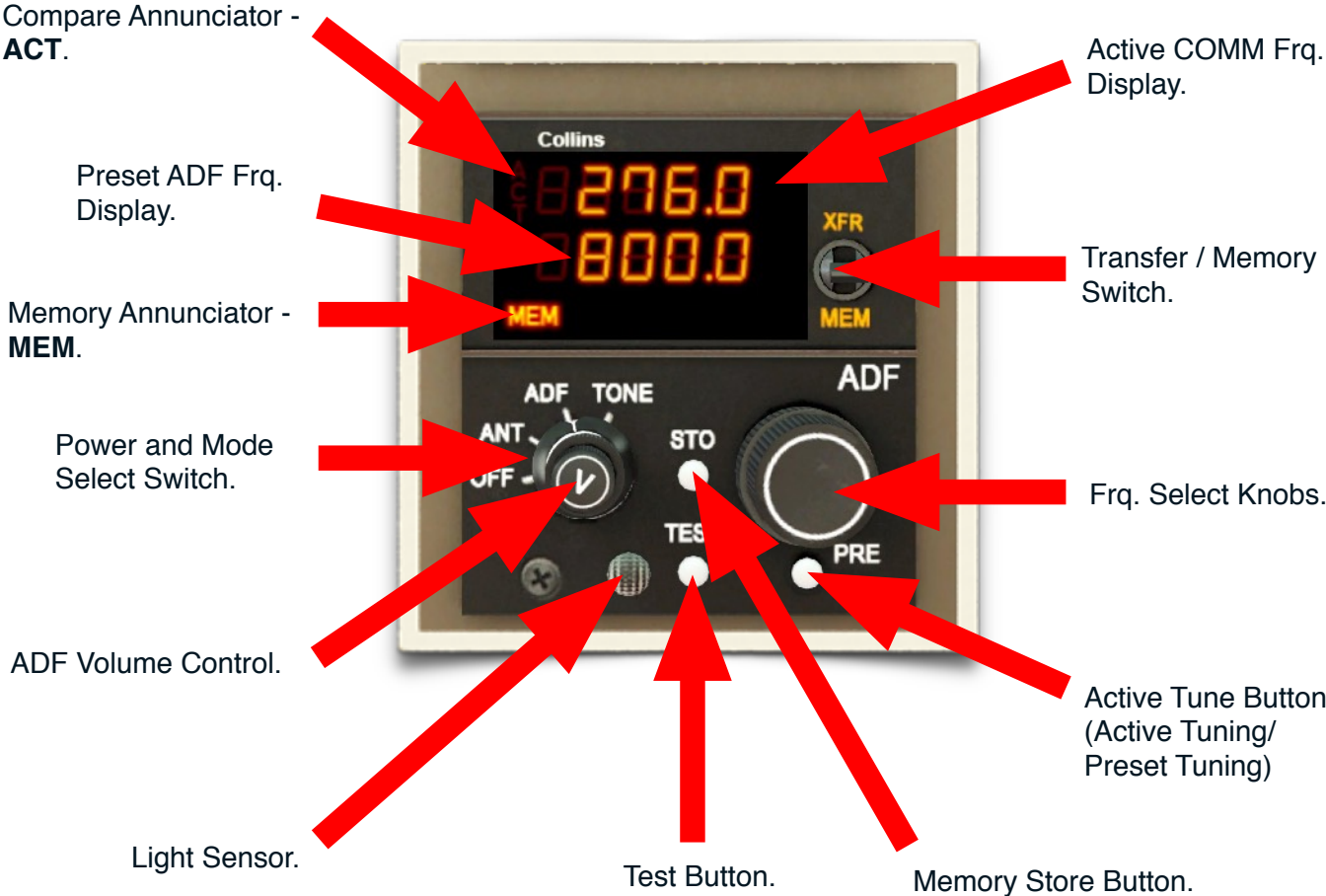
Frq. Select Knobs - Two concentric knobs control the preset or active frequency display. The larger knob changes the two digits to the left of the decimal. The smaller knob changes the three digits to the right of the decimal point. Numbers roll over at the upper and lower frequency limits.

ACT Button - Push the ACT button to enable the frequency select knobs to directly retune the active frequency. The bottom window will display dashes and the upper window will continue to display the active frequency. Push the ACT button a second time to return the control to the normal two-display tune/preset mode of operation.

STO button - The STO button allows up to six preset frequencies to be selected and entered into the memory. To store a frequency, simply toggle the MEM switch until the upper window displays the desired channel number (CH 1 through CH 6), rotate the frequency select knobs until the lower window displays the frequency to be stored, and push the STO button. After few seconds, the control will return to the normal two-display tune/preset mode of operation.

TEST Button - Push the TEST button to initiate the radio self test. The self test routine requires few seconds to be completed. During the test 4 dash lines are displayed in the top active frq. display. In case test is successful two Zeros are displayed in the bottom preset frq. display.

Automatic Direction Finding Instrument (ADF).



MEM annunciator - The MEM annunciator illuminates whenever a frequency is displayed in the lower window.

Power switch - The power and mode switch contains four detents positions.

OFF - The OFF position interrupts system power (Turns the ADF off). Selecting ANT, ADF, or TONE applies power to the ADF system and establishes the system mode of operation.

ANT - In ANT mode, the ADF receiver functions as an aural receiver, providing only an aural output of the received signal.

ADF - In ADF mode, it functions as an ADF receiver connected to bearing indicator and an aural output of the received signal is provided.

TONE - TONE mode provides a 1000-Hz aural output tone when a keyed CW signal is being received.

XFR switch - When moved to the XFR position, the preset frequency is transferred up to the active display and the ADF retunes. The previously active frequency becomes the new preset frequency and is displayed in the lower window.

MEM switch - When this switch is moved to the MEM position, one of the four stacked memory frequencies is loaded into the preset display. Successive pushes cycle the four memory frequencies through the display.

Frq. Select Knobs - Two concentric knobs control the preset or active frequency displays. The larger knob changes the 1000's and 100's KHz digits. The smaller knob changes the 10's, units, and tenths KHz digits.

ACT Button - Push the ACT button to enable the frequency select knobs to directly retune Active Frq. and DME. The bottom window will display dashes and the upper window will continue to display the active frequency. Push the ACT button a second time to return the control to the normal 2-display active/preset mode of operation.

STO button - The STO button allows up to four preset frequencies to be selected and entered into the memory. To store a frequency, simply toggle the MEM switch until the upper window displays the desired channel number (CH 1 through CH 4), rotate the frequency select knobs until the lower window displays the frequency to be stored, and push the STO button. After few seconds, the control will return to the normal two-display tune/preset mode of operation.

TEST Button - Push the TEST button to initiate the radio self test. The self test routine requires few seconds to be completed. During the test 4 dash lines are displayed in the top active frq. display. In case test is successful two Zeros are displayed in the bottom preset frq. display.

Transponder.

Compare Annunciator -
ACT.

IDENT display.
(Displayed when
Ident Button used.)

Power and Mode
Select Switch.

Light Sensor.



Active ATC Code
Display.

No. 1 or No. 2
Select Switch.

Transponder Reply
Annunciator.

Code Select Knobs.

Preset Button.

Test Button.

Ident Button.

TX annunciator - The TX annunciator illuminates when the transponder replies to an interrogation.

Power switch ON/OFF position - The power and mode switch contains four detents positions.

OFF - Power is removed and is applied when any of the other modes is selected.

STBY - power is applied to the transponder but it is prevented from transmitting replies. STBY should be used only during taxi or when requested by ATC.

ALT - The ALT position is the normal operating position and allows the transponder to reply to the interrogation pulses as well as transmitting uncorrected barometric altitude when the transponder is interrogated in mode-C.

ON - It deletes the altitude code and is normally used when requested by ATC.

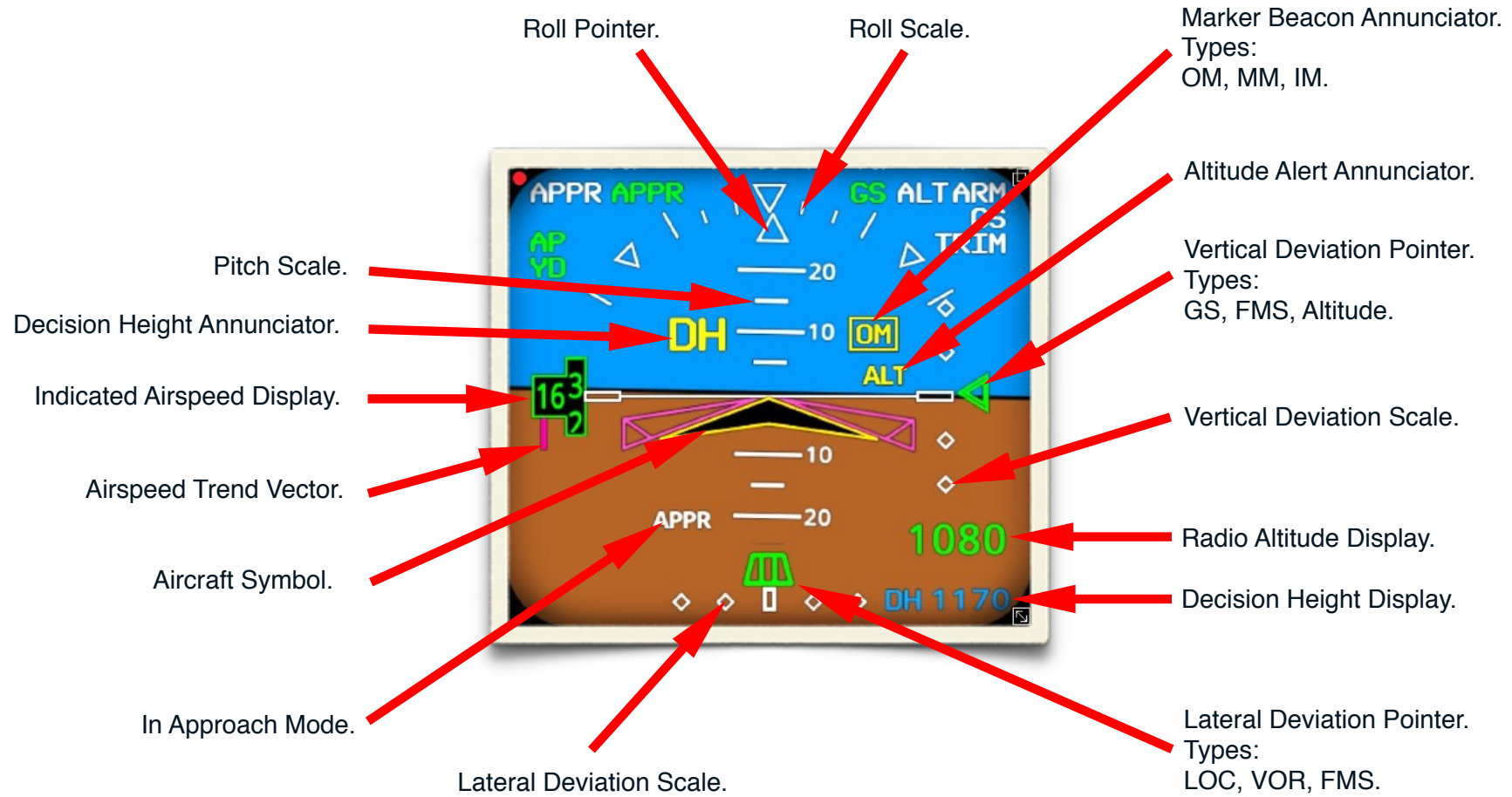
No. 1/No. 2 switch - It selects which of two transponders is active.

Code select knobs - Two concentric knobs control the active code display. The larger knob changes the two more significant digits, and the smaller knob changes the two less significant digits.

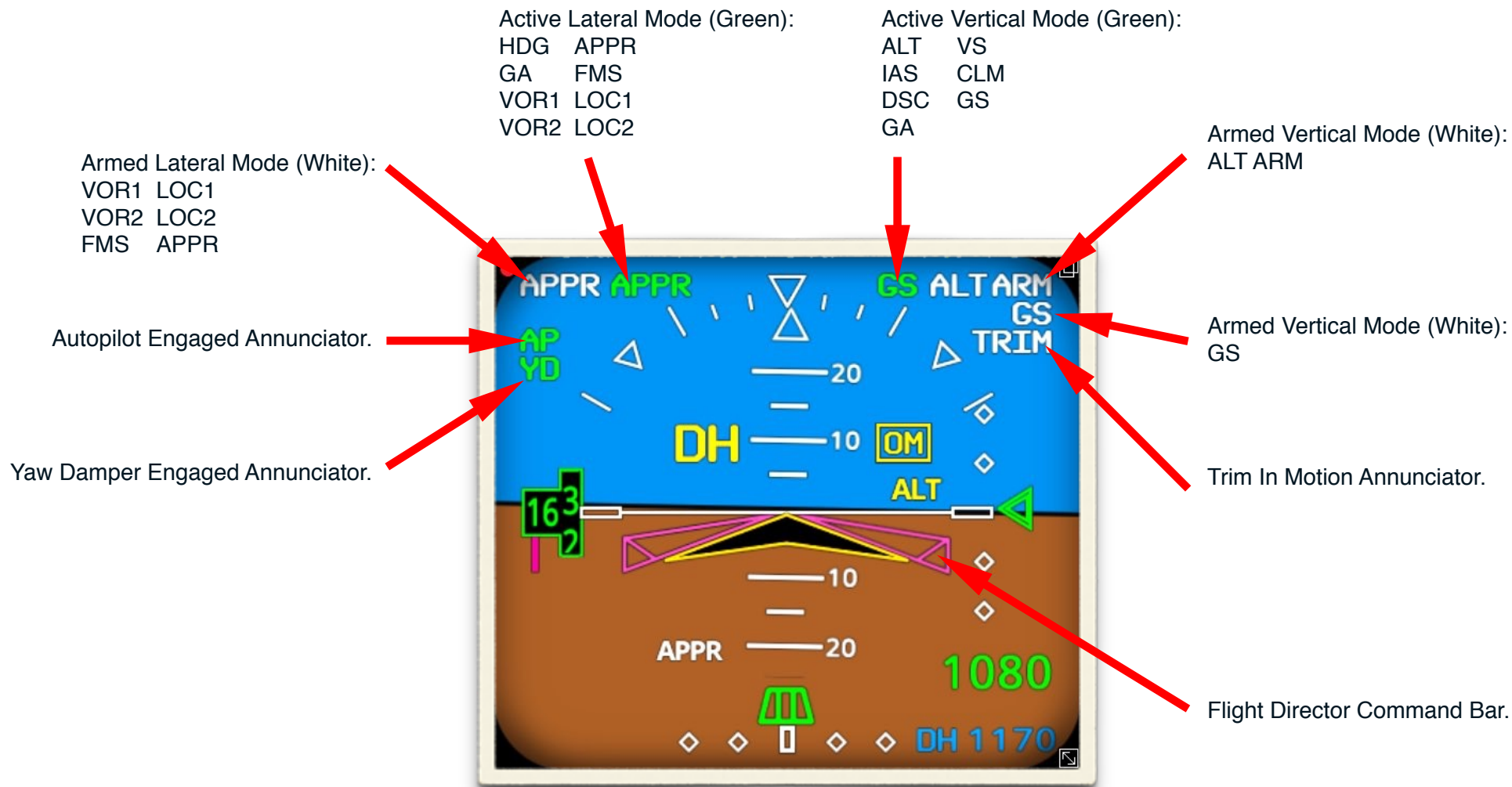
IDENT Button - It causes the transponder to transmit a special identification pattern that is displayed on the ground controller's radar scope. This button should be pushed only when you are requested to "squawk ident" by the ground controller.

TEST Button - Push the TEST button to initiate the radio self test. The self test routine requires few seconds to be completed. During the test 4 dash lines are displayed in the top active frq. display. In case test is successful two Zeros are displayed in the bottom preset frq. display.

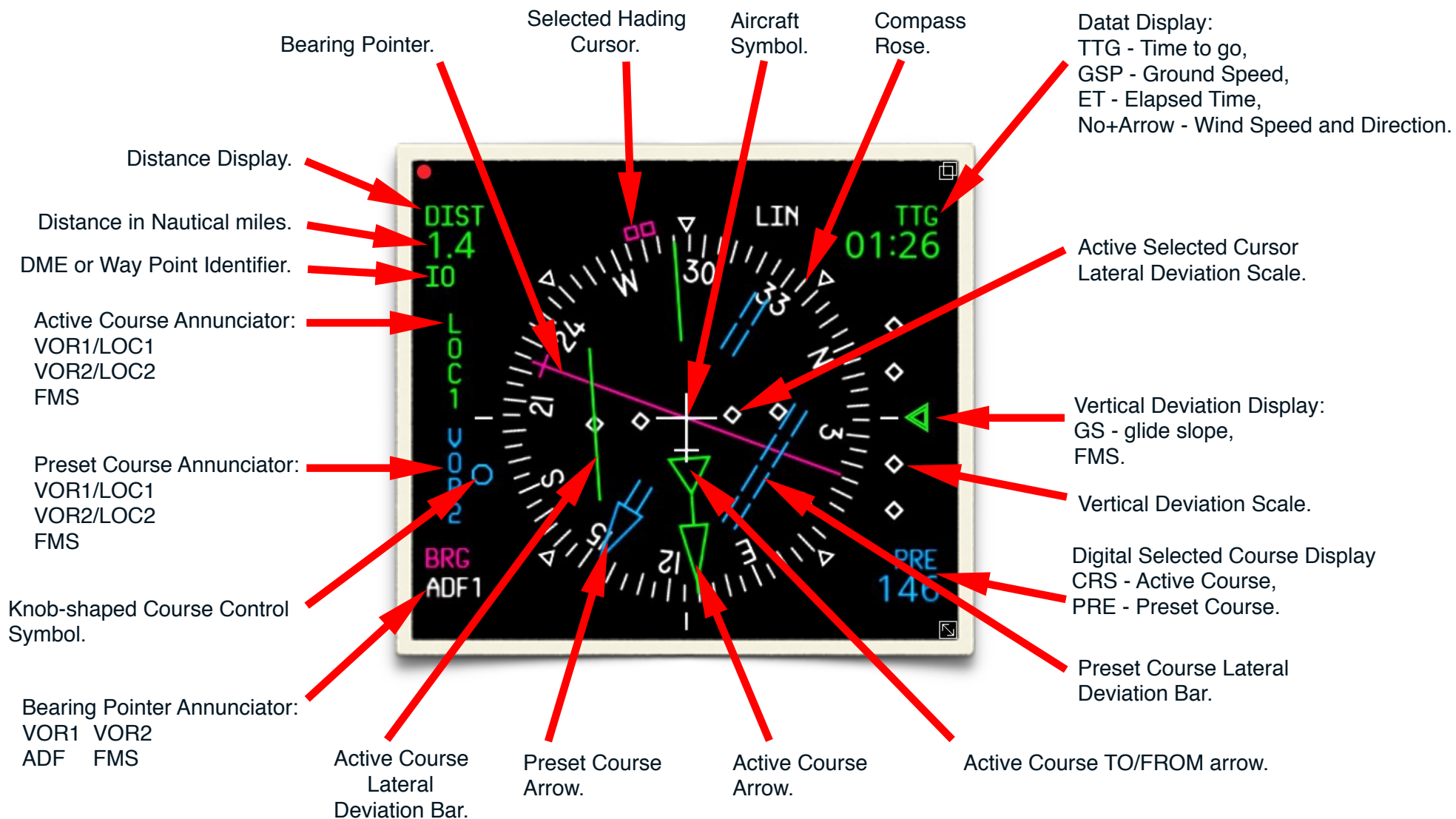
EADI (Electronic Attitude Director Indicator).



EADI (Electronic Attitude Director Indicator) Autopilot modes.

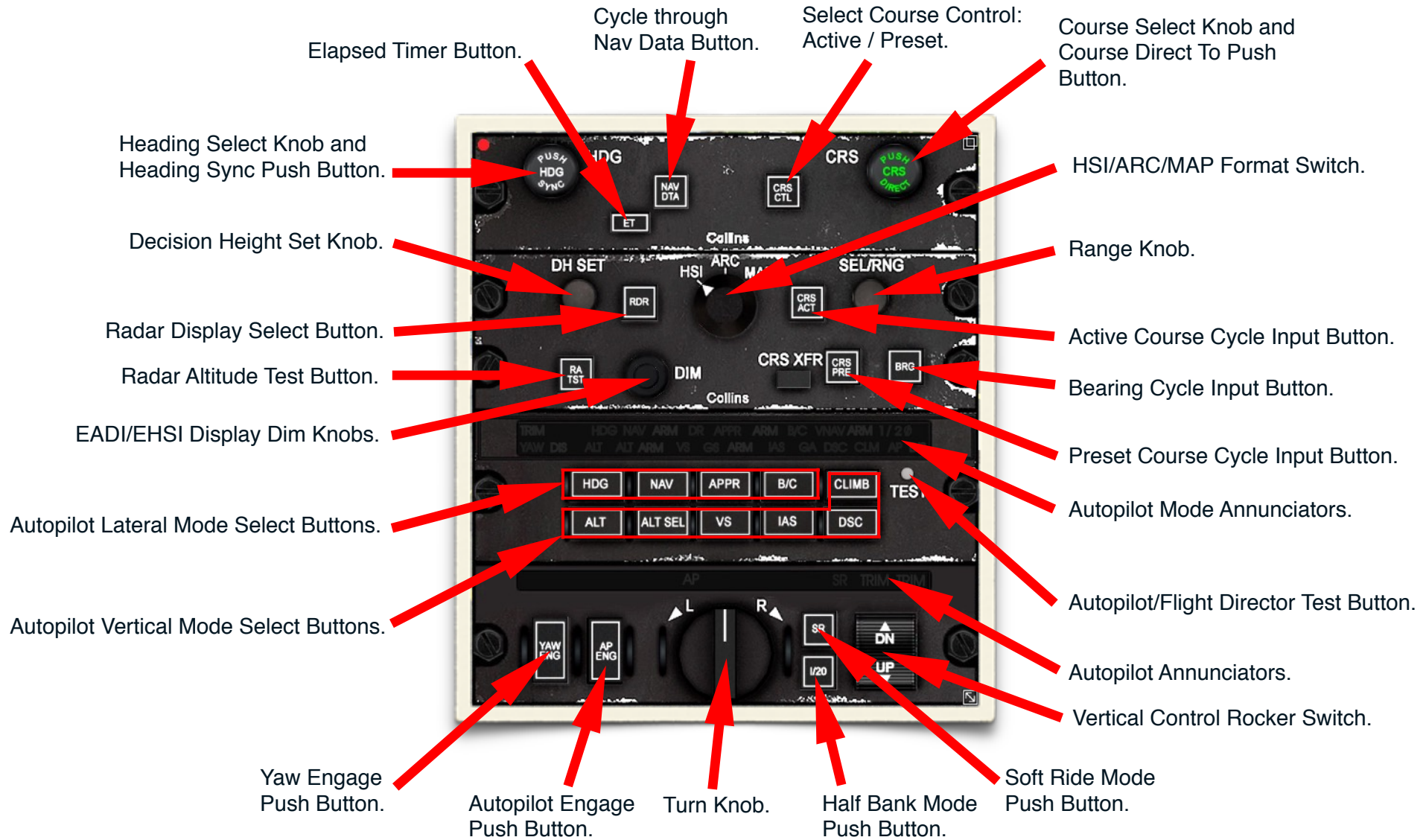


EHSI (Electronic Horizontal Situation Indicator).

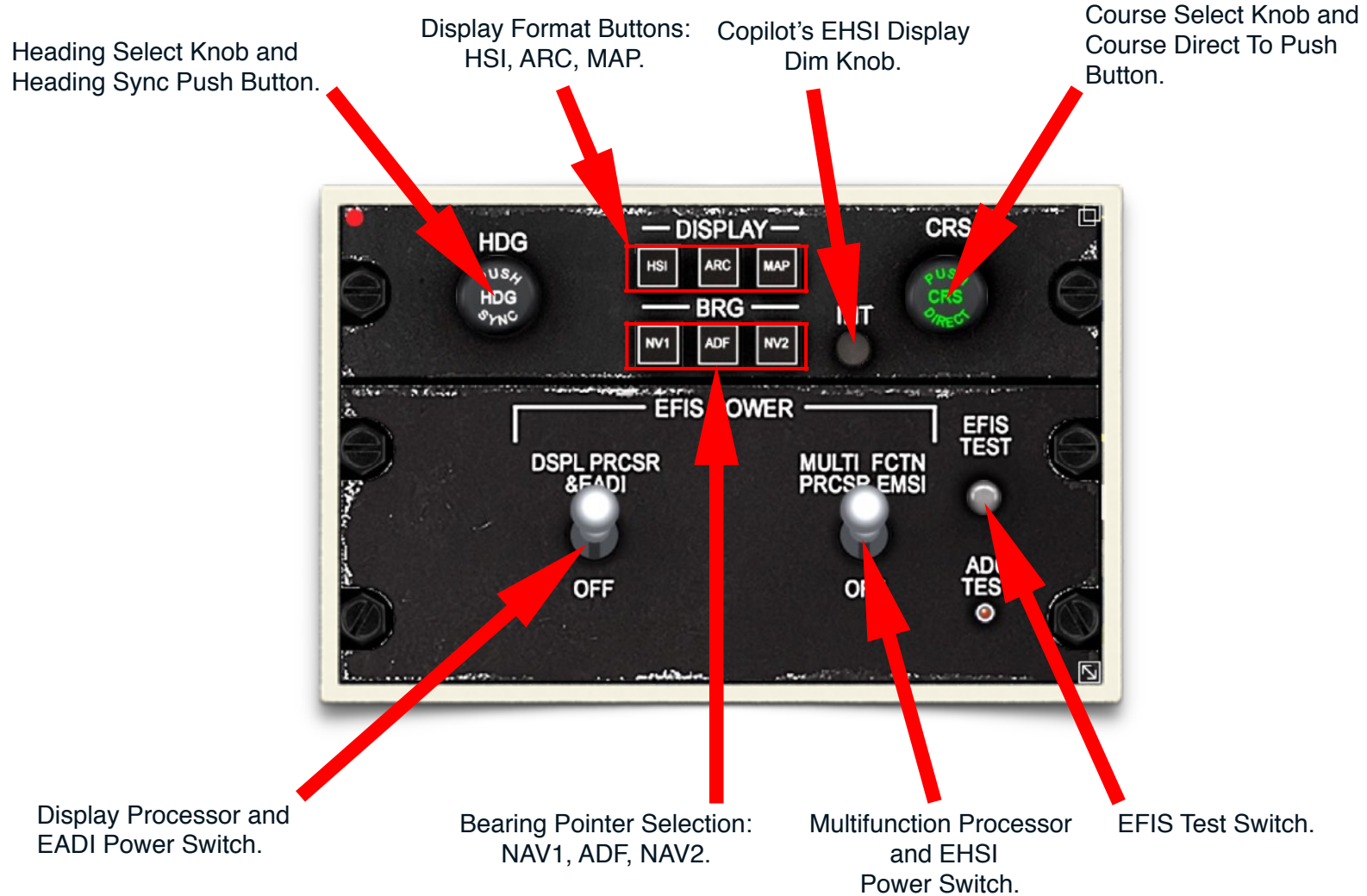


Avionics Control Panels.

Pilot's Control Panel.



Copilot's EHSI Control Panel and EFIS Power.

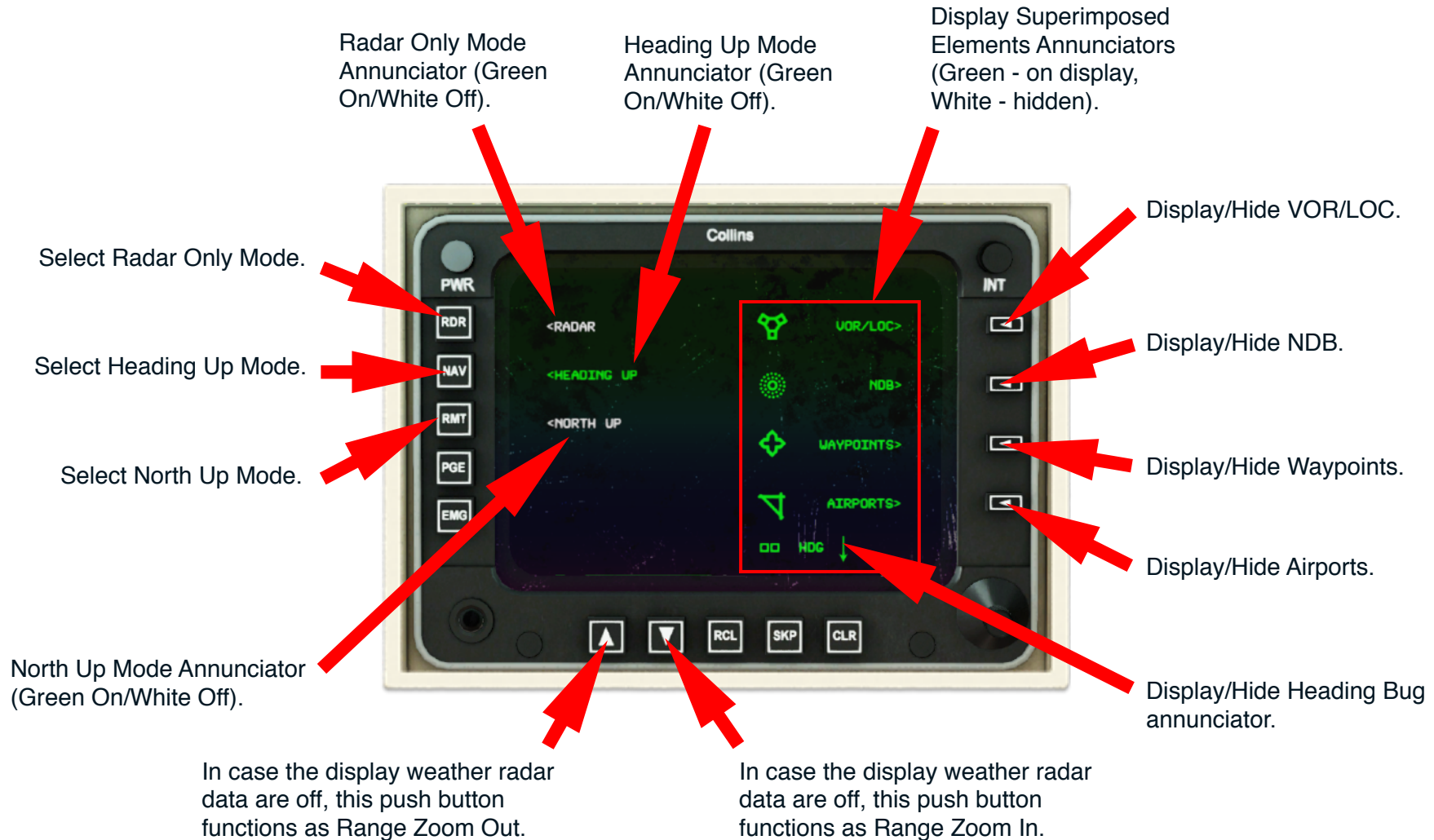


MFD - Multifunction Display.

Note: Only basic functionality of the MFD is simulated - basically all that is possible to simulate with default X-Plane 11 behavior.



MFD menu display.



MFD Display modes.



Heading Up Mode, Radar Off.



North Up Mode.



Weather Radar test Sequence.



Heading Up Mode, Radar On.



Radar Only Mode, Radar On.

Autopilot Modes.

Annunciators.



AP - Autopilot engaged.

DIS (AP) - Autopilot disengaged.

YAW - Yaw damper engaged.

DIS (YAW) - Yaw damper disengaged.

HDG - Selection of heading mode.

NAV - Selection of navigation mode.

ARM (NAV) - System is armed to capture VOR, LOC or FMS.

APPR - Selection of approach mode.

ARM (APPR) - System is armed to capture VOR, LOC.

B/C - Selection of back-course localizer mode.

CLM - Selection of climb mode.

DSC - Selection of Descent mode.

ALT - Selection of altitude hold mode.

ALT ARM - System is armed to capture a preselected altitude.

VS - Selection of vertical speed hold mode.

GS - GS System is responding to glide slope signal. It is automatically selected with APPR.

GA - Selection of go-around mode.

TRIM - Electric elevator trim system in motion.

1/2φ - Selection of half-bank mode.

AP - Autopilot failure.

SR - Selection of soft ride mode.

TRIM - Trim system failure.

Engaging Autopilot.

If autopilot is engaged, yaw damper engages automatically and ALT ARM of preselected altitude will engage, too. If no lateral or vertical mode is selected, the autopilot will maintain present roll and pitch that can be altered by the Roll Knob and the Vertical Control Rocker Switch.

Disengaging Autopilot.



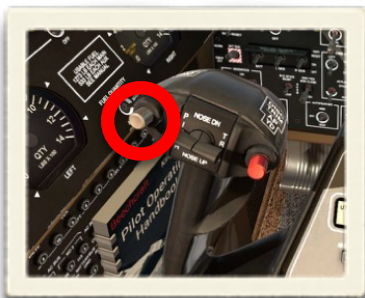
The most common way to disengage the autopilot is by pressing Autopilot Disconnect Switch on the yoke (Red Push Button on the left handle, right side). By pushing this button momentarily Autopilot disengages, Yaw Damper Disengages and Rudder Boost disengages. If the button is held for more than 2 seconds Electric Pitch Trim system disengages, too.

*We recommend to assign our **custom command** to a joystick button or keyboard:*

Command: KA350/cmd/Yoke/AP_YD_ElecTrim_disc, Description: "AP, YD, Electric Pitch Trim disconnect."

You can also disengage the Autopilot by pressing the AP button on the autopilot control panel but it disengages only autopilot. Yaw Damper stays engaged as well as Rudder Boost and Electric Pitch Trim.

Autopilot Only Mode.



If no lateral or vertical mode is selected, the autopilot will maintain present roll and pitch that can be altered by the Roll Knob and the Vertical Control Rocker Switch. Another way to alter Pitch and Roll in this mode is to push and hold the PITCH SYNC & CWS push button on the yoke (Grey push button on the left handle, left side).

Activating the PITCH SYNC & CWS disengages the aileron and elevator servos and permits the aircraft to be flown manually. The system will reengage and hold the roll angle present at the moment the PITCH SYNC & CWS button is released. During the time the button is pressed the AP DIS annunciator will flash.

*We recommend to assign our **custom command** to a joystick button or keyboard:*

Command: KA350/cmd/Yoke/CWS_SYNC, Description: "AP - Control Wheel System synchronization."

With the **ALT**, **IAS**, or **VS** flight director modes of operation selected, depressing the **PITCH SYNC & CWS** button and manually maneuvering the aircraft to a new reference altitude, airspeed, or vertical speed will cause the flight director command bars to sync to the new values when the button is released.

HDG - Heading Hold Mode.

Selection of this lateral mode will command the aircraft to fly selected heading. The altitude preselect mode is automatically selected with the heading mode. The heading mode is also automatically selected when another lateral mode is selected and the selected lateral mode is armed. The steering and autopilot commands are limited to provide a maximum commanded bank angle of approximately 25°.

NAV - Navigation mode.



When the Navigation Mode is selected VOR, LOC or FMS signals are flown. The altitude preselect mode is automatically selected with the navigation mode. To select what signal should be commanded press the Active Course Cycle Input Button on Pilot's Control Panel. In case there is no signal present the system activates NAV ARM submode. If after selecting NAV the system is in NAV ARM submode the Heading Mode is selected automatically.

APPR - Approach mode.

When the Approach Mode is selected VOR, LOC signals are flown and GS/GS ARM (Glide Slope/Glide Slope Arm mode) is selected automatically. To select what signal should be commanded press the Active Course Cycle Input Button on Pilot's Control Panel. In case there is no signal present the system activates APPR ARM/GS ARM submode. If after selecting APPR the system is in APPR ARM submode the Heading Mode is selected automatically.

B/C - Back Course Localizer Approach.

Back course localizer approach is selected by pushing the B/C mode button. This mode is similar to Approach mode except it provides commands to capture and track the localizer (LOC) back course.

ALT - Altitude Hold Mode.

When the altitude hold mode is selected the aircraft will maintain the altitude at which the mode was selected. The aircraft's vertical speed should be reduced to 500 feet per minute or less prior to selecting altitude hold for a smooth capture of the desired altitude. The selected altitude can be changed by using a Control Wheel Sync button and manually maneuvering the aircraft to a new altitude.

IAS - Indicated Airspeed Mode.

The IAS mode will manage to maintain the current indicated airspeed present at the time the mode was selected by pitch change. The Vertical Control Rocker Switch can be used to change the IAS reference in 1-knot increments each time the control is activated. Also, using a Control Wheel Sync and then changing the aircraft speed can be used to change the IAS reference.

VS - vertical Speed Mode.

When activated this mode will hold the vertical speed that was present at the moment of selection. The vertical speed mode reference can be changed with the Vertical Control Rocker Switch. Also using a Control Wheel Sync and then changing the aircraft vertical speed can be performed to change the VS reference.

ALT SEL - Altitude Preselect Mode.



The altitude preselect mode is automatically selected anytime a lateral flight director mode is selected or anytime the autopilot is engaged. The system will capture the desired altitude when it is approached. The selection of the preselected altitude is provided by the Altitude Preselect Panel in main Avionics Front Panel. By pushing the knob you select if you want to change 100 ft or 1,000 ft. The panel is provided with a ALT ALERT annunciator. It alerts the pilot when the selected altitude is within 1,000 ft. The light will automatically cancel when the selected altitude is within 200 feet. After the aircraft acquires the selected altitude, if the aircraft deviates more than 200 feet the light will flash and the audio tone will turn on. A press of the ALT ALERT button cancels the flashing.

CLM - Climb Mode.

Climb mode provides transition from previously selected vertical mode to a preprogrammed vertical climb profile. The climb profile is defined by a preprogrammed IAS in relation to the altitude of the aircraft:

<i>Altitude</i>	<i>5000</i>	<i>12500</i>	<i>17500</i>	<i>22500</i>	<i>27500</i>	<i>32500</i>
<i>Speed KIAS</i>	<i>170</i>	<i>160</i>	<i>150</i>	<i>140</i>	<i>130</i>	<i>120</i>

Selection of the mode automatically arms the altitude preselect mode. The Vertical Control Rocker Switch can be used to change the IAS reference in 1- knot increments each time the control is activated. However, the vertical control cannot be used to command a negative climb rate. If the climb mode is selected while the preselector is set at the present altitude, the system automatically cycles directly to the altitude hold mode without climbing.

DSC - Descent Mode.

Descent mode provides transition from previously selected vertical mode to a preprogrammed vertical speed descent 1500 ft/min. Selection of the mode automatically arms the altitude preselect mode. The Vertical Control Rocker Switch can be used to change the VS reference in increments each time the control is activated. However, the vertical control cannot be used to command a positive climb rate. If the descent mode is selected while the preselector is set at the present altitude, the system automatically cycles directly to the altitude hold mode without climbing.

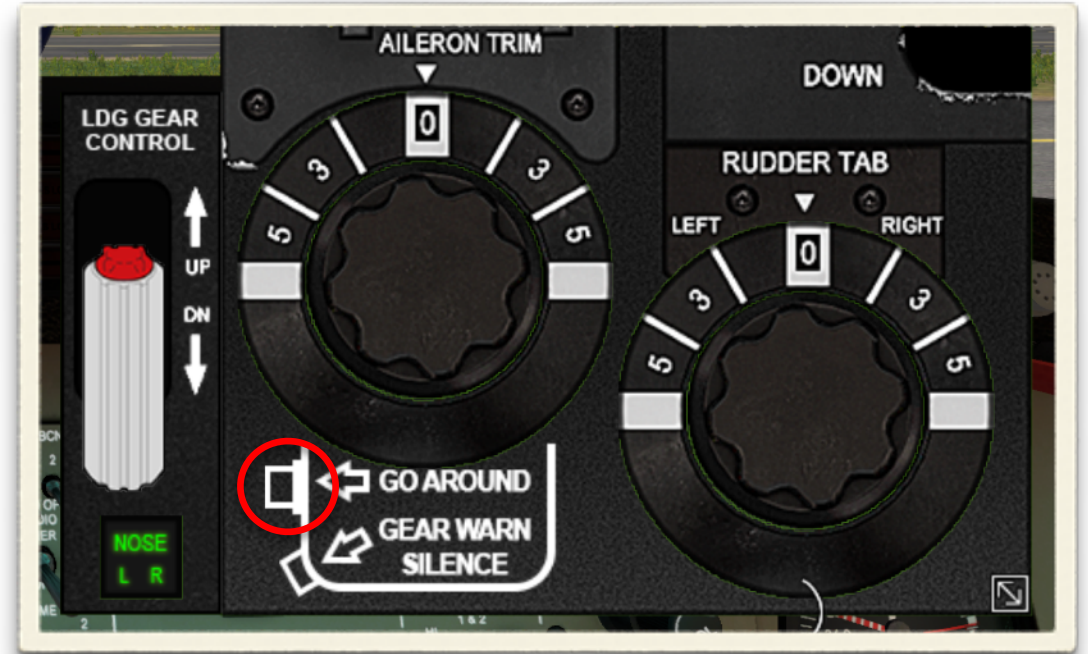
1/2 Ø - Half-Bank Mode.

When the half-bank mode is selected it reduces the normal bank limit to approximately 12.5°.

Soft Ride Mode.

If this mode is selected it changes the gain of various circuits in the computer to provide increased passenger comfort during turbulent conditions.

GA - Go Around Mode.



This Go Around mode can be selected either by clicking on the 3d throttle handle button or on the Throttle Quadrant 2D panel. It is a wings level, fixed 7° pitch up autopilot mode. Selection of the GA mode disengages the autopilot.



USER MANUAL

<https://www.airfoillabs.com/>