# Cowan Simulation 222B for X-Plane 12

## www.CowanSim.com

# 222B USER MANUAL

## Thank you for purchasing the Cowan Sim 222B!

Your support is VERY much appreciated. The 222* project started in September 2019 and in Oct 2020 the 222B was released to the public. With the help of real world helicopter pilots and a handful of developers this model has come a long way. This is the second aircraft offered by Cowan Simulation and will not be the last. With input from the community, the 222B will be improved and grow into something even more amazing. Your reviews and critiques are very helpful tools. Thank you!

A huge THANK YOU goes out to the people that helped with the 222* project. Some do not want to be named for privacy reasons. You all know who you are. :-)

- **Joe Kipfer** is a coding guru and was a huge help with flight, systems testing, coding and virtual reality.
- **Sergio Costa** was kind enough to host the official Cowan Simulation forums @ HeliSimmer.com and helped with flight and systems testing.

- **David Erard** made the Care Flight & Helisimmer paints.
  See more of his work HERE.
- **Julien Lebrun aka Dark Angel** made 15 amazing paints for the 222s.
  See more of his work HERE.
- **Nick Bates**, a real helicopter pilot, helped with important details inside and out that only a pilot would know, along with systems testing and realism tweaks.
- **FlyAgi** helped with flight and systems testing and provided the force trim code.
- **Tyler Hastings** provided wonderful rotor and interior sounds from a real life flight that cannot be matched.
- **All Silent Partners** provided flight, systems, animations and sound testing and a great guy created the Xchecklist feature.

This helicopter is a work in progress. Over time, known issues will be updated and fixed as well as many additions. The initial version is a brand new luxury style that is very clean. A medical and true utility version is in the works and will be available at a later date. Please take a quick look at the known issues and WIP items:

- Idle stop coding does not work when using an actual hardware device for controlling the throttles. In VR it works partially as intended. When using a mouse it works exactly as intended. There is simply no way to physically stop your device from moving past the idle stop. Listen for the clicks.
- Currently no hoist system available. Cable cut and hoist power pilot/crew on collective inoperable. Cable release on cyclic inoperable.
- OBS select switch set to pilot and inoperable.

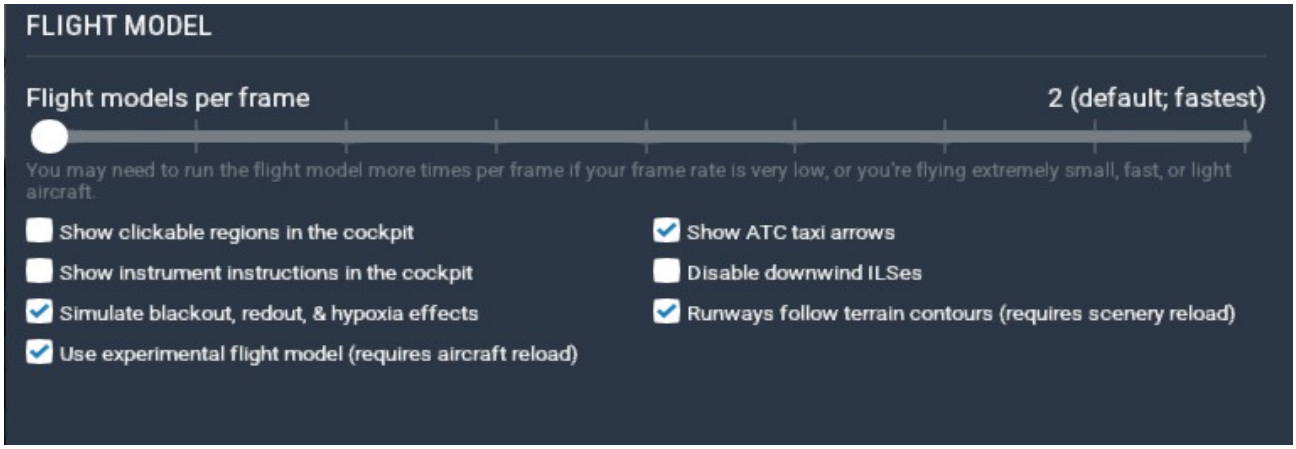
**Install:** To install simply extract the .zip file to your X-Plane 12 “Aircraft” folder. (or copy “Cowan Simulation – 222B” folder to the “Aircraft” folder)

**Uninstall:** To uninstall simply delete the “Cowan Simulation - 222B” folder from your “Aircraft” folder.

# X-Plane Flight Model Settings

In the X-Plane settings menu under the “general” tab check the box “Use experimental flight model.” This is what what used to design the flight model and will provide the best results.

“Flight models per frame” was set at the lowest option of 2 (default; fastest) when designing the flight model. This option tells the sim how many times per frame to calculate all of the math involved in the flight model. If you have yours set higher than 2 then that is perfectly fine, the sim will just use more CPU resources.




# STARTING

## Cold & Dark Starting

For Startup and Shutdown procedures please see the **“CHECKLISTS - START-UP”** PDF file in the **“DOCUMENTS”** folder. If you use Xchecklist then there is a checklist just for that included too. If you don't have Xchecklist then you may download it for free from x-plane.org here: Xchecklist Also check this video tutorial: HERE.

## Start with Engines Running

If you want to jump in and fly right away you can start up with the engines running. Everything is coded to start up ready to go except for the **throttles and idle stop**.

### Auto Starting

You can auto start the 222B by hitting ctrl + shift + e or by using the “fully automated start-up” in the upper menu. The fully automated start will do everything for you, all the way up to flight ready.

# ROTOR BRAKE

The rotor brake is located to the right of the pilot seat on the panel near the rear of the door. Pushing the rotor brake handle all the way back disengages the rotor brake. Pulling the handle slowly forward will increase rotor brake pressure to slow the rotors down and stop them after shutting down the engines.

# Operating the Idle Stop

The idle stop switch is located on the collective box. The idle stop is designed with a 5 second delay relay. This system prevents closing the throttle when decreased to idle and prevents passing idle when increased from closed.

When starting with engines running the throttles are both set at the idle lock position and must be activated to increase to 96% $N_R$ RPM. Once unlocked you can increase both throttles simultaneously by using the “RPM INC” switch on the collective or one at a time using the twist grips. Remember, the system allows you 5 seconds to move each throttle past idle, up or down. When $N_R$ RPM is at 96% the governor will automatically turn on.

After landing hold down the “RPM DECR” switch to turn off the governor and rotate the throttles to the idle stop. Again, to move past the idle stop, activate the relays and then close the throttles.

# RPM INC DEC SWITCH

The “RPM INC/DEC” switch can be used to “beep” up or down the RPM. This also works to set the governor RPM. You can increase to a max of 104% $N_R$ (100% $N_R$ is standard) for take off and landing. 96% $N_R$ is the minimum and default governor setting that is used for normal flight.

# Flying the 222B

Like many helicopters, the 222B requires some left anti-torque peddle input while hovering and a little at low speeds as well. While forward flight speed increases less left peddle input is needed. Pay attention to the trim ball on the lower part of the attitude indicator. Try to keep the ball centered when flying by adjusting left and right anti-torque peddle input.

This manual is a simple starting point. Further instructions on flying techniques are beyond the scope of this document. Practice makes perfect.

# AviTab

Thank you to the author of AviTab! If you don't have the AviTab plugin then it's highly suggested since it's integrated with the 222B. AviTab is a functional tablet, or iPad, with moving maps, the ability to view PDF documents, such as this or charts, and it's VR compatible. You can grab AviTab free here: AviTab

Adjusting the AviTab is easy, there are click spots on the iPad as seen below.


# Panel Configuration

The 222B has a unique collective which can seem to get in the way. For this reason, and because everyone has different preferences, the ability to change the location of essential equipment was introduced. As seen below, there is a simple click spot for changing around the configuration between two options.



# Other Manipulators (click spots)

There are a lot of manipulators throughout the 222B. If you want to get a good look at them all you can select “Show Instrument Click Regions” in the X-Plane “View” menu. This will show the, normally invisible, objects that are used to manipulate things and interact with the model as see below.

# Reality XP GTN 750 Integration

The RXP GTN 750 is integrated and the checklists were programmed into it. If you have this add-on installed you can access the GTN 750 by using the clipboard in the door pocket. Clicking on “RXP GTN 750 Owner” will replace the default “530” and “430” or radio stack (depending on current setup) with the GTN 750.

# Trimming & Force Trim System

The trim hat switch located on the top of the cyclic works just as any other helicopter would. Pushing up will trim the nose down, pushing down will trim the nose up, pushing left will trim roll left and right, right. These can be mapped to your hardware of choice.

The force trim system is much different. There are several commands that can be mapped to your hardware of choice within the joystick and keyboards settings. The toggle switch on the collective box turns the entire system on or off.

To set up the button on the cyclic do the following:

- Assign at least one command “Force Trim” to a key or button of your choice. Pushing this button engages the force trim logic, pushing once again switches it off.

- It's recommend to assign the second command “Force Trim Release” as well - this one just disengages the force trim logic and resets your trim values to center.

## USING FORCE TRIM...

Get some altitude and speed and then push and **HOLD** the force trim button. **WHILE HOLDING** the button then center your joystick and then release the button afterwards – the helicopter will now hold its attitude without much effort. This is a fast way to trim the helicopter out and simulate “Force Trim” the best it can be simulated.

# Fuel System

Fuel normally feeds from all tanks equally with the exception of the auxiliary tank. There is a hose and FUEL INTERCONNECT valve connecting the main tanks at the bottom. Pressing the FUEL INTCON button on the left side of the overhead panel will open the FUEL INTCON valve. This is normally closed to prevent total loss of fuel if one of the cells were to be damaged or leak. If one of the tanks has more fuel than the other then this switch can be used to equalize them.

The auxiliary tank is controlled using a valve switch on the center of the panel and the aux fuel panel located on the right side of the center console. The valve switch on the panel must be set to “OPEN” for the system to operate. Setting the toggle switch on the aux panel to “AUTO” will transfer fuel from the aux tank to the main tanks when the fuel gets low enough. Setting the same toggle switch to “ORIDE” will transfer fuel from the aux tank to the main tanks on demand.

# Flight Director Mode Selector / Autopilot

### Standby (SBY)

Pressing the SBY button on the mode selector disengages all flight director modes. This is basically an ON/OFF button for the entire system.

### Altitude Hold Mode (ALT)

When the ALT button is pressed on the mode selector it overrides the ILS, GS, GA, IAS or VS modes. Once engaged the helicopter will hold altitude.

### Indicated Air Speed (IAS)

When the IAS button is pressed on the mode sector it overrides the ILS, GS, GA, ALT or VS modes. An indicated air speed reference at the moment of engagement is used by the flight computer which then controls indicated air speed.

### Vertical Speed Hold Mode (VS)

When the VS button is pressed it overrides the ILS, GS, GA, ALT and IAS modes. A vertical speed reference at the moment of engagement is used by the flight computer which then controls vertical speed.

### Heading Select Mode (HGD)

When the HDG button on the mode selector is pressed then the flight director computer provides all roll command inputs to command a turn to the heading indicated by the HSI. When HDG is selected it overrides the NAV, BC and ILS modes.

### Navigation Mode (NAV)

The NAV mode provides steering commands for both VOR, localizer navigation and area navigation.

### Instrument Landing System (ILS)

ILS mode is used to make a full ILS approach. Pressing the ILS button with a LOC frequency tuned arms both the localizer and the glideslope mode. When pressed, both the NAV and ILS modes are armed to capture the localizer and glideslope, respectively.

### Back Course Approach Mode (BC)

When the BC button is pressed and setting the course pointer to the front of course heading then reverse switching in the flight director computer is commanded. This changes the polarity of roll attitude, course error and radio deviation. Proper HSI display results from this which allows correct steering to beam center. Back course eliminates the additional mental effort required for flying a back course approach.

### VOR Approach Mode (VOR APP)

Pressing the VOR APP button on the mode selector, with the navigation receiver tuned to VOR frequency, engages the VOR approach mode.

### Go-Around (GA)

Pressing the GA button on the mode selector, or the GA button on the collective box, activates go-around mode. This disengages all other modes. When engaged the flight director computer commands a roll level attitude and a pitch attitude of 750 FPM rate of climb. The pilot must maintain desired air speed by adjusting the collective.

## LANDING GEAR

When the landing gear is extended the 3 green L N R indicators will be illuminated. Pressing the test button will illuminate the red UNSAFE light. When the landing gear is fully retracted then the TEST button will illuminate the 3 green L N R lights and the red UNSAFE light.

The landing gear audio warning is activated at speeds below 30 knots. To mute the audio warning press the MUTE button on the landing gear panel.

# Virtual Reality Pilot View

With the built in custom plugin you can go to the clipboard and change your position using the up, down, left, right, forward and backward arrows. Once in the perfect spot then hit the Save Position button. This writes directly to the vrconfig file. An aircraft reload is necessary for this to work. Your spot will be save for future flights.

# Timer – Battery Voltage – OAT

The timer is a default X-Plane 11 timer. To reset it there is a hidden click spot in the center of the “SELECT” and “CONTROL” buttons. This throws a lot of people off. Clicking “VOLTS” will show you the battery volts in this format “24E”. Clicking “OAT” will show the outside air temperature in Celsius or Fahrenheit. Clicking select will change timer modes and clicking “CONTROL” will start and stop the timer.

### Battery Drainage

A ground power unit will be added in a future update. When sitting with the power on and no engines running the generators, the batteries will drain. This will cause hard or long starts and the battery caution and warning lights will remain illuminated until the batteries have fully charged.

This Manual is a WIP too. It will grow with feedback. Again, thank you very much for purchasing this product. My family thanks you greatly as this has taken many months and lots of 16 hour days to get this far. Happy Flights.