

RC flight sim

RF-X

REALFLIGHT[®] experience

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RF-X, The RealFlight eXperience

Arguably, RealFlight has been the #1 R/C Flight Simulator in the world for almost 20 years. It has earned a reputation as having the best flight physics, graphics and features any R/C pilot could want. With RF-X, we have now taken RealFlight to the next level.

RF-X graphics have been rewritten from the ground up, with the help of the UNiGiNE 3D engine. The world's best R/C physics was painstakingly moved to work seamlessly with the new graphics. The User Interface is easier to use and more intuitive. And the InterLink-X controller now has additional channels to support more aircraft, and to offer existing aircraft more functionality, than ever before. This is, by far, the biggest advance in R/C flight simulation since the original release of RealFlight in 1997.

While we have made RealFlight easier to use, you might still have questions. This manual is designed to help you answer those questions and enjoy RF-X to the fullest.

Installation

RF-X features a simple, one-step installation process. There are, however, further steps that must be followed prior to running the program for the first time. This section will explain how to install the RF-X software and hardware. Upon completion of this section, you should be able to fly the aircraft on your PC.

The InterLink controller's built-in transmitter interface also allows you to use your own R/C transmitter to control RF-X should you opt to do so. To activate the interface adapter, you will first need to follow the instructions in the section below. This section explains how to use the transmitter interface option in the InterLink controller.

Alternatively, you may also decide to use the RealFlight wired or wireless interface, which is sold separately.

Update Drivers

Before you begin installation, we strongly suggest that you update the drivers for both the sound and video cards on your PC. A driver is a software program that your computer uses to control hardware devices. Each card has its own respective driver. Most problems with installing and using RealFlight, as well as many other programs that use Microsoft DirectX, arise from using outdated video and/or sound card drivers.

Connect the InterLink Controller or interface

The InterLink controller and the RealFlight wired/wireless interface use the USB (Universal Serial Bus) port, so there is little to do in the way of setup.

1. With the software installation procedure complete, firmly plug into an available USB port on the PC. You do not have to shut the PC down to plug the controller in.
2. Shortly after plugging in, a dialog box should appear on the screen indicating that Windows has located a new device and will then automatically install the necessary drivers.

Please note: It is possible that Windows will need to install the appropriate files for the InterLink-X controller or interface unit to function properly.

Installing the Software

After you have completed installation of the new video and sound card drivers, you are now ready to install RF-X.

1. Before installing the software, make sure to close any applications that you are running. This includes virus scanning software and other similar background applications.
2. Insert the RF-X disc into the appropriate DVD drive.
3. If Auto-Play is active, setup will begin automatically when the DVD drive is closed. Simply click the Install button when prompted. If Auto-Play is not active, click Start on the task bar. Next, click Run (for Windows 7) or type directly into the search bar (for Windows 8 and above). Type 'd:\setup' (assuming that 'd' is your DVD drive) and click OK.

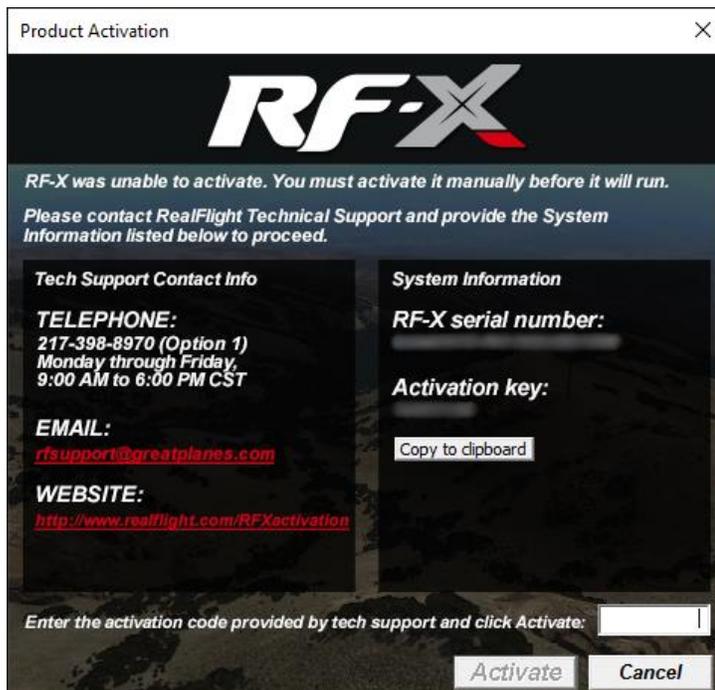
Follow the on-screen instructions to complete the setup procedure. Upon completion of the installation, click OK.

Installing or Updating DirectX

1. RF-X will ask if you wish to install DirectX on your PC. It is important that your PC utilizes DirectX. Click OK to proceed to the DirectX License Agreement.
2. Click "I accept the license agreement" to install DirectX. Alternatively, if you do not wish to update DirectX at this time, click Cancel.
3. If you have opted to accept the license agreement, click Next to proceed with the installation. DirectX will install the necessary files to update your PC.
4. When prompted, click Finish. Your PC will power down and then restart once again.

Starting RF-X

1. Double-click the RF-X Launcher located on your desktop.
2. Type the software serial number in the appropriate location. Please be sure to enter the numbers exactly as they appear. Failure to enter the serial numbers correctly will not allow you to proceed to the next step. Once the serial number is entered properly, you will see that the OK button will now become active and allow you to continue.
3. Click OK. RF-X will attempt to activate your software. The activation process must proceed in order to run RF-X. If the computer is not currently connected to the internet, this activation process will fail to connect to the activation server and the following window will appear.



If you do not have internet access on the computer which RF-X is installed, follow the on-screen prompts. Write down the serial numbers and activation code that appear and log on to www.realflight.com/rfxactivation on a different computer to activate RF-X. Alternatively, you may contact Software Support via email or phone.

4. Once activated, the RF-X Launcher will appear. Click Run RF-X to start the simulator.

Using Your Own R/C Radio

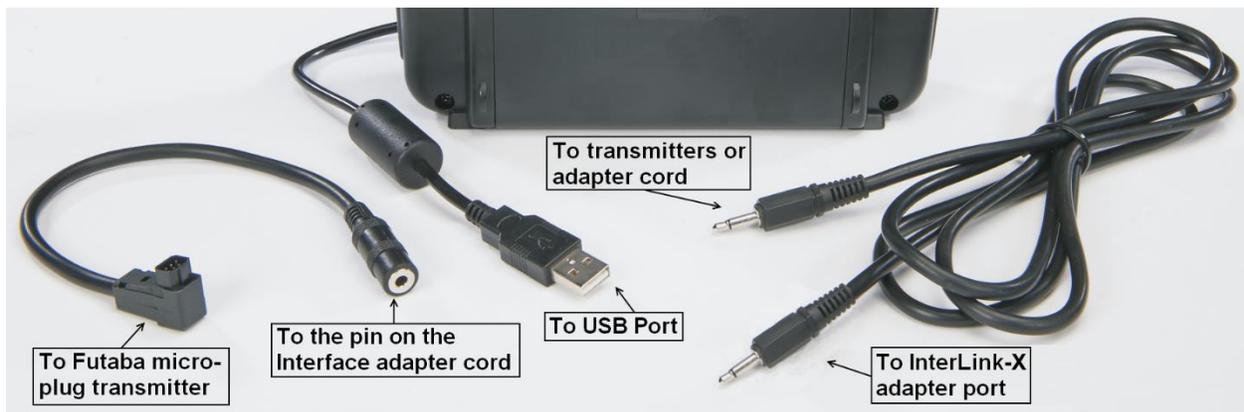
The RealFlight interface requires you to fly in the simulator using your own R/C transmitter.

Alternatively, if you purchased the InterLink-X controller, it has several different modes of operation. By itself, it serves as a realistic 'standalone' controller or joystick. Alternatively, it has a built-in interface that allows you to use your own R/C transmitter to control RF-X.

Follow these instructions if you intend to use your own R/C transmitter to control RF-X. If you do not want to use your own transmitter, you may skip this section.

Connecting Your Transmitter to the InterLink

You can use your R/C transmitter to control RF-X by connecting it to the InterLink controller, 'buddy box' style (see diagrams). RF-X includes several cables used to make the connection to many popular R/C transmitters.



Locate the cable input port on the rear of the InterLink controller. Plug one end of the included connector cable into this port. Next, plug the other end of the adapter cable into the buddy box port (a.k.a. trainer jack) of your transmitter. The procedure for doing so depends on your transmitter:

- If your transmitter's buddy box port directly accepts the 1/8" stereo plug, insert this end directly into the radio. This works for most Tactic™, JR® and Spektrum® radios.
- If your transmitter's buddy box port requires the micro (square) connector, use the square adapter cord included with the simulator. Insert the 1/8" headphone plug into the female receptacle on the square adapter cord, then insert the square connector into the transmitter.

Connecting your Transmitter to the RealFlight wired interface

The USB end of the interface should already be plugged into the computer. Plug the other end of the interface cable into the buddy box port (a.k.a. trainer jack) of your transmitter. The procedure for doing so depends on your transmitter:

- If your transmitter's buddy box port directly accepts the 1/8" stereo plug, insert this end directly into the radio. This works for most Tactic™, JR® and Spektrum® radios.

- If your transmitter's buddy box port requires the micro (square) connector, use the square adapter cord included with the simulator. Insert the 1/8" headphone plug into the female receptacle on the square adapter cord, then insert the square connector into the transmitter.

After you have connected your transmitter, you will need to perform a brief setup procedure before utilizing it with the simulation.

1. First, make sure that the transmitter is in FM or PPM mode rather than PCM mode. Refer to the manual for your transmitter if you are unsure how to do this.
2. If the transmitter did not power up when the interface cord was plugged into it, turn the power switch on at this time.
3. Next, open the RF-X Settings menu, followed by Controller. On the Controller screen, select Advanced to set up your transmitter for RF-X. For more detail information about this dialog, see page 23.

Binding your SLT Transmitter to the RealFlight wireless interface

The wireless interface should already be plugged into the computer. With your transmitter turned on, following these steps to bind your radio to RF-X.

1. From the main menu, click Settings, followed by Controller. From the Controller screen, select Advanced. The following window will appear:

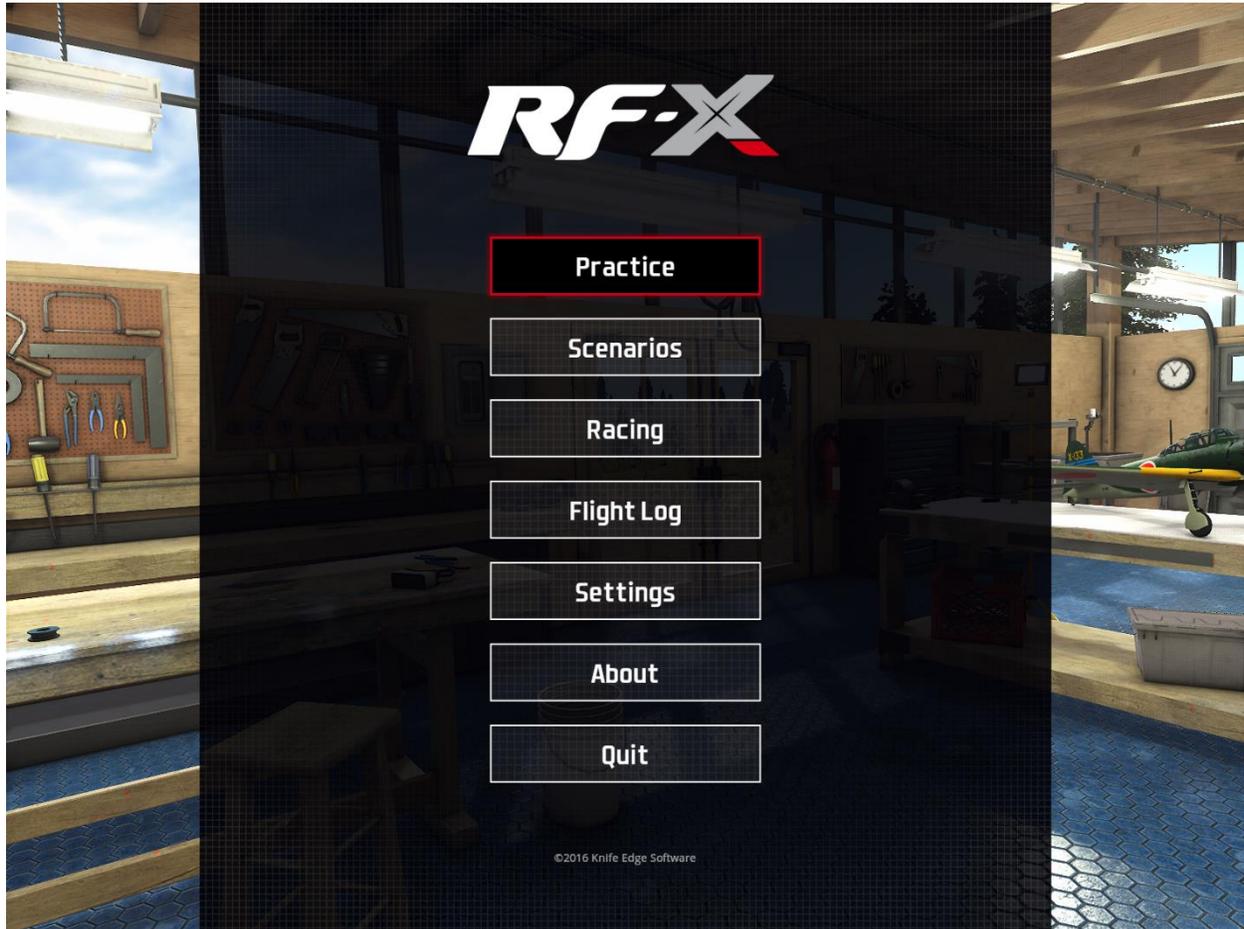


2. With your SLT radio turned on, click the Bind button on the screen.
3. When the red light on the wireless interface turns solid, your radio is bound to RealFlight. You should not need to go through this process again, unless you choose to use a different radio.

It is possible that you may still need to edit the radio profile to work with the channel mapping of your radio. Please see Controller... on page 23 for more information.

Main Menu

When RF-X first loads, the following screen and menu options will appear. All menu options that appear throughout the simulator can be controlled either by keyboard and mouse, or, if you are using an InterLink controller, by the QuickSelect buttons.



- Practice – For a quick flight, choose Practice where you may select your aircraft and airport of choice and begin flying immediately.
- Scenarios – A great choice for pre-determined practice settings. Scenarios automatically set up the aircraft, airport and environment for the perfect set up depending on your selection.
- Racing – Got the itch to test your FPV flying skills? Select Racing for the R/C adrenaline rush.
- Flight Log – Select this to enable and view the flight log of all your flying sessions.
- Settings – Adjust parameters for the video, audio and other options for the simulator.
- About – View your serial number and version number here. You will also find a list of all the hard working people that brought you this amazing product.
- Quit – As the name suggests, select this option to exit and close RF-X and return to Windows.

Please see the following sections for more details about each of these options.

Practice

Two basic options are available to you from the Practice menu.



Select Aircraft

Choose the Select Aircraft option to view a list of available aircraft as well as details about each. You may also sort and search for aircraft to make your selection easier.



Search Aircraft –

RF-X allows users to enter data in this field to search for a particular aircraft. The list will be filtered in real time as you type, so there is no need to type out the entire name.

Ordered By –

Clicking this field will sort the visible list based on the current choice. These include:

- Name – Display the list in alphabetical order.
- Favorites – Display only your favorite aircraft. Click the star next to an aircraft to add it to your favorite list. Click it again to remove it.
- Flights – Sort the list based on the number of flights you have on each aircraft.
- Type – Sort the list based on the type of aircraft. This includes Airplane, Helicopter and Multirotor.
- Source – Display the list based on where the aircraft originated from.
- Year – Sort the list based on the year which the aircraft were released for RF-X.

Aircraft List –

The list displayed will be determined based on your search criteria (if any) and the order in which you have the list sorted. The selected aircraft will be highlighted with a red box.

Aircraft Details –

On the right side of the Select Aircraft screen will display an image of the currently selected aircraft along with other details. These include:

- Year – The year the aircraft was released for RF-X.
- Source – Where the aircraft originated from. If it was included with RF-X, this will be noted as Stock.
- Flights – The number of flights you have on the aircraft.
- Duration – The amount of time you have spent flying the aircraft.

Below the image of the aircraft is a short description. For more information, click the ... Details button.

If you do not wish to change your aircraft and simply want to return to the previous screen, click the X button.

Click the Checkmark button to select the currently displayed aircraft.

Select Airport

Choose the Select Airport option will present to you a list of available airports as well as details about each. You may also sort and search airports to make your selection easier.



Search Airports –

RF-X allows users to enter data in this field to search for a particular airport. The list will be filtered in real time as you type, so there is no need to type out the entire name.

Ordered By –

Clicking this field will sort the visible list based on the current choice. These include:

- Name – Display the list in alphabetical order.
- Favorites – Display only your favorite airport. Click the star next to an aircraft to add it to your favorite list. Click it again to remove it.
- Flights – Sort the list based on the number of flights you have at each airport.
- Source – Display the list based on where the airport originated from.
- Year – Sort the list based on the year in which the airports were released for RF-X.

Airport List –

The list displayed will be determined based on your search criteria (if any) and the order in which you have the list sorted. The selected airport will be highlighted with a red box.

Airport Details –

On the right side of the Select Airport screen will display an image of the currently selected aircraft along with other details. These include:

- Year – The year the airport was released for RF-X.
- Source – Where the airport originated from. If it was included with RF-X, this will be noted as Stock.
- Flights – The number of flights you have at the airport.
- Duration – The amount of time you have spent flying at the airport.

Below the preview image of the airport is a short description.

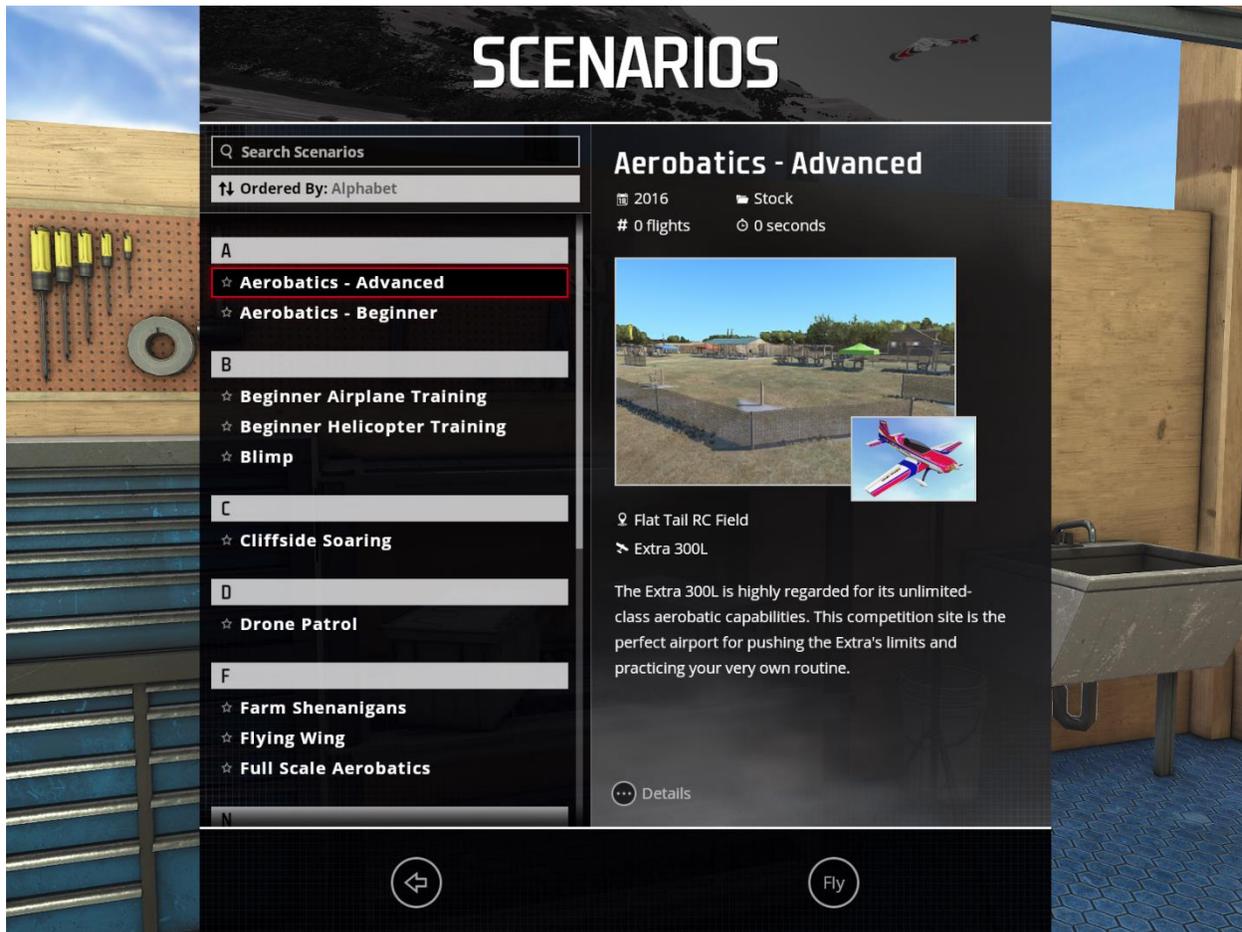
If you do not wish to change your airport and simply want to return to the previous screen, click the X button.

Click the Checkmark button to select the currently displayed airport.

Ready? – Fly!

Once happy with your choice of aircraft and airport, click the Fly! button to begin the simulation. See the Simulator Flight section below for in-flight options.

Scenarios



Scenarios allow you to fly with pre-selected aircraft and airports, with the environment set up perfectly for the scenario selected. For example, if you select a slope soaring scenario, the airport will be located on a hill slope, with a glider. Wind speed and direction will be pre-set for ideal flights. There are many different scenarios from which to choose. The Scenarios screen functions very similar to the Select Aircraft or Select Airport screens.

Search Scenarios –

RF-X allows users to enter data in this field to search for a particular scenario. The list will be filtered in real time as you type, so there is no need to type out the entire name.

Ordered By –

Clicking this field will sort the visible list based on the current choice. These include:

- Name – Display the list in alphabetical order.
- Favorites – Display only your favorite scenario. Click the star next to an aircraft to add it to your favorite list. Click it again to remove it.
- Flights – Sort the list based on the number of flights you have with each scenario.

- Type – Sort the list based on the type of aircraft. This includes Airplanes, Helicopters and Multirotors.
- Source – Display the list based on where the scenario originated from.
- Year – Sort the list based on the year in which the scenario were released for RF-X.

Scenario Details –

On the right side of the Scenarios screen will display two images; one for the airport and one for the aircraft that are used for the selected scenario. The name of the airport and aircraft are also displayed below these images. Additional details include:

- Year – The year in which the scenario was released for RF-X.
- Source – Where the scenario originated from. If it was included with RF-X, this will be noted as Stock.
- Flights – The number of flights you have with the selected scenario.
- Duration – The amount of time you have flying the selected scenario.

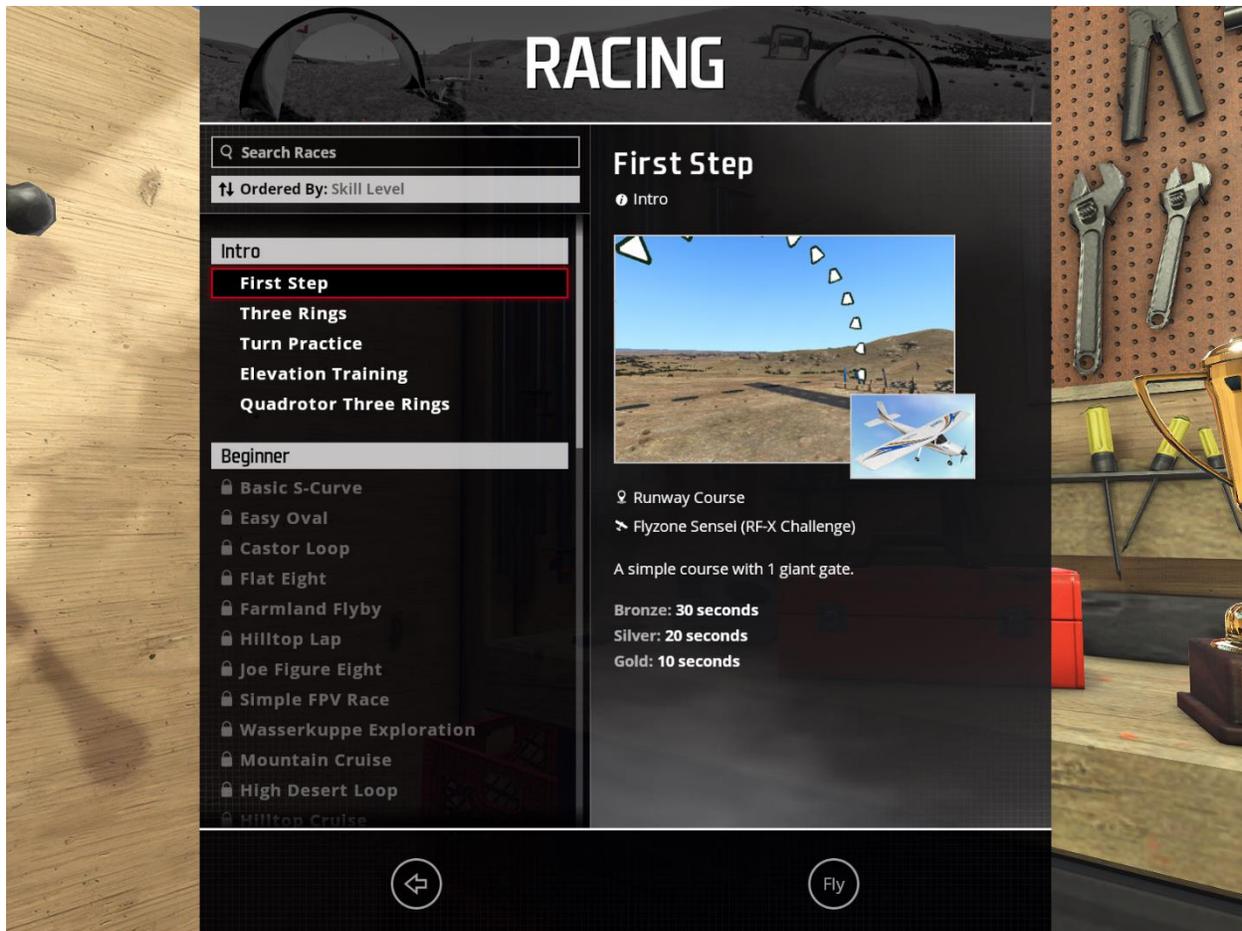
Below the images for the scenario is a short description. For more information, click the ... Details button.

If you do not wish return to the main menu screen, click the X button.

Click the Fly button to select and fly the currently chosen scenario.

Racing

If you want a challenge and to test your flight skills, try out FPV racing. Selecting Racing from the main menu will display the following screen.



You will find that the Racing screen functions very much like other screens. The options available include:

Search Races –

RF-X allows you to enter data in this field to search for a particular race. The list will be filtered in real time as you type, so there is no need to type out the entire name.

Ordered By –

Clicking this field will sort the visible list based on the current choice. These include:

- Skill – Sort race list in order of skill ranked, from easiest to the most difficult.
- Aircraft Type – This will sort the list based on the type of aircraft used for each race.
- Medals – Sort the list based on the medals earned for each race.

Race Details –

On the right side of the Racing screen will display two images; one for the airport and one for the aircraft that are used for the selected race. The name of the airport and aircraft are also displayed below these images. Additional details include:

- Skill – Indicates the difficulty level for the selected race.

- Time – The existing best time recorded for the selected race.

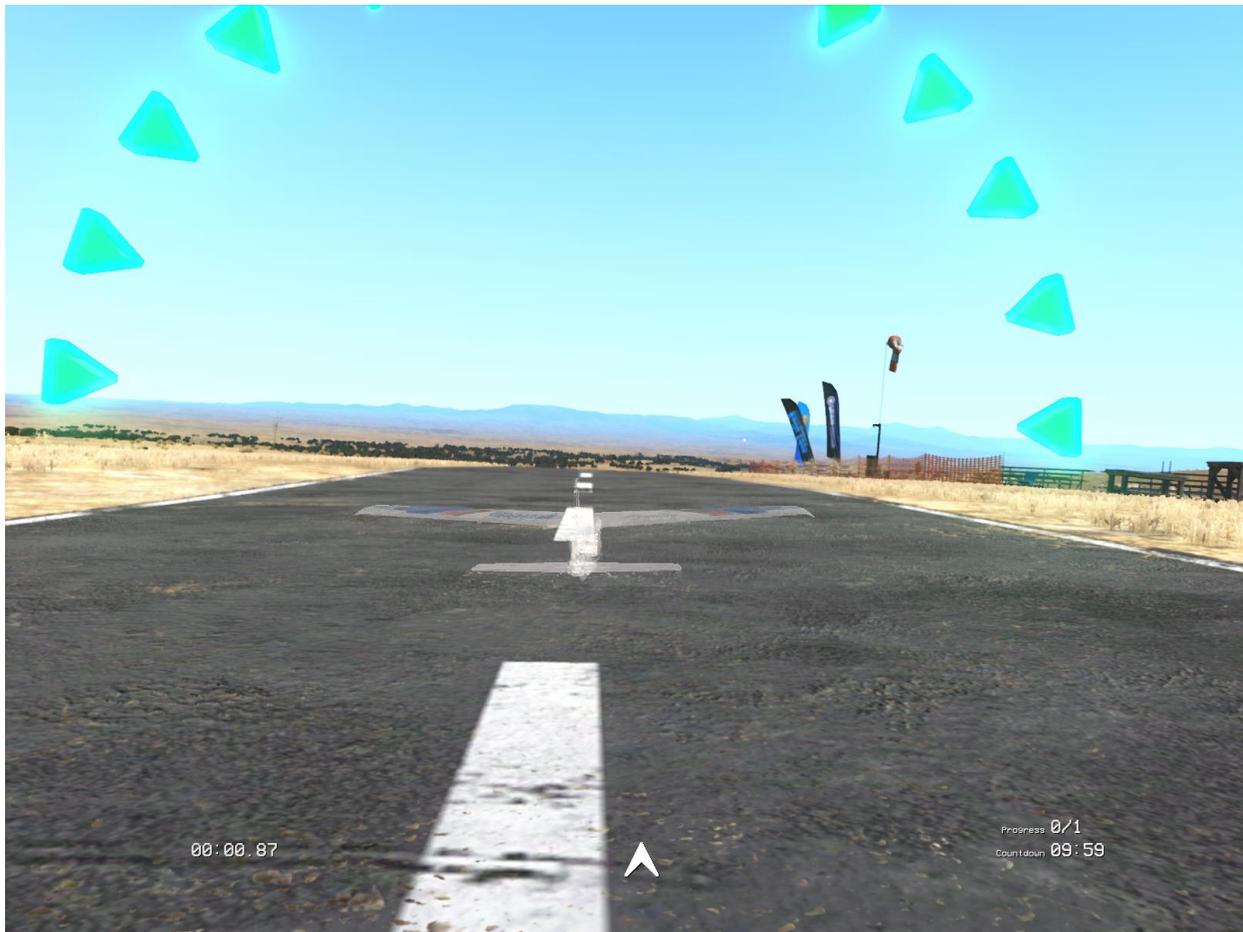
Below the images for the race is a short description of the race.

If you do not wish return to the main menu screen, click the <- back button.

Click the Fly button to select and fly the current chosen scenario.

Flying a Race

When a race loads, grab the controls and get ready for an adrenalin rush. The countdown timer will start immediately and when it reaches zero, be quick on the throttle!

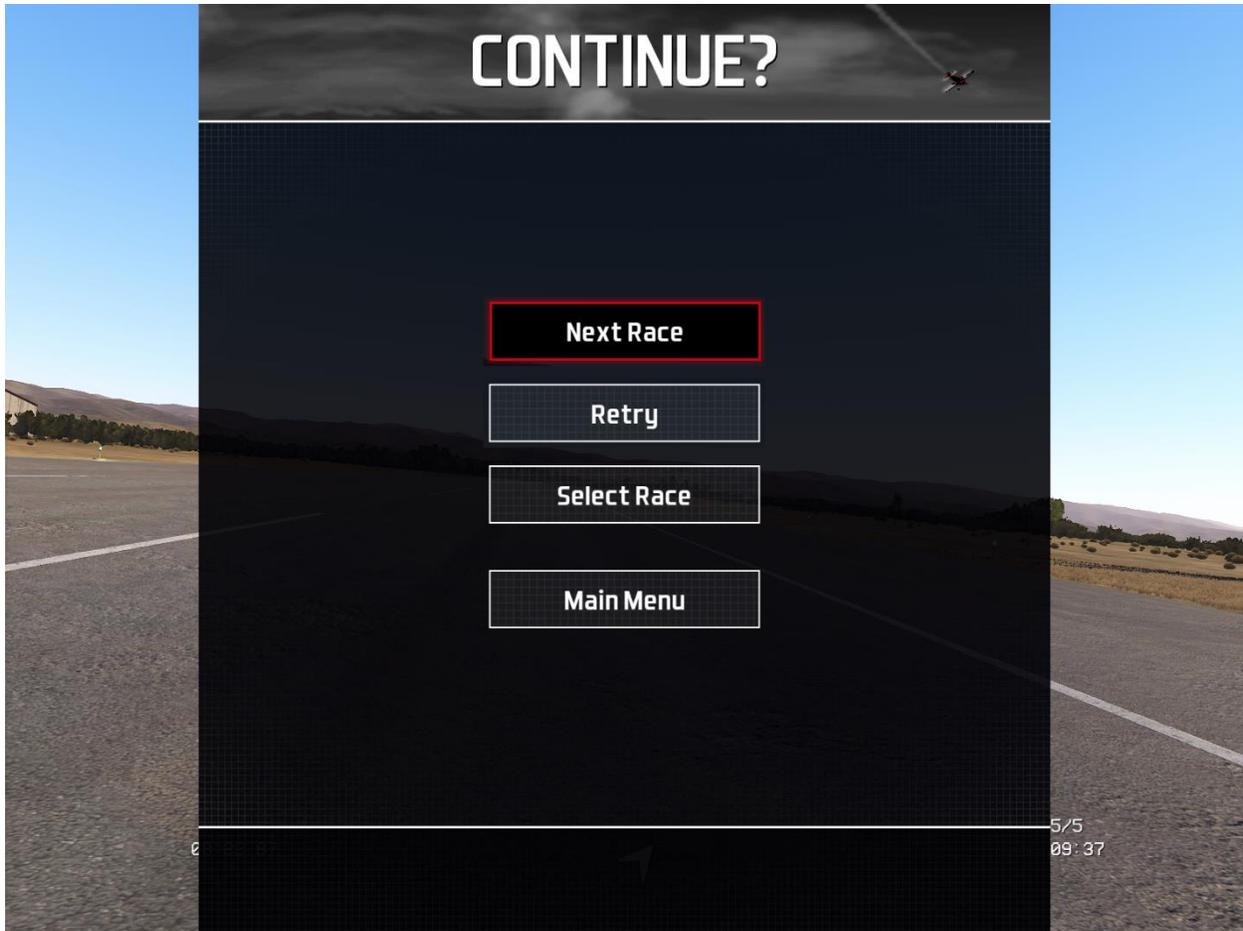


In RF-X races, you are challenged to fly through a number of gates that can vary in size and appearance. The faster you fly through the course, the better the chance to earn a top medal.

If, during the race, you lose sight of the next gate you must fly through, note the arrow that appears at the bottom-middle of the screen. Follow it to the next gate, noting that if it is pointing down, the gate is behind you.

At any time you may restart the race by simply hitting reset on your InterLink controller, or by pressing the Spacebar.

Once you completed the race, you'll receive the following options.



Next Race – Click to load the next race that is available to you.

Retry – Redo the race to attempt to complete it in a better time.

Select Race – This option will return you to the race selection screen.

Main Menu – Exit the races and return to the Main Menu.

Flight Log

RF-X has the ability to record each of your flights for playback at a later time. This is disabled by default as it might impact the simulator's performance. Selecting this option for the first time will present you the option to enable this feature. Once you have one or more flights recorded, this screen will list all recordings available for playback.

You can disable the Flight Logs at any time by clicking the option button in the upper-right corner. Disabling this feature does not delete any Flight Logs you already have recorded.



Like many of the other screens in RF-X, Flight Logs functions in a very similar way. The options available are:

Search Flight Log –

RF-X allows users to enter data in this field to search for a particular flight log. The list will be filtered in real time as you type, so there is no need to type out the entire name.

Ordered By –

Clicking this field will sort the visible list based on the current choice. These include:

- Date – Sort based on the date each log was recorded.
- Favorites – Display only your favorite logs. Click the star next to an aircraft to add it to your favorite list. Click it again to remove it.
- Duration – Sort the list based on the amount of flight time of each log file, in descending order.
- Vehicle – Sort the list based on the vehicle flown for each recording.
- Airport – Like vehicle, select this to sort the list based on where the recording takes place.

Flight Log Details –

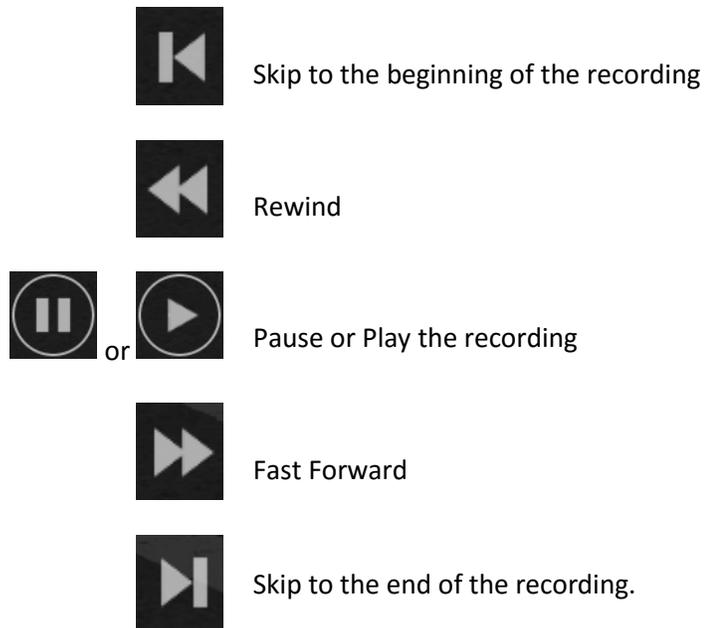
The right side of the screen will display more details about the currently selected recording. These details include:

- Date and Time stamp of the flight log.
- Duration of the recording.
- Preview image of the airport and aircraft used in the recording.
- Name of the airport and aircraft.

Towards the bottom right appears the trashcan button. If you wish to delete the selected Flight Log, click this button.

If you do not wish return to the main menu screen, click the <- back button.

Clicking the Fly button will load the simulation and playback the selected Flight Log. During playback, standard video-style buttons appear at the bottom of the screen, which offer the following functions:



You may also move the progress bar to the desired playback location. Press Play to start/restart the video from that point.

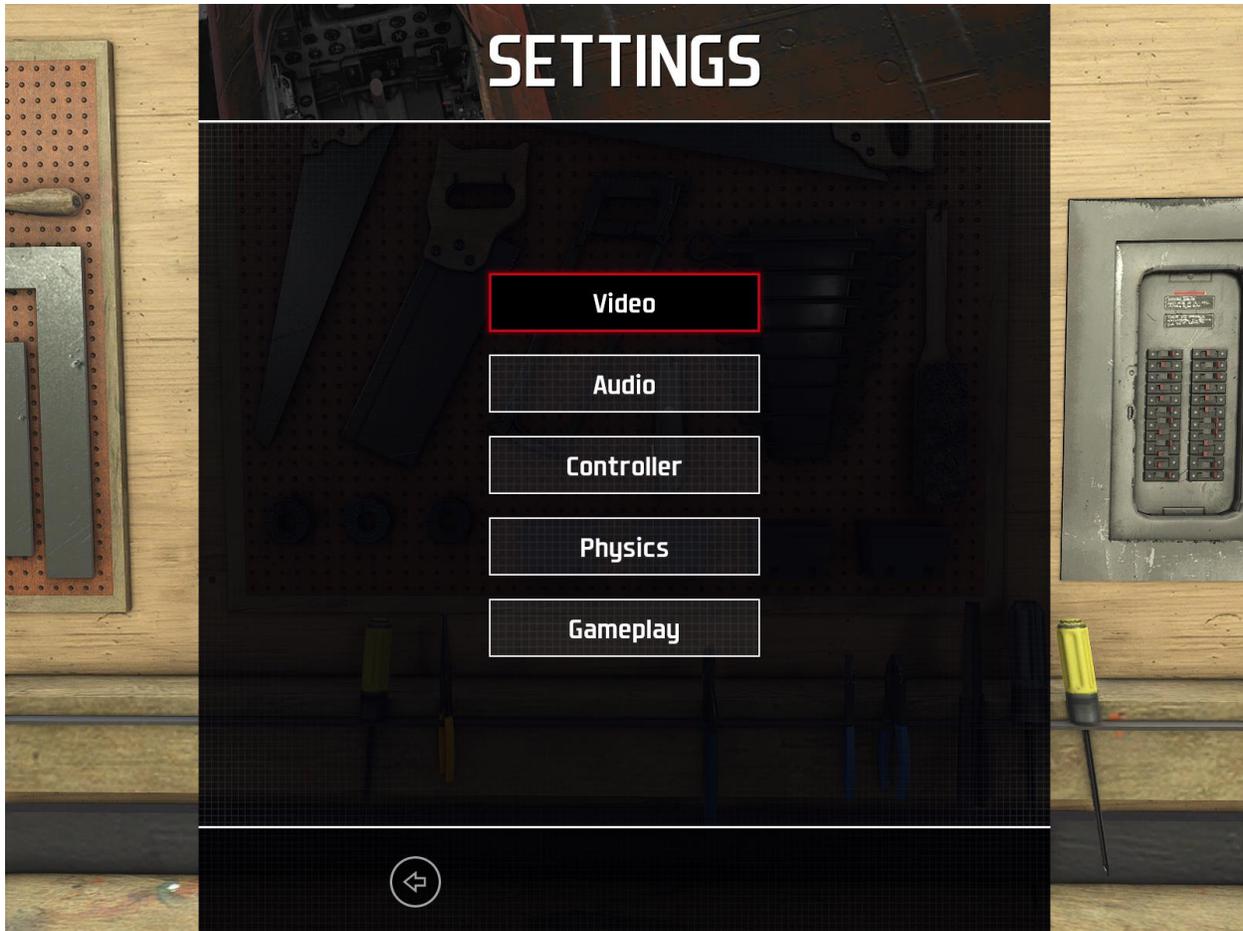
During playback, pressing the Esc button will pause the simulation and present the following options.



- **Select Flight Log** – This will display the Flight Log screen again, allowing you to choose a different recording.
- **Start Flying** – Selecting this option will stop the playback and allow you to fly using the aircraft and airport from the currently running Flight Log.
- **Settings** – Display the settings options (see the Pause Menu – Settings section for more information).
- **Keyboard** – View a list of in-simulator key commands.
- **Main Menu** – Select this to return to the main menu.

Settings

Choose the Settings option to edit the parameters on how the simulator looks and functions.



Video

Select to adjust graphic parameters. Make changes here to decrease or increase the quality of the graphics. This would also be the first place to make adjustments to help improve performance of the simulation if you are experiencing low frame rates during flight.



- Resolution – You may increase or decrease the window resolution of RF-X. The options in the dropdown list are limited to the capabilities of your video card and computer monitor.
- Full Screen – Enable this function to run RF-X in full screen mode instead of its own window.
- Anti-Aliasing – This dropdown option helps make the edges of graphical objects appear a bit smoother, but usually at a cost on performance. The options available include:
 - None – No Anti-Aliasing is done. This will result in the best performance for RF-X.
 - Fast Approximate – The graphics engine will look at each frame of graphics like an image and smooth out any jaggy parts. Good performance.
 - Temporal – This option will sample each frame to smooth out objects, especially those that are moving on screen. This requires a strong video card. Lowest performance but offers the most life like appearance.
- Texture Quality – Adjust the level of the quality for texture to Low, Medium or High. The lower the level, the better performance you can achieve. Higher texture quality will increase the realism of the simulator, but at a cost on performance.
- Texture Filtering – This parameter dictates how textures are smoothed out when they are increased or decreased in size. Trilinear will look better than Bilinear, but at a cost on performance.

- Shader Quality – Shaders tell the graphics card how to draw an object on the screen. You can adjust the quality of this function to Low, Medium or High. The higher the setting, the lower in performance.
- Anisotropy – This option has similar results to Anti-Aliasing, but with less blurry results. Anisotropy assists in the appearance of textures at steep angles. Options are available from Off up to 16X. The higher number will result in better visuals, but at a cost on performance.
- Bloom – The amount of glow that appears around a source of light. Select this to turn on or off. Off will increase performance.
- Volumetric Shadows – Turn object shadows on or off. Off will increase performance.
- Ambient Occlusion – This feature calculates how much a surface is exposed to ambient light. Activating this feature will improve the overall appearance of the simulator. Deactivating will result in better performance.
- Depth of Field – As the name implies, this will cause objects to go out of focus if closer or farther away from aircraft, giving you a sense of distance on an otherwise flat computer monitor. Turn this off to increase performance.
- Motion Blur – This will cause the ground and other objects that move quickly across the screen to blur, giving a sense of speed. Turn this off to help increase performance.

Reset Defaults –

If you found yourself making a lot of adjustments to the video settings and wish to set all parameters back to their original settings, click the Reset Defaults button.

To save the current settings and return to the previous screen, click the checkmark button.

Audio

The Audio screen allows you to adjust the volume of a variety of sound sources. Clicking the Audio option on the Settings screen will display the following choices.



- Enable Sounds – To turn on or off all sounds throughout RF-X, click this option.
- Master Volume – This controls the overall volume of the audio. All other options on this list represent a percentage of this value. Using the image above as an example, the vehicle sounds are 80% of the master volume’s 75%.
- Vehicle – Adjust the volume of the aircraft sounds.
- Ambient – Adjust the volume of the ambient sounds while in the simulation.
- UI – Adjust the volume heard throughout the User Interface.
- Engine – Adjust the engine volume for the aircraft.
- Gadgets – Adjust the volume of the sounds generated by the on-screen gadgets.
- Effects – Adjust the volume of all other effects that don’t fall in any of the above categories.

Reset Defaults –

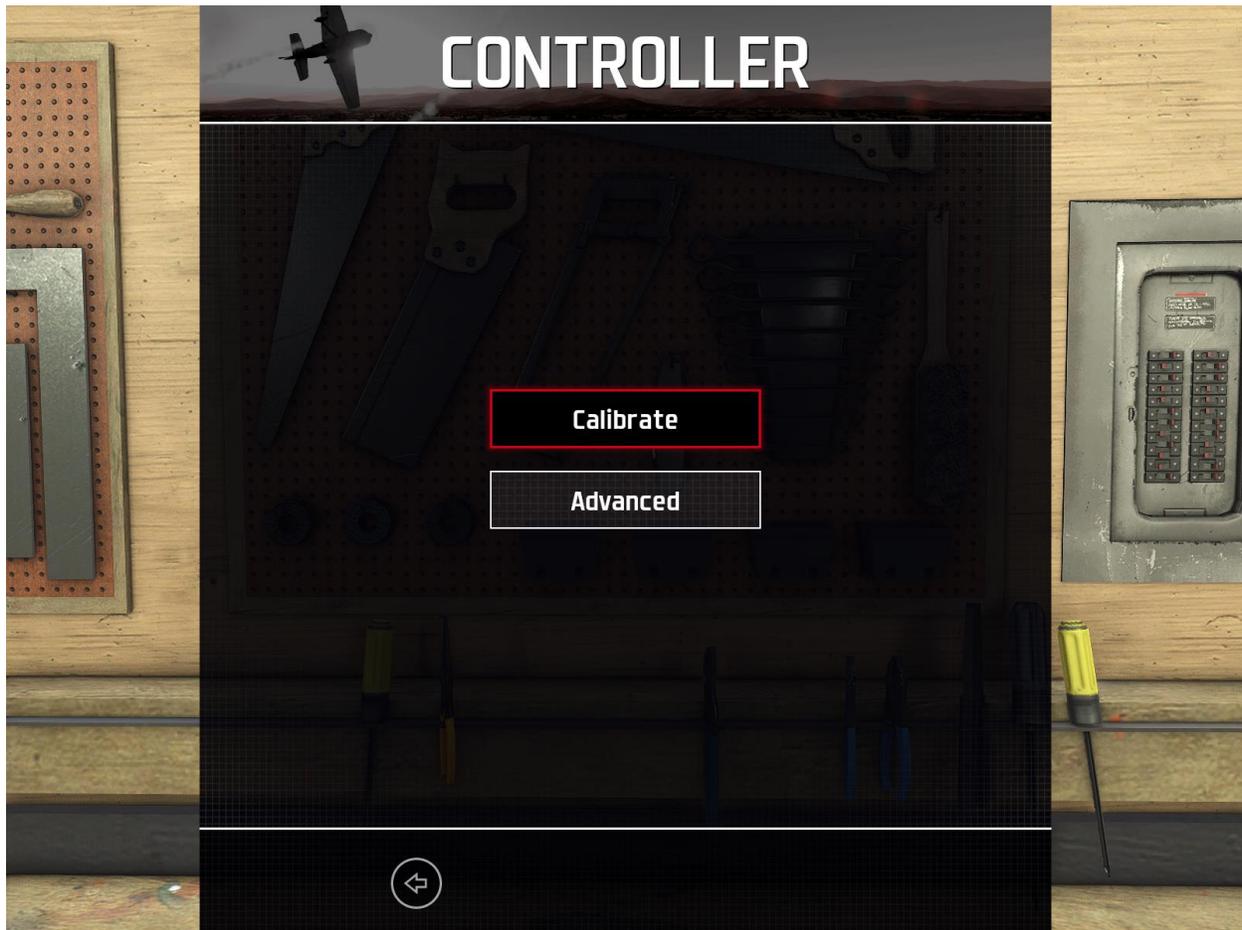
If you found yourself making a lot of adjustments to the audio settings and wish to set all parameters back to their original settings, click the Reset Defaults button.

To save the current settings and return to the previous screen, click the checkmark button.

Controller

RF-X allows you to fly with a multitude of different controller methods. This includes, but is not limited to, the RealFlight SLT Wireless interface, the wired interface, InterLink Elite, or the new InterLink-X. And

with any of these, you may also fly with your own, real transmitter. Due to the wide variety of controller options, RF-X allows you to customize and calibrate your controller accordingly.



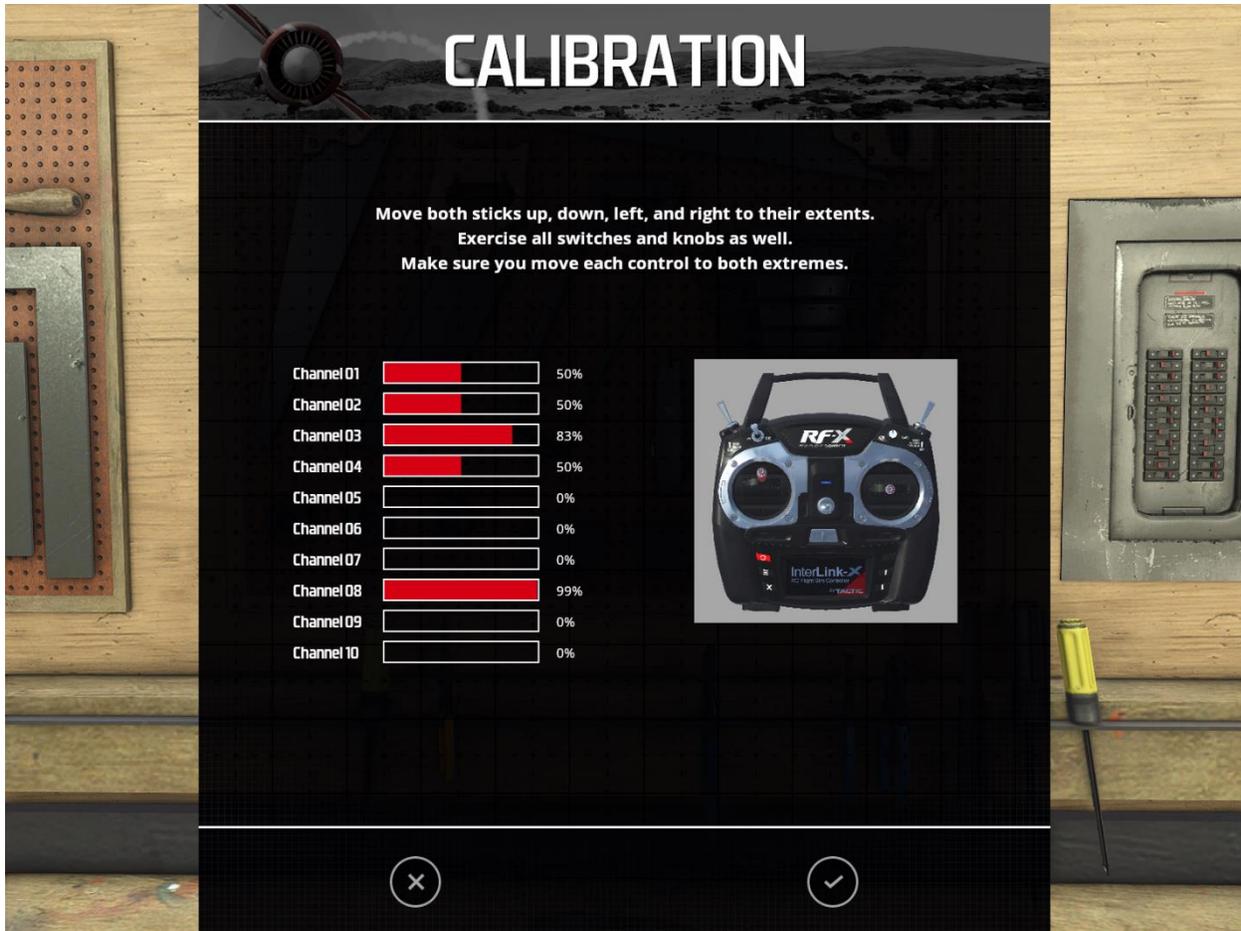
Choosing Controller from the Settings screen presents you with two options; Calibrate and Advanced. Calibrate, as the name suggest, allows you to fine tune your controller of choice. Advanced offers more options to adjust the channel layout.

Calibrate

If you are using a controller for the first time, whatever the method is, it is highly advisable to calibrate the controller before flight, so RF-X recognizes the minimum and maximum range for each input. Choosing this option will display the following screen.



At this point, following the on-screen instructions. Make sure that all controls that can be centered are. This includes the throttle and any other proportional channels (sliders and knobs). After doing so, click the arrow at the bottom to move to the next step.



For step two, move ALL channels to their minimum and maximum positions. Ensure that all sticks are moved through their full range of travel. Do this a few times for each channel.

Once completed, click the checkmark button to save your calibration.

Advanced

Advanced allows you to customize the channel layout for each of your controllers, and save them as a unique profile which you can access again at a later time.



Normally, you will only see one controller listed. If you have more than one controller plugged in, each will be listed on this screen. From the dropdown, select the controller you wish to use and edit. The selected controller will display a red bar along the left side and be noted in the title with (Active).

- Profile – From the dropdown, select the channel layout profile you wish to use for the selected controller. If there is not a profile that matches your controller, edit and save a new profile.
- Edit – Adjust the channel layout for your controller (see next section).
- Bind – If you are using the RealFlight wireless interface, you will see that a Bind button is available directly above the Calibrate button. To bind your radio to the wireless interface, make sure the radio is switched On, then click the Bind button.
- Calibrate – Proceed through the calibration process (as described previously) for the selected controller.

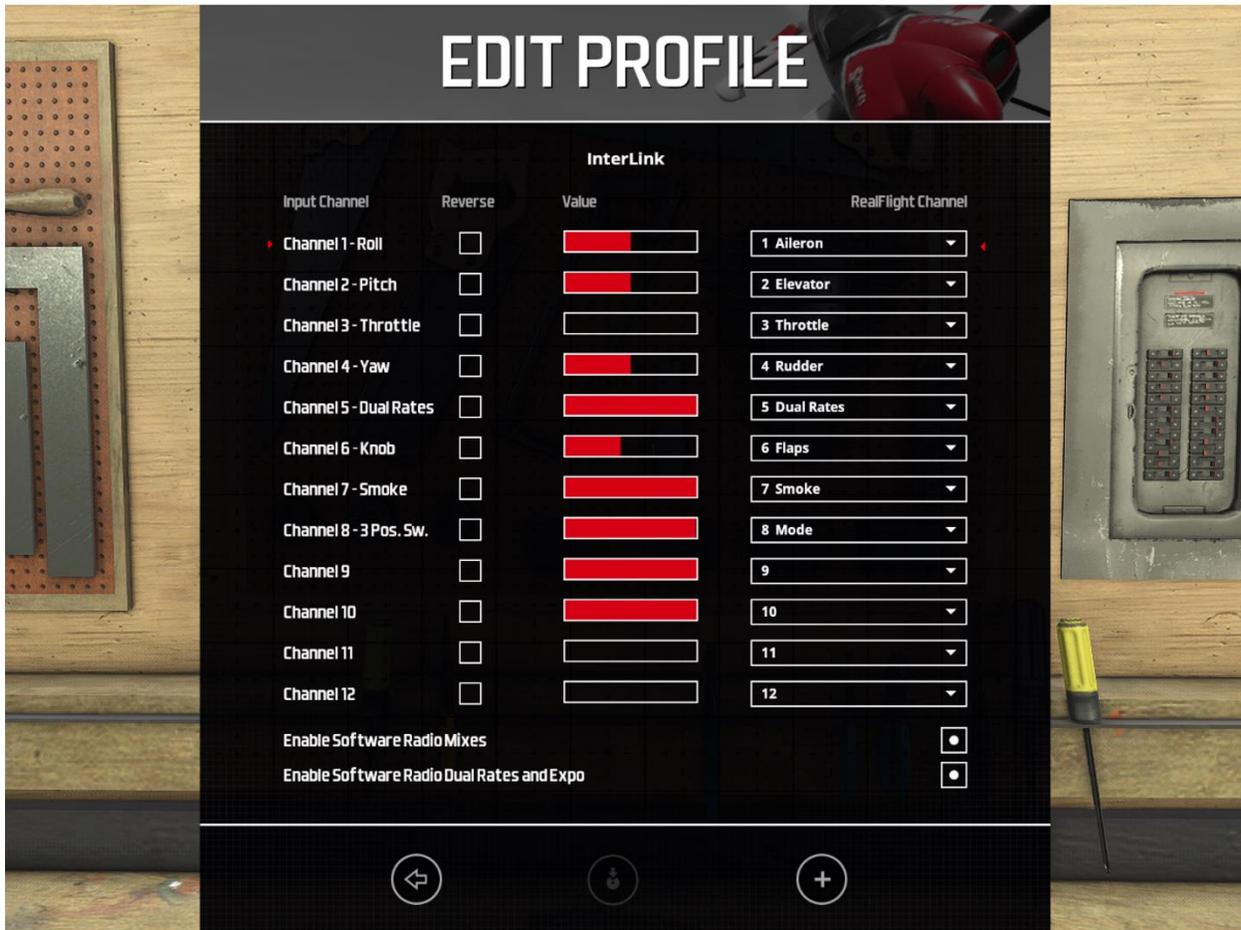
If you plugged in a new controller while RF-X is running, you might not see it listed on this screen. In this case, try clicking the Refresh List.

Click the Checkmark button to accept any changes and return to the previous screen.

Edit Profile

With the multitude of transmitters available in the R/C world, each with their own unique layout, channel assignment and so forth, it's impossible to for each one to function exactly as it should without

some refinements to the simulation. As such, RF-X offers the ability to adjust the channel mapping and save these to individual profiles. Clicking Edit on a controller in the screen above will display the following:



The four columns include:

- Input Channel – This is the list of channels that RF-X uses for its aircraft. These cannot be modified.
- Reverse – Check this box to reverse the direction throw for a channel.
- Value – The bars that appear in this column show the current value for each input channel. For example, if you move the throttle stick on your controller, the associated bar will move.
- RealFlight Channel – This is the channel on your radio that is assigned to the Channel column.

Using the information from these columns, you can edit the channel lineup to match your radio. For example, if your radio outputs the throttle on channel 1, you will follow these steps to correctly assign it to RF-X's throttle:

1. Find "3 Throttle" from the channel column.
2. Change the Input channel assigned to throttle to Channel 1.
3. The Value for throttle to move to the far right at full throttle and to the far left at idle. If this is backwards, click the Reverse box for this assignment.

Repeat for all other channels you wish to reassign.

Enable Software Radio Mixes-

By default, RF-X will handle all channel mixing in each aircraft. This is the simplest method to fly. In this mode, you should not have any mixing programmed into your radio, otherwise channels will be mixed twice; once by your radio and then by RF-X. If you wish to use the mixing programmed in your radio, uncheck the box Enable Software Radio Mixes.

Enable Software Radio Dual Rates and Expo-

Some radios allow you to program the expos and dual rates on your transmitter. If you prefer this method, make sure Enable Software Radio Dual Rates and Expo is unchecked.

If you are flying with the InterLink, or with a radio that does not offer this functionality, you will want to enable this feature. Then, make sure you assign a channel to “5 Dual Rates” in the channel assignments above. RF-X will then handle all rates and expos for you.

Save or Add new profile –

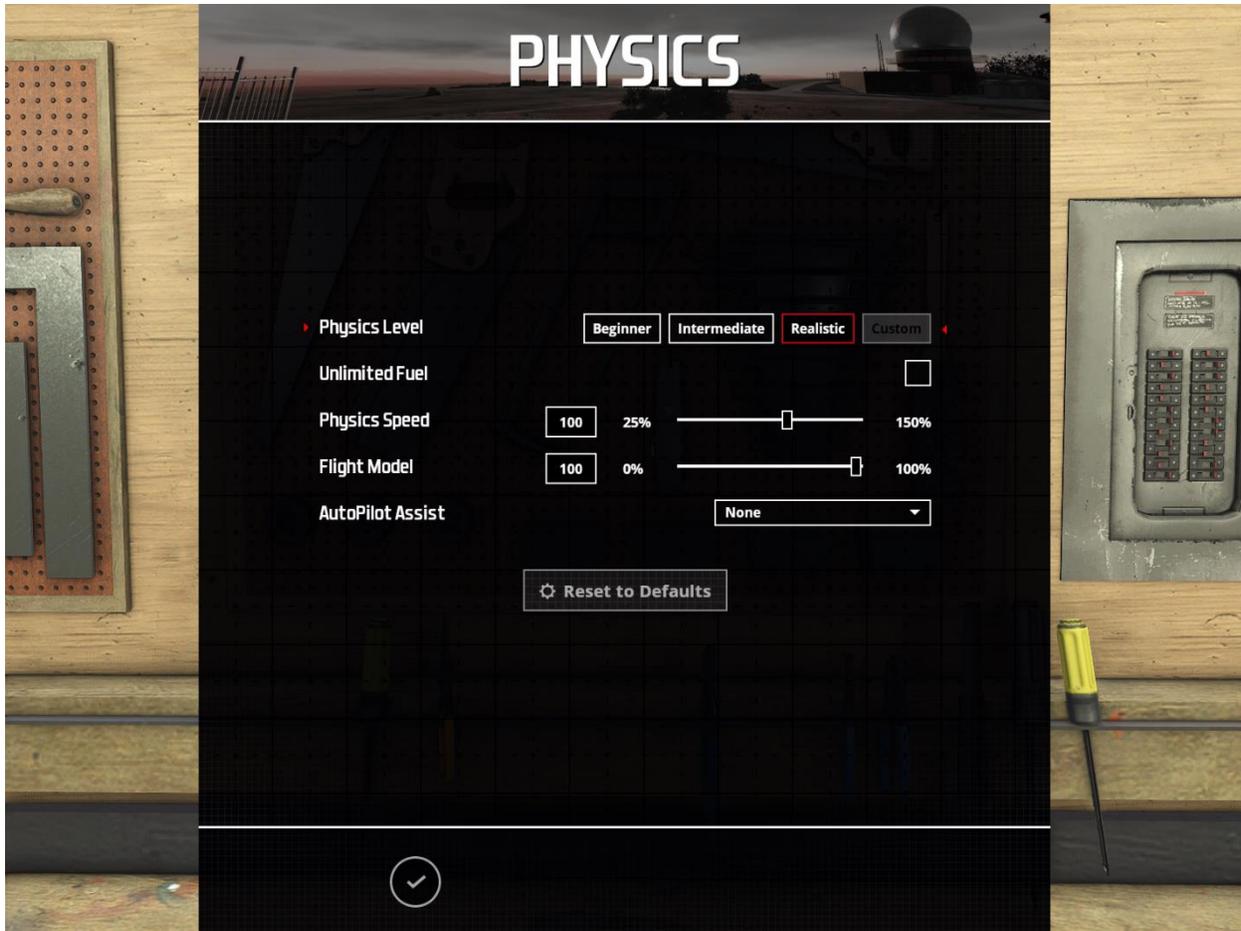
To save the current settings to the profile selected, click the save button (middle-bottom).

If you wish to save the settings to a new profile, click the plus + button. This will display a small dialog in which you can enter the new profile name. Type in the new name, then click the checkmark to save the profile. Click the X button to discard and return to the Edit Profile screen.

Click the back arrow to return to the previous screen.

Physics

RF-X is proud to offer the best R/C flight physics in the industry.



Physics Level –

- Beginner – This setting is perfect for the first time pilot. It reduces the speed of the physics to allow a beginner time to react and learn how an aircraft is controlled. At this level, you cannot run out of fuel, and crashes are more forgiving.
- Intermediate – Crashes are not as forgiving, and aircraft will run out of fuel just as they would at the field. The physics speed is reduced slightly, but not as much as Beginner.
- Realistic – By default, RF-X is set to Realistic. As the name implies, this setting accurately reflects the flight performance of their real-world R/C counterparts. The flight physics level for Realistic is very similar to Intermediate. However, you will notice that the severity of the stalls has increased from those found in Intermediate; forcing the pilot to react faster to stalls and other similar flight characteristics.
- Custom – Select custom to adjust the physics parameters yourself. This option will be selected for you by default if you try to make any changes when Physics Level is set to something other than Custom.

Unlimited Fuel –

This option determines whether or not your aircraft will run out of fuel. If selected, the engine will run indefinitely – assuming, of course, that you do not crash. If disabled, the aircraft will

indeed run out of fuel. The length of time required to do so is based upon a number of factors including the engine utilized and throttle management, just as it would be at the flying field.

Physics Speed –

Expressed as a percentage, this value controls the time scale of the simulation. Reducing the value allows you to create a slow-motion effect. This is useful when learning new skills or maneuvers; slowing the aircraft's reaction time.

Flight Model –

This setting can range from 0% to 100%. At a low percentage setting, the aircraft are easier to fly than in real life. This is especially true at slow speeds. If set to a higher percentage, RF-X simulates real life aerodynamics in every way, including abrupt loss of lift during an aerodynamic stall. Setting the Flight Model to something in-between will provide a compromise.

Autopilot Assist –

RF-X offers assistance for new pilots to help control and maintain level flight, when the need arises. Select the Autopilot Assist that best fit your needs.

None – As the name suggests, this disables all autopilot assistance.

Minimal – The automatic recovery of the aircraft is very mild. In most cases, you might not even notice that it is turned on. This will help the aircraft stay straight and level over long flights, but it will not reduce the chance of a crash.

Recover Near Ground – At this setting, RF-X will gently level the aircraft at higher altitudes, while pull out of dives and other similar maneuvers to avoid impact with the ground.

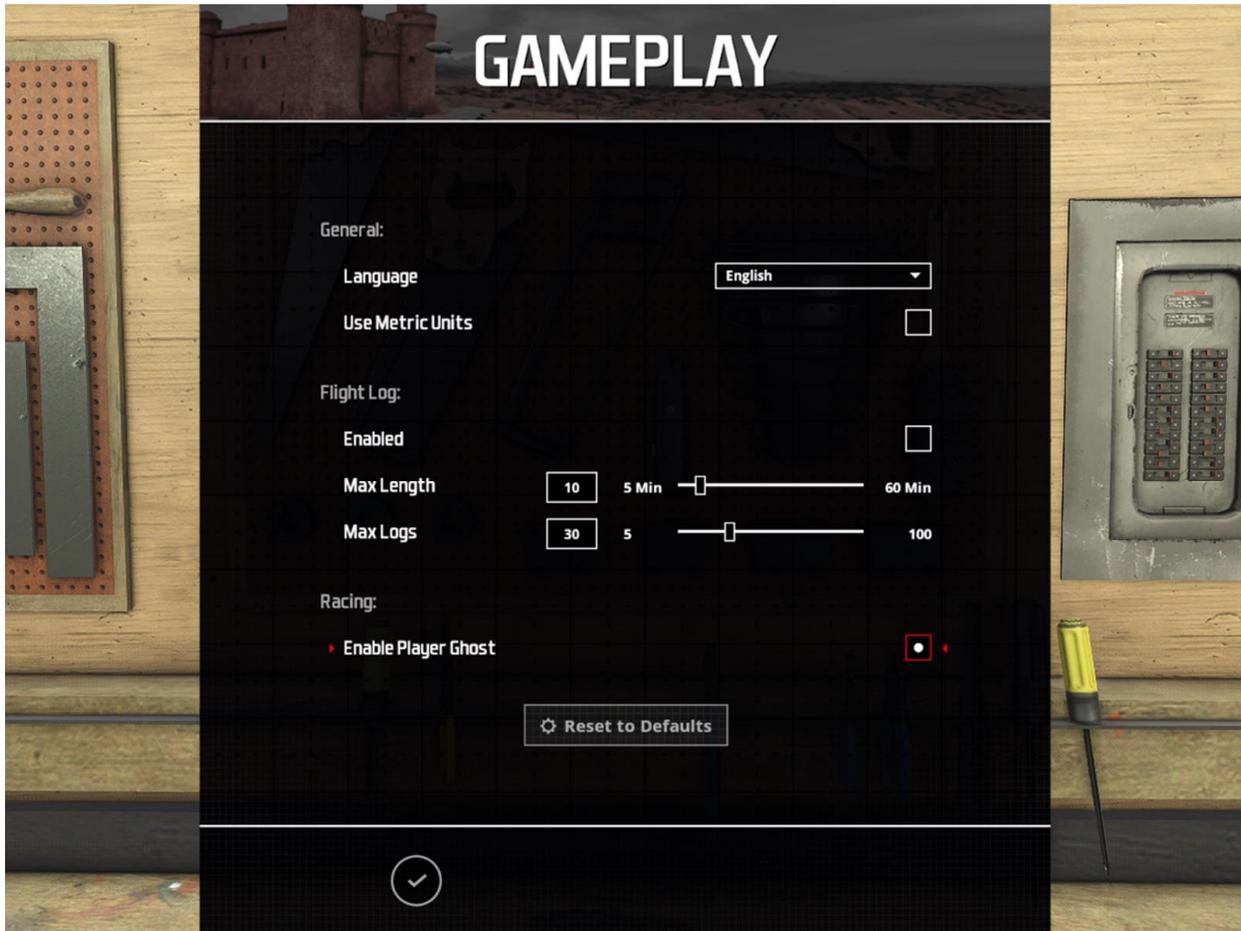
Auto Recovery – Selecting this option will cause RF-X will always level the aircraft during pitch and roll maneuvers.

Full – At this level, RF-X will aggressively avoid the ground as well as complete auto-recovery during flight.

Click the checkmark button to accept any changes and return to the previous screen.

Gameplay

The Options available on this screen offer adjustments to settings for general flight during the simulation.



General –

- Language – Click the dropdown to select the language to display throughout RF-X.
- Use Metric Units – By default RF-X displays measurements in SAE units. Turn this option on to display metric units.

Flight Log –

- Enabled – Check this option to turn on or off the Flight Log feature. This can also be controlled from the Flight Log screen.
- Max Length – Maximum recording time, in minutes, of each flight log. The box to the left of the slider shows the selected value. Type a new value into this box, or move the slider to the desired value.
- Max Logs – Maximum number of recordings to keep. The box to the left of the slider shows the selected value. Type a new value into this box, or move the slider to the desired value.

Racing –

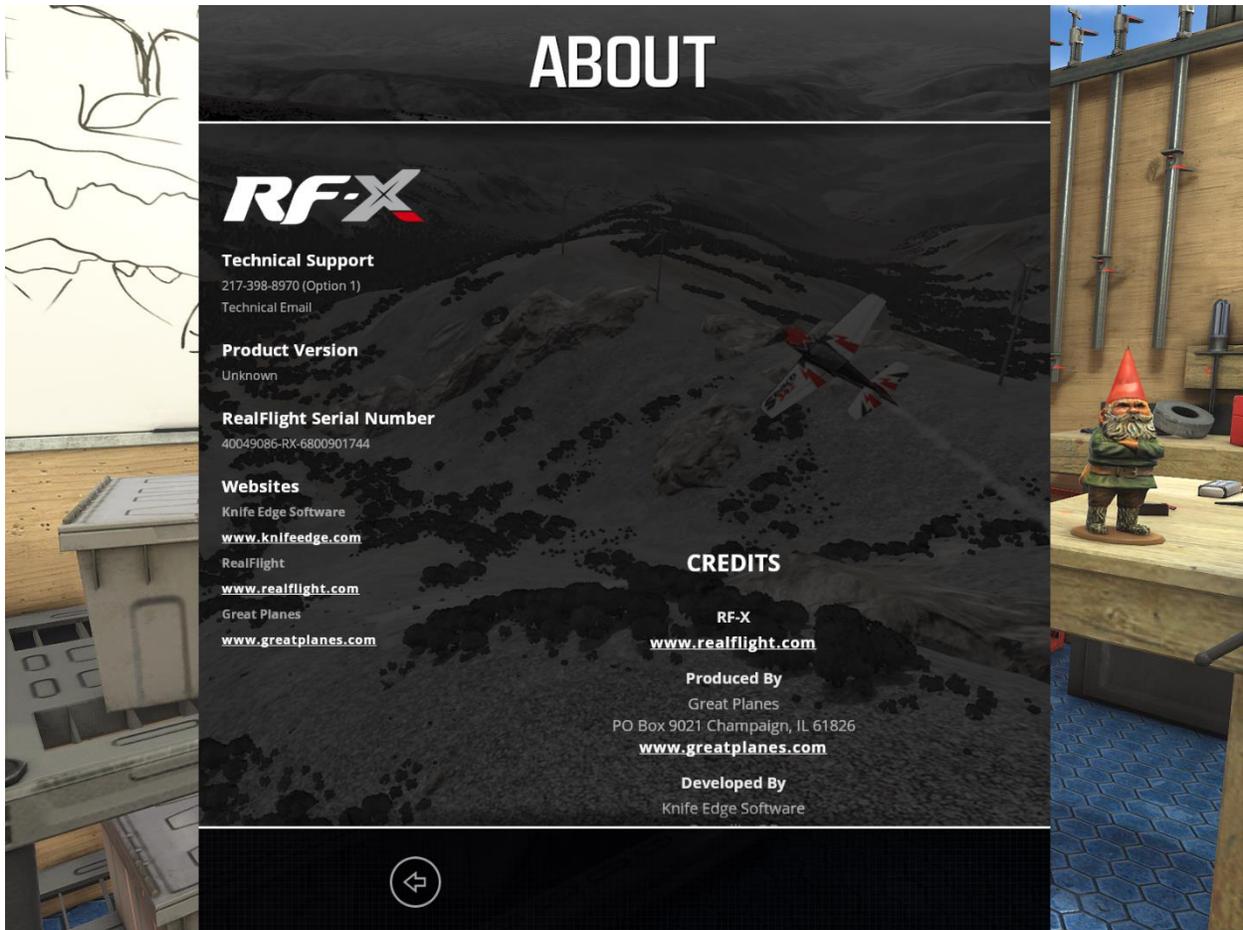
- Enable Player Ghost – To help improve your time in racing events, enabling this options allows you to compete against your best time for each course.

If you wish to return all settings to their original values, click the Reset to Defaults button.

To accept any changes and return to the previous screen, click the checkmark button.

About

The About screen provides some useful information, including your serial number for RF-X as well as the current version of the software. Also, many people worked hard to bring you the best R/C flight simulator in the industry. View the About screen to display the credits of those individuals.



To return to the previous screen, click the Back button.

Quit

As the name implies, to exit RF-X, simple click the Quit button on the main menu.

Pause Menu

During flight, press the Esc key at any time to pause the simulation. While paused, the following options will appear.



From this screen, you may change your aircraft, airport or settings without returning to the main menu. Those options function identical as if selected from the main menu. See the appropriate sections above for instructions on those options.

Available only from the Pause screen are the ability to adjust and view parameters for the Environment, Camera and Keyboard.

Environment

As the name suggests, this screen allows you to adjust environment settings, including the sun location, wind parameters and the appearance of clouds.



For any of the adjustments available, the box to the left of the slider shows the selected value. Type a new value into this box, or move the slider to the desired value.

Sun Angle –

- Inclination – Expressed as a degree from 0 to 359, adjust the inclination of the sun, or the angle of the sun as it pertains to the flying site. This can also be changed in real time using the Shift + Page Up and Shift + Page Down keys.
- Azimuth – Also expressed as a degree in direction from 0 to 359, this allows you to adjust the direction of the sun. Change this in real time using the keys Shift + Home and Shift + End.

Wind –

- Speed – Change the speed of the wind. Alternatively, press Page Up or Page Down during flight to adjust the wind speed.
- Direction – Change the wind direction from 0 to 359 degrees around you. Or, during flight, press Home or End to make this adjustment.
- Turbulence – As a percentage, increase or decrease the amount of turbulent, or choppy air. Pressing Insert or Delete will also change this value during flight.

- Variation – A percentage from 0% (no change) to 100%, this setting will add some randomness to the wind speed and direction. Just as the winds that you experience at the local field are not constant, neither are the winds in RF-X.
- Gust – This value represents the change of the wind speed and direction corresponding to a proportion of the wind speed it calculates in one second.

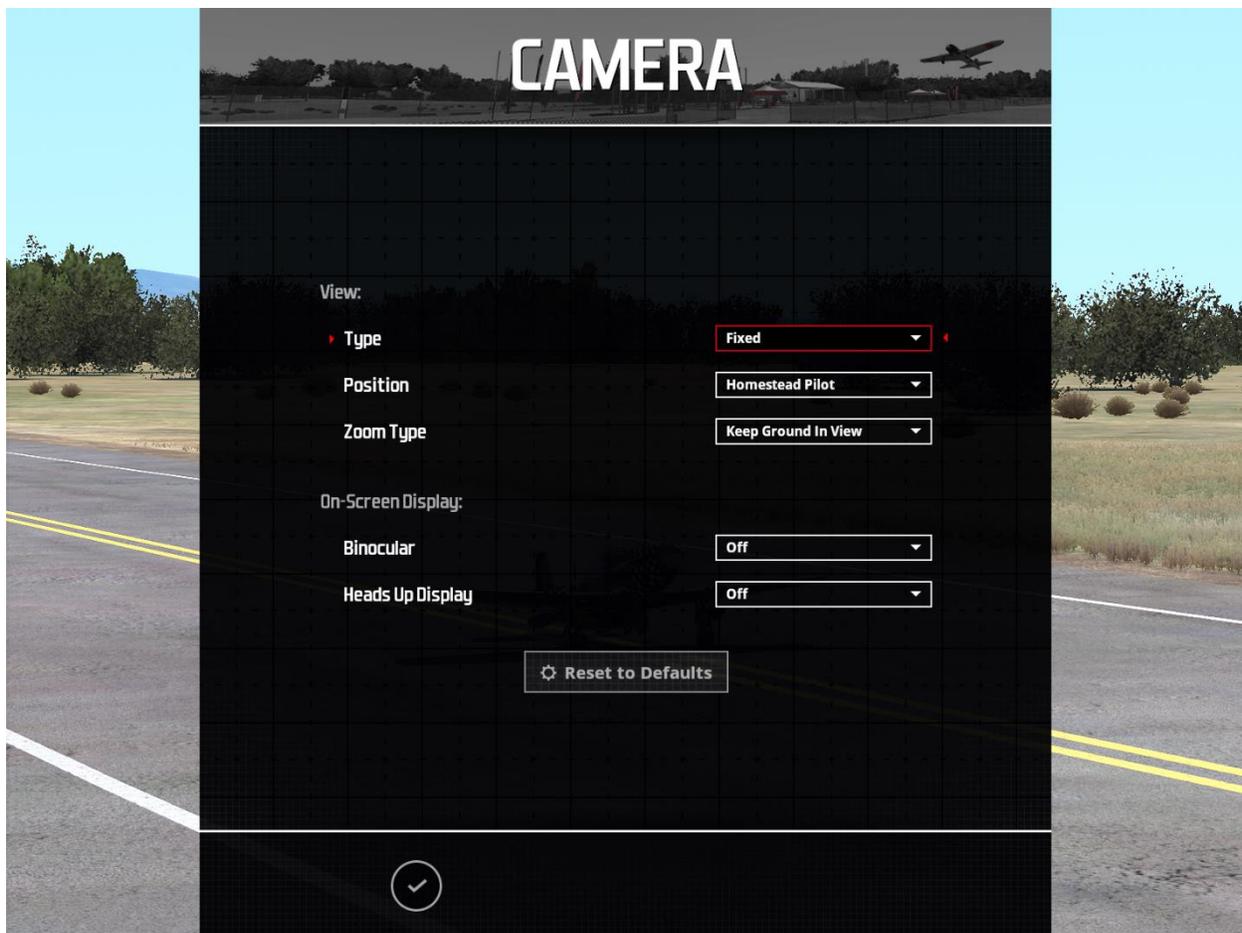
Clouds –

- Density – This setting determines how close together the clouds appear to be. The higher the density, the more clouds that will be visible in the sky.
- Height – This option allows you to set the altitude of the clouds, above sea level.
- Thickness – The value that determines how tall the clouds are.
- Precipitation – Add a little rain to your R/C flight without getting wet. Increase the precipitation to increase how rainy and overcast the environment is. Note that Density has less effect as the value of Precipitation is increased.

If you wish to return all settings to their original values, click the Reset to Defaults button.

Camera

The Camera screen allows you to make modifications to your view point during flight.

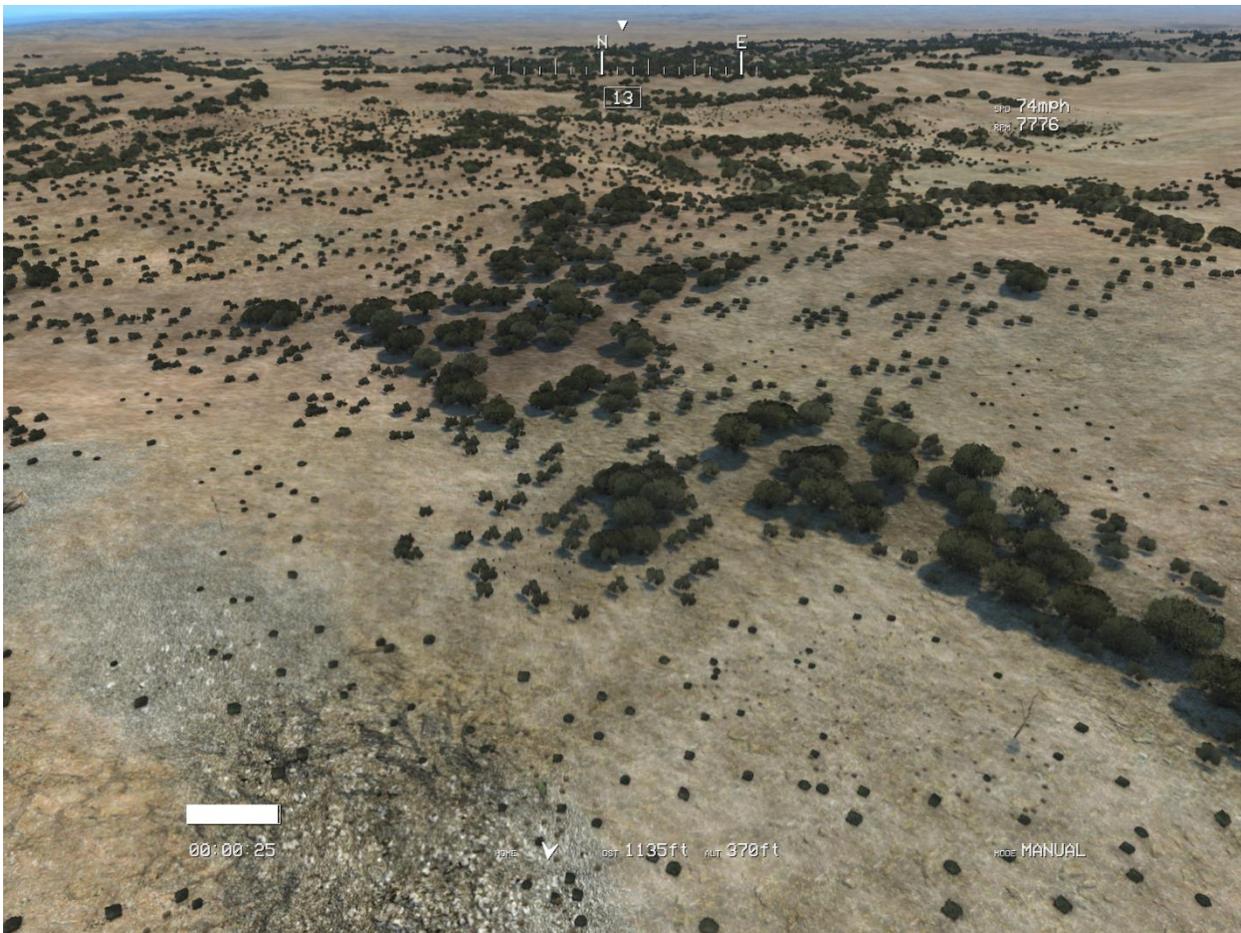


View –

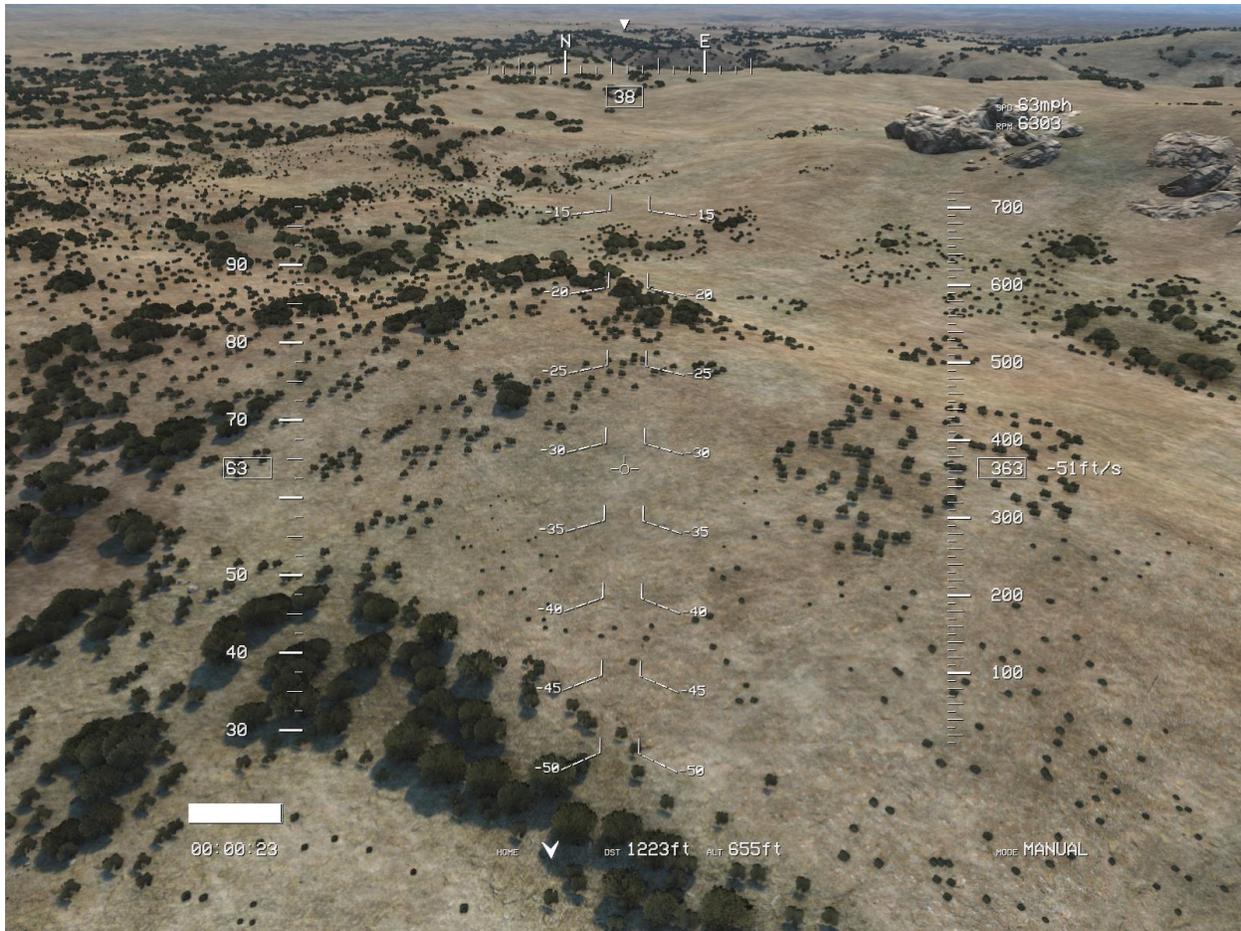
- Type – The list available for this option differs from aircraft to aircraft. Pick a camera point of view from this dropdown menu to change to the selected vantage point. Alternatively, you can cycle through this list during flight by pressing the C key. Some of the standard choices (Pilot, nose, etc.) can be accessed directly by pressing the respective Function key (F1, F2, etc.). See the Keyboard screen for more details.
- Position – Change the location of the pilot’s point of view on the ground. Or, press the X key to cycle through the different choices.
- Zoom Type –
 - Autozoom - This zoom type adjusts the zoom range based on the distance of the aircraft from the pilot. The camera automatically zooms in as the aircraft gets further from the pilot and then automatically zooms out as the aircraft gets closer to the pilot.
 - Keep Ground in View - This zoom type attempts adjust the camera so that the aircraft and the ground are always in view. This is the only zoom type that disallows zooming in and out.
 - Manual - This enables the standard view with zoom capabilities that are user-controlled. To increase the zoom, press the + key; to decrease the zoom, press the – key.

On-Screen Display –

- Binocular – When the aircraft gets too far away, it can be difficult to see. Selecting a binocular view will assist you in these situations. Pressing the B key will cycle through these different options.
 - Off – No Binocular view is enabled. This is the most realistic recreation. However, new pilots might wish to enable one of the other modes to assist with orientation until they are used to flying and controlling their aircraft.
 - Dynamic – Only appears once the aircraft reaches a certain distance from the pilot. The view appears in the middle of the screen where your aircraft would normally be viewed.
- Heads-Up Display (HUD) – Select the options available here to display on-screen flight information. Alternatively, press the V key to cycle through these options during flight.
 - Off – No Heads-Up Display visible.
 - Basic – The HUD displays basic information at the top and bottom, so not to distract from your view during flight



- Advanced – More complete HUD, shows all available flight information.



The data available on-screen when the HUD is enabled includes:

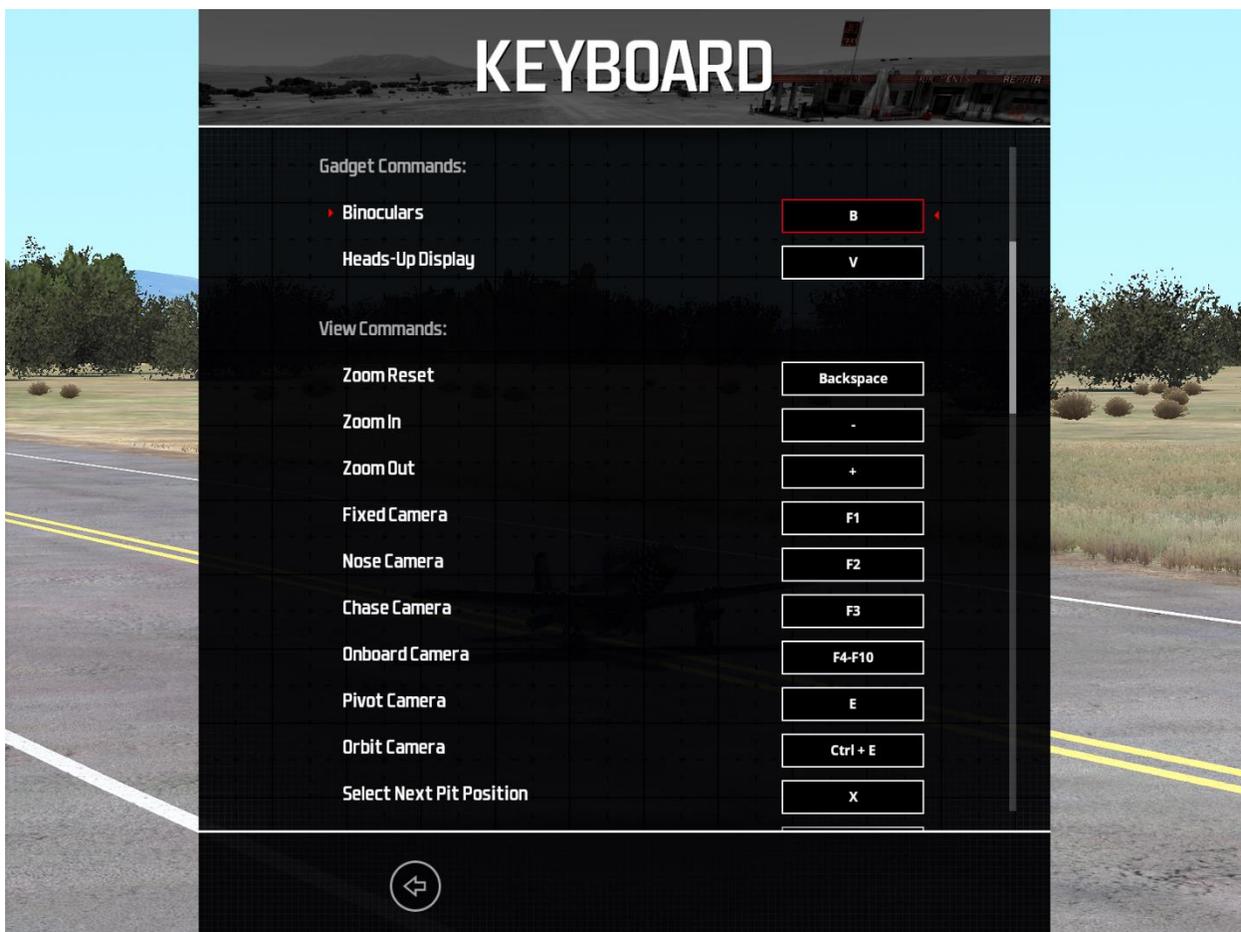
- Heading (Basic/Advanced) – Top-middle of the screen, this indicates the direction the nose of the aircraft is pointing.
- Speed (Basic/Advanced) – Upper-right corner. The airspeed of travel.
- Speed (Advanced only) – Left side of the screen. Also the airspeed of the aircraft.
- RPM (Basic/Advanced) – Upper-right corner, below speed. This indicates the RPM, or revolutions per minute, of the aircraft’s motor.
- Fuel/Battery Gauge (Basic/Advanced) – Bottom-left of the screen, indicated as a percentage bar. The bar is full, or maxed, at the beginning of the flight. This will decrease as the fuel or battery is consumed.
- Flight Time (Basic/Advanced) – Directly below the Fuel Gauge, this timer indicates the duration of the current flight.
- Mode (Basic/Advanced) – Bottom-right section of the screen. Some aircraft are programmed with different flight modes. This will indicate which mode you are currently flying. For example, multirotor aircraft could have three different modes; Loiter, Altitude Hold and Stabilize.
- Home Direction (Basic/Advanced) – Bottom-middle of the screen. The arrow indicates the direction of the starting location, or your home airport. Note that this is relative to the aircrafts heading, not the pilot’s point of view.

- Home Distance (Basic/Advanced) – Bottom-middle, next to Home Direction. This indicates the distance between the aircraft and your starting location.
- Altitude (Basic/Advanced) – Bottom-middle, next to Home Distance. Indicates the aircraft's height above the ground.
- Altitude (Advanced only) – Right-middle, displayed as a ladder indicator. This displays the height of the aircraft above or below the starting location at take-off.
- Variometer (Advanced only) – Right-middle of the screen. The value displayed indicates the rate of climb or decent.
- Pitch/Roll Ladder (Advanced only) – Center of the screen, showing the aircraft's pitch and roll in relationship to the horizon.

If you wish to return all settings to their original values, click the Reset to Defaults button.

Keyboard

Select this screen to view all keyboard commands available during flight.



The complete list of the keyboard commands include:

Virtual Channels –

If you are using your own transmitter, it is possible the radio has fewer channels available than what some of the aircraft are programmed to use. If that is the case, you can operate these channels using the following keys.

Channel 5	Y
Channel 6	U
Channel 7	I
Channel 8	O
Channel 9	H
Channel 10	J

Gadget Commands –

Binoculars (Press to cycle the Binocular view)	B
Heads-Up Display (Press to cycle through each HUD option)	V

View Commands –

Zoom Reset	Backspace
Zoom In	+
Zoom Out	-
Fixed Camera	F1
Nose Camera	F2
Chase Camera	F3
Onboard Cameras (Varies based on aircraft)	F4 - F10
Pivot Camera	E
Orbit Camera	Ctrl + E
Select Next Pit Position	X

Select Previous Pit Position	Shift + E
Select Default Pit Position	Ctrl + E
Change Zoom Mode	Z
Change Camera Mode (Press to cycle between Fixed, Nose or Chase camera)	C
Change Movement Mode (Press to switch between Walking or Flying)	Q

Movement Commands –

Press Q to change between different Movement Modes. Use these keys in conjunction with the mouse. The following keys will allow you to move the camera, while the mouse allows you to change the direction the camera is pointing.

Move Forward	W
Move Backwards	S
Move Left	A
Move Right	D
Move Slow	Ctrl
Move Fast	Shift
Move Very Fast	Shift + Ctrl

Environment Commands –

Increase Wind Direction	Home
Decrease Wind Direction	End
Increase Wind Speed	Page Up
Decrease Wind Speed	Page Down
Increase Wind Turbulence	Insert
Decrease Wind Turbulence	Delete
Increase Sun Azimuth	Shift + Home
Decrease Sun Azimuth	Shift + End
Increase Sun Inclination	Shift + Page Up

Decrease Sun Inclination

Shift + Page Down

Miscellaneous –

Reset Vehicle

Spacebar

Pause Simulation

Esc

Kill Engine

K

Mute/Unmute Audio

M

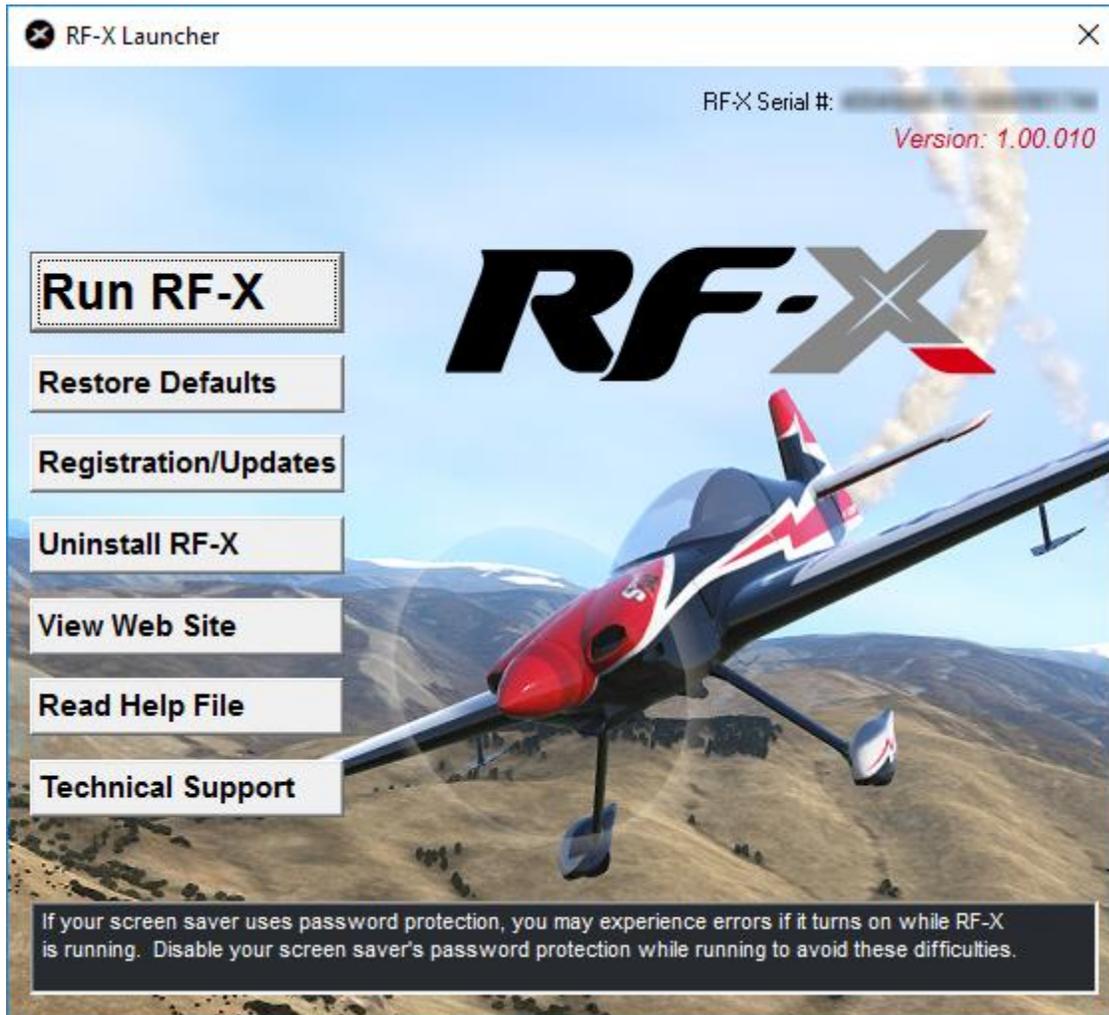
Look At Aircraft

T

RF-X Launcher

This item allows you to run the simulation, register and update the software, and much, much more.

To run RealFlight or to access the additional options, click the RF-X Launcher icon located on your desktop.



Run RF-X

To start running RF-X, double-click the RF-X Launcher located on your desktop. Next, click the Run RealFlight button. The simulation will begin loading the terrain, airport objects, textures, etc. Your simulation experience will begin as soon as the loading process completes.

Restore Defaults

Use this button to restore RF-X's default settings. Doing so will NOT remove custom aircraft, flying sites, etc. Rather, it is designed to simply restore the factory default values and settings for the simulation.

Registration/Updates

Use this button to register or update the software. Clicking the Registration/Updates button will bring up the following selections.

Online Registration

This button allows you to register your copy of RF-X. The registration information entitles you to complimentary technical support and applicable free online updates.

Please enter all of the required information to complete the registration. If you forget your password, contact the Great Planes Software Support team. To do so, email them at rfsupport@greatplanes.com or telephone them at 217-398-8970 (option #1). They will confirm your identity, and reset your password.

RealFlight Newsletter –

Periodically, Great Planes will send out an electronic newsletter to customers that are subscribed. The newsletter includes information about new products, product updates, shows and events we are attending, tips and tricks and other useful information. If you wish to receive this newsletter check the box labeled Yes, I want to receive the RealFlight newsletter via email.

Hardware Information –

RF-X offers the option of automatically sending us information pertaining to your system hardware and settings when you register. If you leave the Send Hardware Information box checked when you register, RF-X will send us this information.

This hardware information will assist us in diagnosing any problems you may encounter later, should you need to contact Technical Support. Consequently, we suggest that you leave this box checked when registering.

This feature is optional. If you uncheck the box, RF-X will not send us any information about your system.

Alternatively, you can view exactly what information RealFlight will send us before you decide. To view the information, click the Technical Support button on the main RF-X Launcher window. When the Technical Support page appears, click Assemble System Information.

Update to Latest Version

After registering (you only need to register once), you may update to the latest version of the software. This will download all necessary files and correctly install the upgrade.

Click this button to update to the latest version of RF-X.

Please note: Your PC must be connected to the internet in order to check for updates.

Check for Updates Before Starting RealFlight-

If you check this box, every time you run the RF-X software it will check to determine whether or not there is a more recent version of RF-X available to you. If a new version exists, RF-X will ask if you wish to download and install the newer build.

Please note: Your PC must be connected to the internet in order to check for updates.

Update to Specific Version

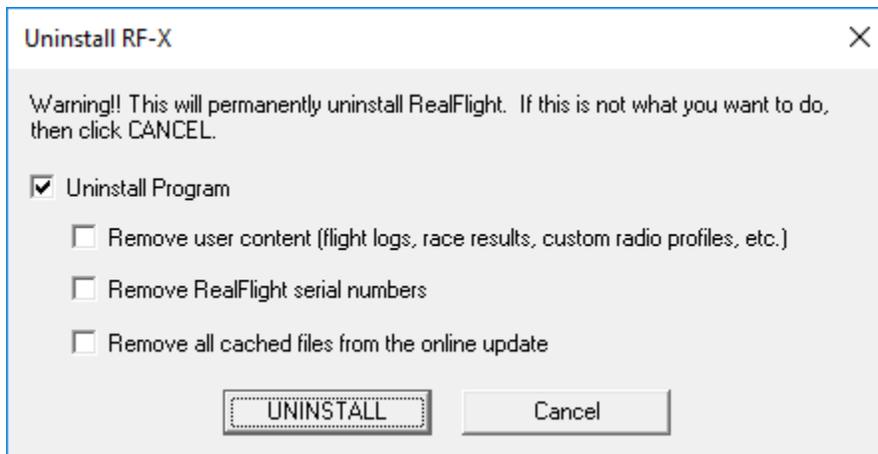
If you are experiencing difficulties with a version you have installed, this will allow you to retrieve a previous version of the software. If the previous version fixes your problem, please contact our technical support team at rfsupport@greatplanes.com and let them know about the difficulty encountered.

Clear Download Cache

Occasionally, files may become corrupt during a download. If you are having difficulties with the online updates, remove all cached files using this option. Next, choose Update to Specific Version and then select the Completely Refresh option.

Uninstalling RealFlight

Click the Uninstall RealFlight button to uninstall the software. The following dialog will appear:



The RF-X Launcher will remove all necessary RF-X files.

Uninstall Program

Choose this option to uninstall only the RF-X program itself.

Remove user content –

Choose this option to uninstall any user files such as customized airports, customized aircraft, color schemes, etc. Be careful with this option! These files are unrecoverable after being uninstalled. You could lose a lot of your work by inadvertently uninstalling these files.

Remove Serial Numbers –

Choose this option to remove the serial numbers from your system. This will remove the RealFlight and InterLink serial numbers as well as your online activation. Since RealFlight Expansion Packs may also be installed on your computer for previous versions of RealFlight, you may wish to leave those serial numbers untouched. To do so, click the box Leave Expansion Pack serial numbers intact.

Remove All Cached Files From The Online Update –

Choose this to option to remove all cached download files from your system. If you uninstall these files, future downloads may take a little longer.

View Web Site

Click the View Web Site to visit the RealFlight web site. A browser window will open for you and you will be automatically directed to the site.

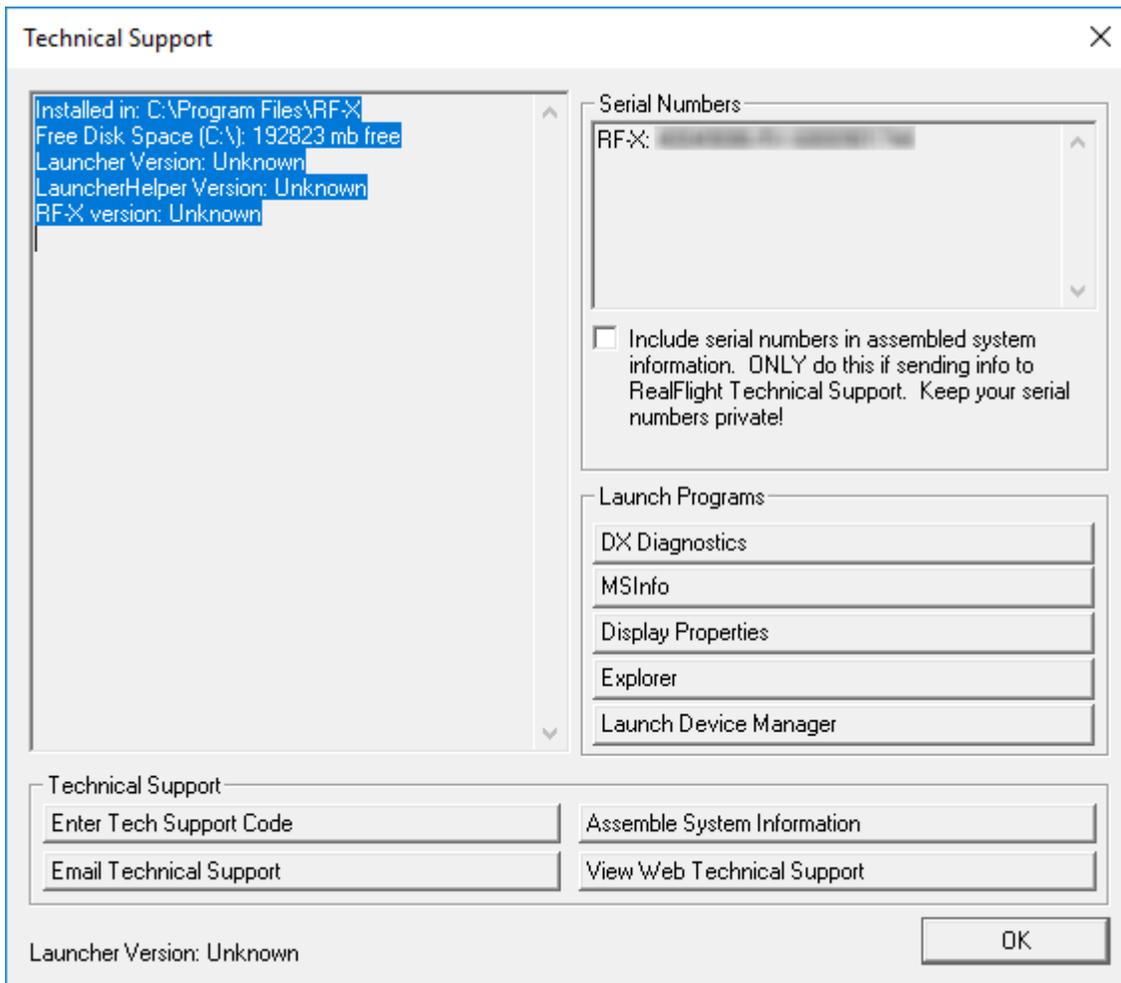
Please note: Your PC must be connected to the internet in order to view the RealFlight web site.

Read Help File

Press the Read Help File button to open the manual, this document that you are reading now, for RF-X.

Technical Support

Press the Technical Support button to bring up technical support information pertaining to your system. If you encounter any difficulties with RealFlight, this information can help you to resolve the situation on your own, or may assist Great Planes' Support Staff to diagnose the problem.



The panel on the upper-left portion of the window displays a list of the critical system information. Before you email technical support, or report a bug with the software, please be sure to cut and paste this information into your email. This will greatly assist them in diagnosing the difficulty.

Enter Technical Support Code –

Choose this option to enter a technical support code. If you do encounter problems running RealFlight, our Technical Support team may supply you with a code to enter. Entering this code will help them diagnose or resolve your difficulty.

Email Technical Support –

This gives you the email address rfsupport@greatplanes.com to which you can email your difficulties. If you do email us, please be sure to attach the Assemble System Information output to your email.

You will receive an auto-reply message back confirming that Great Planes Support Staff has received your email. If you do not receive the auto-reply message, please double-check that you sent your email to the correct email address.

Assemble System Information –

Choose this option to collect critical information about your system, and about your RealFlight settings. You may find this information useful if you try to troubleshoot problems on your own. Moreover, if needed you can copy and paste this information into an email to Great Planes Support Staff. Note that it might take some time for your computer to gather this information. Please be patient with this process.

View Web Technical Support –

Choosing this option will open a browser window, and take you to a web site that contains the most up-to-date technical support information for RealFlight.

Include Serial Numbers –

Check this box if you plan to assemble all system information to send to Great Planes Support Staff. If you are sending this information to anyone else, don't check this box. The serial numbers are unique to you, and should only be shared with Great Planes Support Staff.

DX Diagnostics –

This brings up Microsoft's DXDIAG utility. Using this utility can further help diagnose your system.

Please note: If you send us information about your system to help us diagnose a problem, please do not use DXDIAG to generate that information. Instead, use the "Assemble System Information" option. The "Assemble System Information" output file contains more information than the DXDIAG output.

MSInfo –

This option will run MSInfo. This will give you even more information about your system. This program is not always installed on a particular computer, but normally comes with programs such as Microsoft Office®.

Display Properties –

This brings up the display properties for your monitor. You can use this page to change the resolution of your desktop.

Explorer –

This button launches Windows Explorer. This Microsoft Windows utility can help you locate, move and back up your files.

Launch Device Manager –

This button launches the Device Manager. This Microsoft Windows utility will help you determine driver dates and versions, as well as installing and updating video and sound card drivers.

Basics of Flying

Understanding the fundamentals of radio control flying.

Before taking control of a transmitter, it helps to understand the basics of flight, and the functionality of the gimbals, sticks and switches used to properly control the aircraft. This chapter reviews the basics of flying an airplane or a helicopter to help get you started down the right path.

Airplane Basics

Before you fly the plane, make sure all switches are in their off or low rates, positions. The switches may be assigned to different items, or functions, depending on how you have configured your controller and which aircraft you are flying. If you are using your own transmitter to control RF-X, please consult your transmitter owner's manual for more information.

The InterLink Controller features digital trim tabs which are more precise and offer trim memory within the simulation. Trim tabs are the small slider controls on the controller (two per controller stick). They "trim" the aircraft so that it flies straight and level. For example, if an airplane has a tendency to veer slightly downward, you may need to add a slight "up" nudge to the elevator. You can do this by sliding the elevator trim, a click or two at a time, towards the bottom of the controller.

Crashing

Takeoffs are optional, but landings are mandatory. For any type of aircraft or flying, successfully landing an aircraft is a crucial skill to master.

The key to a perfect landing is undivided concentration. Pay close attention to the altitude, orientation, and speed of the aircraft as it approaches the runway. Should you happen to crash, use each crash as a learning experience to perfect your approach and the landing.

Out at the field a crash might result in one or more of the following:

- Bruise your ego
- End flying for the day
- Cost you money
- Cost you time to rebuild
- Cause injury to yourself or a bystander
- Even win you a nice "best crash" trophy!

Of course, when you crash on the simulator, there is really no harm done. None, that is, except the bad habits you may acquire. We suggest that you take the crashes seriously and learn from each one. By doing so, you will be a better pilot out at the field.

Airplane Flight

RF-X accurately simulates how R/C aircraft really fly. This allows you to practice R/C flight without worrying about expensive crashes. Additionally, RF-X is ideal for practicing new maneuvers and experimenting with various parameter adjustments.

It is important to remember, however, that a simulator will only help you learn to fly if you let it. Otherwise, it is just a game. Learning to fly R/C aircraft requires a commitment. One does not just grab the sticks and start dazzling the crowds. A methodical, patient approach will help you get the most out of this simulator.

This section is not designed to teach you how to fly. However, it will help you enhance your experience with the simulator and obtain the most from your experiences.

Takeoffs

When you are taking off, start with the throttle in low position and slowly increase throttle by pushing the throttle stick away from you towards the top of the transmitter until you are at about half speed. Stay in the middle of the runway (you can steer the plane using the rudder). When you have built up enough speed, gradually pull back on the elevator stick to climb off the runway. If the plane is tracking well, apply the rest of the power more quickly, climb out, and gain altitude.

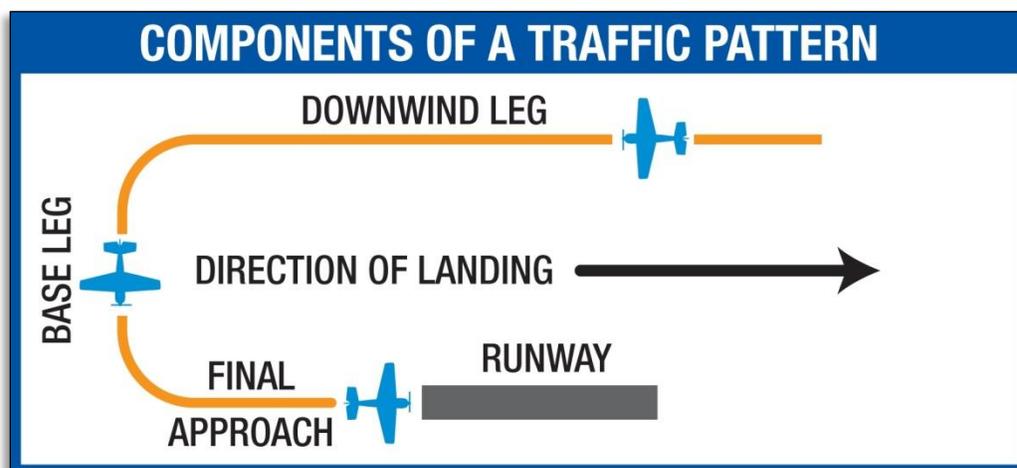
Be careful not to veer off the runway. In a real plane, chances are that you would crash (or get stopped on the grass). Usually this means bent landing gear and a broken prop. If your plane has retracts, they could even be torn out of the wing.

Landings

It is very important to land on the runway, rather than veering off, or touching down before you reach the runway. Either of the latter usually produces a moderately expensive crash. If you “cartwheel” (wing tip hits the ground first), the wing can break, resulting in lengthy down time while you repair your airplane.

Start by aligning your plane parallel with the runway. Fly the approach normally, using your throttle to control the rate of descent. Try to land at the slowest speed possible. If your plane has flaps, use them to kill speed (but be careful; with flaps down your plane will try to pitch up and climb). If your plane has retractable landing gear, lower them. As you touch down, remember to keep your nose up!

For landings, it's important to understand the different segments, or 'legs' during the approach to the runway.



Aerobatics

When you practice aerobatics, the three important steps are:

- Start the plane straight and level, in a controlled situation
- Perform the maneuver
- Return to a straight, controlled situation

Anyone can give it full throttle, jam the sticks in all directions and watch the plane tumble and roll. However, this is not what you will do out in the field. Do this and you will not have control of the airplane!

The key to properly performing the maneuver is in the setup. Doing so will allow you to cleanly finish and your experience will be more rewarding as well as more realistic.

Concentrate on making the maneuvers “clean and crisp.” If you are doing a roll, try to keep the plane on a straight line as you roll. If you are doing a loop, try to make a perfectly round circle; entering and exiting the loop at the same altitude.

Throttle Management

Avoid the temptation of giving the plane full throttle and keeping it there for hours at a time. This teaches you bad habits and makes even a good flier look like a rookie out at the field.

Many of the maneuvers require proper throttle management in order to make a maneuver look good. Loops, stalls, torque rolls, touch-and-goes are just a few examples. Try doing various maneuvers at differing speeds. Try performing a slow roll at medium throttle and keeping a perfectly straight line. This difficult maneuver will earn you more praise at the field than doing a full speed, full stick roll.

Rudder Management

Most airplanes can (more or less) be effectively flown with just the elevator and ailerons. Good pilots will tell you that the proper use of the rudder is just as important, however. Many aerobatic maneuvers require excellent rudder usage.

Rudder control is especially important when landing in a crosswind. Pilots that cannot use the rudder usually land in the tall grass (embarrassing!). Pilots that do use the rudder can land on the numbers almost every time.

Helicopter Basics

A model helicopter is a very complicated machine, which operates on the same aerodynamic principles as its full-scale counterpart. These principles are quite complicated to explain and understand. However, it is not necessary to understand all the underlying aerodynamics in order to successfully fly a model helicopter (or a computer simulation).

The following will help you to better understand the basics of helicopter flight, and the relationship between control stick movements and the actions of the machine. Refer to these instructions often as you become more proficient.

Please note: The inputs below are shown using a Mode 2 transmitter.

Collective (Left Stick – Vertical Movement)

The spinning main rotor blades, which act like rotating wings, lift the helicopter into the air. Changing the pitch (angle of attack) and speed of the blades, using the “collective” and throttle causes the helicopter to rise and descend vertically. Adjusting “collective” increases and decreases the blade pitch. The “throttle” control increases and decreases engine RPM. On a model helicopter, the collective and throttle controls are mixed electronically, and controlled by the throttle stick on the transmitter or controller.



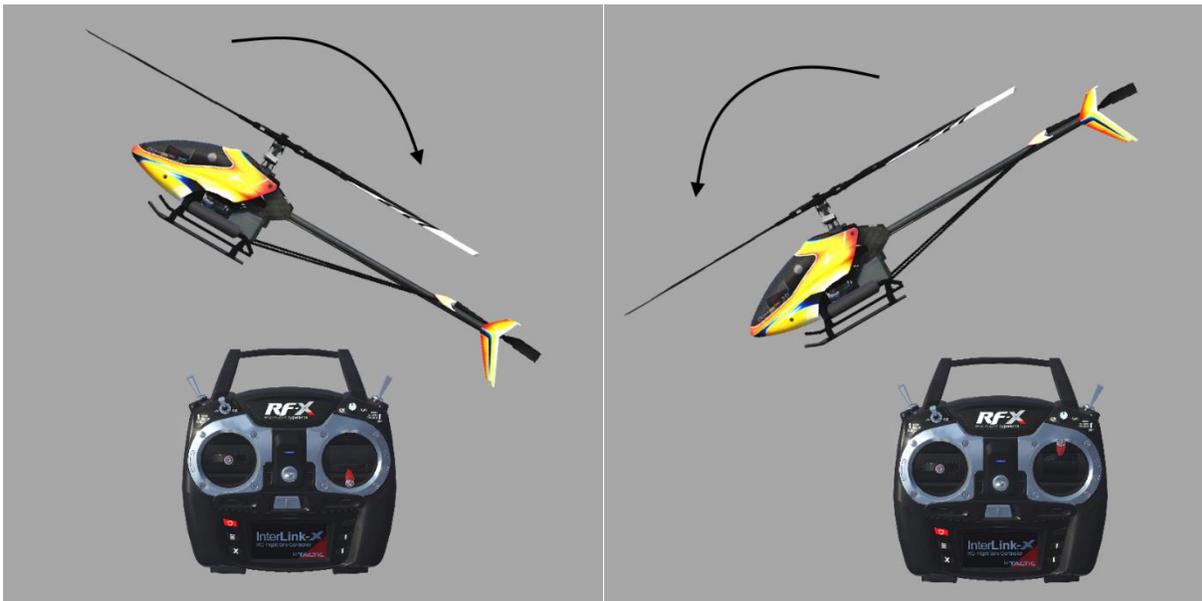
Rudder (Left Stick – Horizontal Movement)

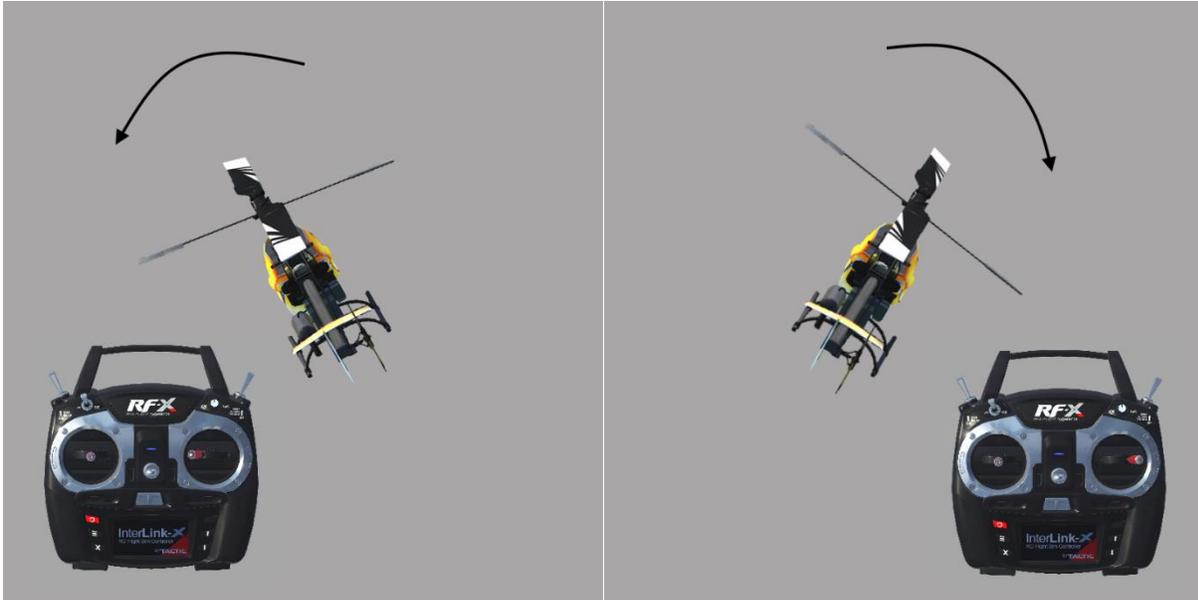
To turn the nose of the helicopter left or right, change the tail rotor pitch (by using the “rudder” control). Changes in collective stick movement will require changes in the amount of rudder input to maintain the desired heading.



Cyclic Stick (Right Stick)

The cyclic stick replaces the “aileron” and “elevator” controls found on a fixed-wing aircraft. “Cyclic” is the term given to the control of the main rotor that allows the helicopter to fly forward, backward, left and right. Forward cyclic stick movement causes the helicopter to pitch forward, left cyclic causes the helicopter to tilt sideways to the left, on so on. You move the helicopter forward or sideways using a coordinated movement of both the cyclic and collective control sticks. Moving the cyclic stick to the right, while simultaneously increasing collective, will cause the helicopter to move sideways to the right. “Rudder” control is used to maintain the heading.





Idle-Up

A switch on the controller actuates a special function, known as “idle-up.” Idle-up offers an alternate throttle and pitch curve, different from the curves used for hovering. Idle-up is usually used for aerobatics, when the pilot wants engine power added when pitch is subtracted. For example, inverted hovering requires positive throttle and negative pitch. As such, pulling the collective stick back provides positive throttle AND negative pitch simultaneously.

Throttle Hold

Another special function is known as the “throttle hold”. When activated, this switch sets your throttle to idle but allows the collective to function normally. This allows you to practice autorotations without shutting the engine off.

Gyro

Any sudden change to the torque of the main rotor, such as a quick change in RPM or a wind gust, can cause the helicopter to turn unintentionally to an unwanted direction. An electronic device known as a gyroscope (gyro) is used to “monitor” and correct for this by giving commands to the rudder control to help stabilize the machine.

Gyros come in a variety of types, each with different features. A normal gyro will not return the helicopter to its former heading; it will simply dampen the unwanted sudden movement. We recommend you start by using the heading hold gyro instead; it will maintain course and keep the nose of the helicopter pointed in the desired direction regardless of outside forces.

Helicopter Flight

Hovering

The machine hovers by adjusting the collective/throttle control to maintain altitude, the rudder to maintain heading, and minute adjustments to the cyclic controls to maintain location. Hovering is the most important aspect of helicopter flight to master, since every other movement of the machine begins and ends with a hover.

Forward Flight

The helicopter moves forward by changing cyclic (moving the cyclic control forward). This causes the rotor head, and thus the helicopter to tilt forward, resulting in a forward thrust. As the cyclic increases, the collective must also be increased to maintain the desired flight path. As forward speed increases, the collective can be reduced slightly.

Backward Flight

Backward flight is accomplished by moving the cyclic control aft, which causes the rotor head, and thus the helicopter to tilt backward. As the cyclic is moved aft, the collective must also be increased to maintain desired flight path. As backward speed increases, the collective can be reduced slightly.

Sideways Flight

Moving the cyclic control left will cause the rotor head, and thus the helicopter to tilt left. Add collective and left rudder to cause the helicopter to “slide” sideways to the left. As speed increases, it will require progressively more rudder input to maintain heading.

To move right, simply follow the same procedure, but reverse the cyclic and rudder movements (move cyclic right, apply right rudder).

Turning from forward flight

Moving the cyclic control left, while applying a small amount of aft cyclic and feeding in left “rudder”, will cause the helicopter to make a coordinated turn to the left. Right movement of the cyclic and rudder sticks will cause the heli to turn to the right.

Turning from a hover

Use the rudder to rotate the nose of the helicopter in the direction you want.

Learning to fly a model helicopter is more difficult and challenging than any other genre of radio control modeling, but is also the most rewarding as you master the techniques required for sustained hover and forward flight. Computer simulation of model helicopter flight is an excellent tool for learning the basics and dramatically reducing the learning curve when you move on to the actual model itself.

Glossary

180-Degree Turn
R/C Term

This basic flight practice starts with a takeoff, and then demonstrates 180 degree turns on a flight path parallel to the runway.

360-Degree Turn
R/C Term

Flying the aircraft in a complete circle (360-degree turn). This maneuver is a great way to learn control inputs for turns while maintaining a constant radius and altitude.

3D Acceleration
Computer Term

3D rendering requires a huge number of calculations. Modern computers offload many of these calculations to the video card, rather than performing the calculations directly on your computer's CPU. This speeds up the simulation and allows for faster frame rates, thereby increasing the realism of the simulation.

ATV
R/C Term

Amount of servo travel. For instance, 50% ATV would mean the servo's maximum travel is 50% of its physical limit.

Adverse Yaw
R/C Term

The tendency of an airplane to yaw in the opposite direction of the roll. For instance, when right aileron is applied, the airplane yaws to the left, thus opposing the turn. Adverse yaw is common in trainer type airplanes having flat bottom wings. It is most noticeable at slow speeds and high angles of attack, such as during takeoffs and when stretching a landing approach. Caused by the unequal drag of the upward and downward deflection of the ailerons, this undesirable trait can be minimized by setting up the ailerons with Differential Throw or by coordinating the turns, using the aileron and rudder controls simultaneously.

Aileron
R/C Term

Hinged control surfaces located on the trailing edge of the wing, one on each side, used to provide control of the airplane about the roll axis. The control direction is often confusing to first time modelers. For a right roll or turn, the right hand aileron moves upward and the left hand aileron moves downward. The movements are reversed for a left roll or turn.

Airfoil R/C Term	A surface (such as a wing or propeller blade) with a shape that produces a force perpendicular to its motion called lift.
Angle of Attack R/C Term	The angle that the wing penetrates the air. As the angle of attack increases so does lift and drag, up to a point.
Arm R/C Term	In this context, the arm is the distance from the point of the application of a force to the axis of rotation. If you press down on the tip of a wing, for example, the arm is the distance from the point where you are pressing to the root of the wing.
Auto-Play Computer Term	A Windows feature that automatically detects when a CD or DVD is inserted and runs the specified program on that disc.
Autorotation R/C Term	A maneuver in which the pilot attempts to bring the helicopter in for a landing without power from the engine. The momentum of the spinning rotor blades is enough to slow the helicopter prior to landing.
Avalanche R/C Term	The Avalanche is a loop with a snap roll at the top of the loop. This snap roll must be centered at the top of the loop.
Channel Mapping RealFlight Term	This term describes the ability of RF-X to alter the mapping or input of the servos to accurately reflect the actual controls from an R/C controller.
Chord R/C Term	The chord of a wing or surface is the width of the surface. A wider chord offers increased lift. However, a wider chord also generates more drag when the aircraft rolls.
CG R/C Term	CG is the abbreviation for the phrase Center Of Gravity. This is the point at which the aircraft balances fore to aft and side-to-side. The location of this point is crucial to how the aircraft reacts in the air. For airplanes, a tail-heavy plane will be very snappy, but generally unstable and susceptible to frequent stalls. Conversely, a nose-heavy plane will tend to track better and be less sensitive to control inputs, but will generally drop its nose when the throttle is reduced to idle. This makes the plane more difficult to land, since it takes more effort to hold the nose up. A nose heavy airplane will have to come in faster to land safely.

Collective R/C Term	A mechanism on a helicopter that changes the pitch of the main blades, thereby allowing the helicopter to ascend or descend accordingly. This is the control that adjusts the pitch of the rotor blades.
Coning R/C Term	When a helicopter hovers, the blades form a slight "cone" when viewed from the side. The Coning effect is caused by the balance between lift and centrifugal forces on the blades.
Control Surface R/C Term	Generally defined as the portion of the airfoil that moves. Examples include ailerons, elevators, rudders, flaps, and spoilers.
Controller RealFlight Term	A device used to control an aircraft in RealFlight. RF-X ships with the USB InterLink-X Controller. This device can be used as a standalone controller, or as an interface to use your own R/C transmitter.
Cuban Eight R/C Term	Model enters in level flight, pulls to complete 5/8s of a loop to the 45 degree down line, completes ½ roll, pulls to complete 5/8s of a loop to the 45 degree down line, complete ½ roll to complete 3/8s of a loop to level flight.
Cyclic R/C Term	For helicopters, this refers to the tilting forward and back (pitch), or tilting sideways (roll) of the helicopter. To do this, the angle of attack of the main rotor blades is changed during rotation, creating different amounts of lift at different points in the cycle.
Deadstick R/C Term	A term used to describe unpowered flight (glide) when the engine ceases operation.
Depth of Field Computer Term	The depth of field (DOF) is the portion of the screen that appears sharp, while all other objects appear out of focus. In RealFlight, depth of field can add more depth perception to your computer monitor, which is flat.
Dihedral R/C Term	The V-shaped bend in a wing. Increasing the dihedral usually enhances the aerodynamic stability of an airplane, and helps the rudder to control both the roll and yaw axis. This is why some trainers and sailplanes require only three channels of radio control (i.e., they have no ailerons).

Direct3D Technology
Computer Term

A Microsoft DirectX technology used to render the 3D image when you have a graphics accelerator card. It works best on faster computers.

DirectX
Computer Term

A technology created by Microsoft that controls graphics and sound operations.

Down Thrust
R/C Term

This is the downward angle of the engine in relationship to the centerline of the airplane. Down Thrust helps overcome the normal climbing tendency of flat bottom wings.

Driver
Computer Term

A software program that controls a card (e.g., video or sound card) in your computer. Card manufacturers usually provide drivers as well. Card manufacturers frequently update their drivers to fix bugs or to make their cards compatible with new software and hardware. You can often find an updated driver for your video or sound card by visiting the card manufacturers web site and following links to "Drivers," "Support," "Downloads", or "Upgrades."

Elevator (Maneuver)
R/C Term

The Elevator is a maneuver in which the aircraft is made to stall completely with a large amount of elevator throw. The aircraft will descend almost vertically much like an elevator. To perform the Elevator, make sure that you have sufficient altitude, dive the aircraft vertically toward the ground and pull full up on the elevator stick.

Elevator (Control Surface)
R/C Term

Hinged control surface located at the trailing edge of the horizontal stabilizer, which provides control of the airplane about the pitch axis and causes the airplane to climb or dive. The correct direction of control is to pull the transmitter Elevator control stick back, toward the bottom of the transmitter, to move the Elevator upward, which causes the airplane to climb. Move the Elevator in the other direction to dive.

Endpoint Adjustment
R/C Term

This radio feature adjusts the length of servo travel in one direction (a single channel will have adjustments for two endpoints). For example, if your aircraft rolls faster one way than the other, endpoint adjustments can correct the problem.

Exponential
R/C Term

A feature commonly found on computer radios that desensitizes the servo when the sticks are close to the neutral position. The further the stick's position from center, the faster the control response.

Figure 8
R/C Term

This is an excellent maneuver to learn perspective and orientation of the aircraft from all angles. Use the ailerons and elevator to turn the aircraft left and right. Use the elevator to ensure that the aircraft maintains a constant altitude, forming an '8' in the sky.

Flap
R/C Term

For Airplanes: hinged control surface located at the trailing edge of the wing inboard of the ailerons. The Flaps are lowered to produce more aerodynamic lift from the wing, allowing a slower takeoff and landing speed. Flaps are often found on scale models, but usually not on basic trainers.

For Helicopters: Flapping is an up-and-down motion of the main rotor blade's tip. With a "dual-damped" head, both blades are able to Flap independently. With "solid axle" heads, moving one blade up causes the other to move down.

Flapping Head
R/C Term

This describes a type of rotor head in which the two blades are not connected directly. Each blade is independent of the other, usually resulting in a helicopter with smoother performance.

Flare
R/C Term

The point during the landing approach in which the pilot increases the amount of up elevator to smooth the touchdown of the airplane.

Flybar Paddles
R/C Term

These are the short blades on the end of the flybar. Available in a variety of weights and airfoils, these paddles assist the main blades in producing lift, etc.

Flybarless
R/C Term

As the name suggests, a flybarless aircraft is a helicopter that does not incorporate a flybar in the rotorhead design. Rather the helicopter uses an electronic stabilization device that electronically replaces the flybar.

Four-Point Roll
R/C Term

These maneuvers are very similar to a slow roll with the exception of a hesitation at either $\frac{1}{4}$ of the roll or at $\frac{1}{8}$ of the roll. It is important to remember to use rudder and elevator to keep the aircraft flying in a straight line.

Frame Rate
Computer Term

Frame Rate is the number of times per second that RealFlight creates a different picture to display on your monitor. Frame rate is determined by the speed of your CPU and graphics card, and how many RealFlight options you turn on. This is not the same as refresh rate, which is the number of times per second that your monitor retraces an image on its screen.

Fuselage
R/C Term

Generally speaking, this is the main part of the airplane that holds the wings and engine. The fuselage is often thought of as the “body” of the airplane. This term is also used to refer to a “body” that might be used on helicopters.

Goldfish
R/C Term

Entering at level flight, pull 45 degrees up; perform $\frac{1}{2}$ roll centered on the line. Then perform a $\frac{3}{4}$ loop back to a 45 degree up line. Finish with another $\frac{1}{2}$ roll centered on the up line.

Governor
R/C Term

A device used to help maintain a constant RPM (head speed), generally used in helicopters rather than airplanes.

Gyro
R/C Term

A device, most commonly used in helicopters, that aids in controlling the yawing action of the helicopter by automatically adjusting the deflection of the tail rotor blades.

Harrier
R/C Term

A Harrier is a slow forward progression of the aircraft with the nose held high. Use the elevator to stall the forward progress of the aircraft. Add in more up elevator until the nose approaches 45 degrees. The throttle should be used to control the forward progress of the aircraft, without climbing.

Hub
R/C Term

The centralized mechanical device used to attach the main rotor blades and paddles.

Humpty-Bump
R/C Term

This aerobatic maneuver consists of two vertical lines connected by a half circle flown across the top.

Immelman Turn
R/C Term

The aircraft will enter a half loop from straight and level flight followed immediately by a half roll to straight and level flight.

Joystick Computer Term	A device that connects to your computer to provide control input for the simulated aircraft. The InterLink Elite controller that comes with RF-X is considered a Joystick.
Knife Edge R/C Term	This maneuver requires the pilot to roll the aircraft 90 degrees so that the wings are perpendicular to the ground, with one wing down and the other up then, holding this position while maintaining the same altitude above ground.
Lateral Balance R/C Term	The right-to-left or side-to-side balance of an airplane.
Launcher RealFlight Term	The RF-X Launcher is useful for many aspects of the RF-X program, including loading the simulator, compiling system information for technical support, or uninstalling RealFlight.
Lead Lag R/C Term	A helicopter term describing the hinge point where the blade attaches to the hub. This allows the blade to move forward and backward at certain times during the blades rotation.
Leading Edge R/C Term	The very front edge of the wing or stabilizer. This is the edge that hits the air first.
Limbo R/C Term	An event (flying competition) in which pilots take turns flying their aircraft under a Limbo bar. The pilot that clears the lowest bar height wins.
Lithium Polymer R/C Term	Rechargeable batteries frequently used in R/C for powering an aircraft's electric motor. A lithium polymer battery offers lower weight and improved run times when compared to other rechargeable batteries.
Low Rates R/C Term	A switch on the radio that reduces the servo movement to much smaller extremes, thus making the model respond more slowly to a given control input.
mAh R/C Term	Milliamp Hour – The measurement of a battery's total capacity.
Mixing (or Programming Mixing) R/C Term	Two or more output channels can be coupled together to move in a desired manner when controlling input channels are activated.

Mode R/C Term	Also known as Flight Mode or Stick Mode, this refers to the transmitter's gimbal stick assignments (locations) which determine the flight mode of your controller. There are two main modes of control, Mode 1- mostly used in Europe and Mode 2 which is the predominant method of controlling aircraft commonly used in the United States.
Pirouette R/C Term	The yawing action of a helicopter that looks much like an ice skater spinning in a circle. One Pirouette is equal to one 360-degree rotation.
Pitch Axis R/C Term	The airplane axis is controlled by the elevator. Pitch is illustrated by holding the airplane at each wingtip. Raising or lowering the nose is the pitch movement. This is how the climb or dive is controlled.
Point Rolls R/C Term	These maneuvers are very similar to a roll with the exception of a hesitation at either 1/4 or 1/8 of the roll.
Propeller R/C Term	Props are generally designated by two numbers (for instance, "10 – 6"). The first number is the length (10" in the example) of the prop. The second number is the pitch or angle of the blades. In this example, the "6" represents the distance the propeller will move forward in one revolution in ideal situations.
RAM Computer Term	Random Access Memory.
RealPhysics 3D RealFlight Term	This is RealFlight's exclusive physics modeling technology. RealPhysics 3D authentically replicates the actual physics of model aircraft by performing hundreds of thousands of floating point calculations each second while delivering sizzling real time performance.
Refresh Rate Computer Term	The number of times per second that your monitor retraces an image on its screen. This is different from the Frame Rate.
Resolution Computer Term	When used in the context of screen Resolution, this term describes the picture quality of the screen. Lower Resolutions will produce an image that is not as sharp as higher Resolutions.

Roll Axis
R/C Term

The airplane axis controlled by the ailerons. Roll is illustrated by holding the airplane by the nose and tail. Dropping either wingtip is the roll movement. Roll is used to bank or turn the airplane. In most airplanes, the ailerons control roll however, when the main wing has dihedral, the plane can be banked using the rudder only. Consequently, many planes with wing dihedral do not have ailerons, and the rudder controls both roll and yaw. This is one reason most trainer aircraft have a large amount of dihedral -- a plane with large dihedral can be controlled using fewer input channels.

Rudder
R/C Term

Hinged control surface located at the trailing edge of the vertical stabilizer, which provides control of the airplane about the Yaw axis (causing the airplane to Yaw left or right). Left Rudder movement causes the airplane to Yaw left, and right Rudder movement causes it to Yaw right.

Servo
R/C Term

An electromechanical device that moves the control surfaces or throttle of an airplane according to commands from a receiver. This device does the physical work of moving parts around inside the aircraft.

Software Radio
RealFlight Term

This term describes RF-X's ability to accurately mimic a computer transmitter (complete with mixing, etc.) in the simulation.

Sound Card
Computer Term

A card inside your computer that controls audio (what you hear over your computer speakers). Most sound cards plug into your computer's motherboard. You can upgrade your sound card (or the software driver that controls it) without getting a new computer.

Split S
R/C Term

The Split S is another step in learning to combine loops and rolls and is a great maneuver to decrease your altitude. A half roll precedes a half loop, making the maneuver a mirror image of the Immelman. The Split S provides course reversal and an easy increase in speed.

Stall
R/C Term

When an airplane's angle of attack is too great to generate lift (regardless of airspeed), the plane will dive and rapidly lose altitude. This is known as a stall. Every airfoil has an angle of attack at which it generates maximum lift. The airfoil will stall beyond this angle.

Swash Plate R/C Term	The mechanism in a helicopter rotor that turns non-rotating control movements into rotating control movements.
Throttle Hold R/C Term	This is used to keep the throttle at a set position, yet allows input to the collective of the helicopter. Generally this function is used to practice autorotation.
Throw R/C Term	Commonly used to describe the degree of deflection of a control surface.
Tip Stall R/C Term	This is when the airplane reaches its stall speed and one wing drops.
Torque Roll R/C Term	The Torque Roll occurs when the nose of the airplane is pointed vertically and the airplane hovers in place. The aircraft will rotate left around its roll axis.
Touch and Go R/C Term	Landing and taking off without a pause, often confused with a good bounce.
Trailing Edge R/C Term	The rearmost edge of the wing or stabilizer.
Trainer R/C Term	A model designed to be inherently stable and fly at low speeds, to give first-time modelers time to think and react as they learn to fly.
Turbulence System RealFlight Term	This is the ability of RealFlight to induce turbulent, rough air, as would be experienced at the flying site.
USB Computer Term	USB, or Universal Serial Bus, is a connection protocol for computer peripheral devices (like Great Planes' USB InterLink-X Controller). USB technology allows you to connect multiple devices to your computer, and supports high data transfer rates and is hot swappable. USB devices have a special connector that only fits into a USB port. Most modern personal computers have USB ports, which are usually clearly labeled. Some computers have one or more USB ports on the front of the computer housing, although the USB ports are usually on the back of the computer.
Variometer R/C Term	An instrument designed to indicate the rate of climb or descent of an aircraft.

Video Card
Computer Term

A card inside your computer that produces the images on your monitor. Most modern 3D video cards have accelerated 3D operations—that is, they perform numerical calculations for rendering a 3D scene, to free up your computer's CPU to perform other tasks. The video card plugs into your computer's motherboard. You can upgrade your video card (or the software driver that controls it) without replacing your computer.

Washout
R/C Term

An intentional twist in the wing, which causes the wing tips to have a lower angle of attack than the wing root. In other words, the trailing edge is higher than the leading edge at the wing tips. Washout helps to prevent tip stalls.

Waterfall
R/C Term

The Waterfall is a maneuver where the plane pivots 360 degrees in the pitch axis with as little forward motion and altitude deviation as possible. As the name suggests, this maneuver resembles a waterfall during flight.

Yaw Axis
R/C Term

The airplane axis controlled by the rudder. Yaw is illustrated by hanging the airplane level by a wire located at the center of gravity. Left or right movement of the nose is the Yaw movement.