

Way Up High in the Virtual Skies

By Mark Lanterman



Introduction

Set the way-back machine for the early 1980s. You are standing in one of the larger hobby manufacturer/distributor facilities of the day. In a corner office you notice a few men huddled around what appears to be a television screen. All eyes are fixed on the screen and their faces are bathed in a green glow given off by whatever they are watching. When one of the men shifts his stance, you get a glimpse of the screen—and it's a monochrome computer monitor.

The image is mostly black, with a few animated green lines in the middle and some text along the bottom. Moving in closer you see that the green lines make up the outline of a rudimentary airplane and the numbers along the bottom reference height, distance, etc. There's no sound except for the keyboard clicking, but every so often the group lets out a collective "Ooh" or "Watch out!"

What this group is watching so intently is a computer program—the first of its kind—that is running on one of the original Apple personal computers. The program's author, a college professor, had just sold two of the first copies of his new program to a couple of guys in this group.

Almost instantly a few telephone calls were made, a partnership was created, and the result was the birth of the Radio Control (RC) flight simulator. Notice that I wrote "Radio Control"; the military has been using various types of flight simulators to train its pilots since the 1930s, but they had been bulky and only available to those in the service. Not until the advent of the personal computer has this type of technology been available to help teach modelers to fly.

This first RC simulator was rough. The technology behind it was pushing computer technology to its limit. Loops and rolls were basically it as far as aerobatic capability. Since the simulator had no sound, color, scenery, or runway, it took quite a bit of imagination and dedication to fly. However, RC-pilot wanna-bes had this new method to use to learn how to fly.

Computers have advanced in capability through the years, and so have RC simulators. When color and sound became standard equipment, simulators roared to life and included vivid color graphics. As computer speeds increased, programmers were able to pack more complex calculations into their programs, improving the flight dynamics.

All of these improvements have brought us up to today's simulators, which include photo-realistic graphics, accurate flight characteristics, interfaces that allow control using actual RC transmitters, and the ability for pilots around the globe to fly together at virtual airfields via the Internet. Simulators have come a long way. They are now a viable alternative to using buddy cords or other forms of traditional flight training.

However, nothing in this article should convince you to attempt to fly your first model by yourself. Although the simulator can give you all the skills needed to take off, fly, and land your model successfully, it does not teach you how to properly build and set up your model, start the engine, adjust the needle valve, or spot problems on the ground. Enlist an experienced modeler's help when flying in the real world.

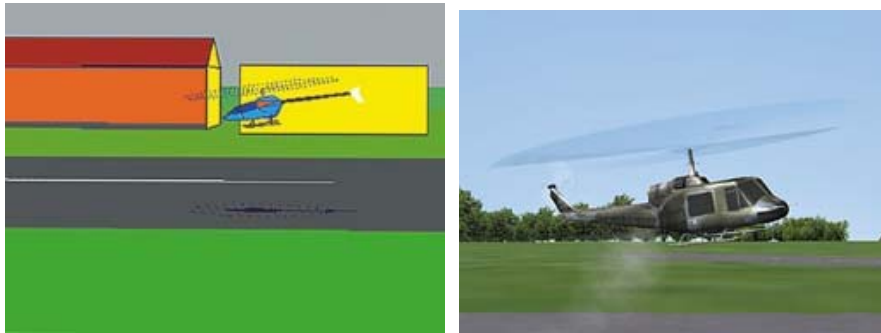
People normally ask how long it will take them to learn to fly using a simulator, but there's no firm answer because people learn at different speeds. A rule of thumb is that when you can fly competently around the sky where you want and take off and land where you are supposed to, you're probably ready to try the real thing.

A simulator will allow you to learn at a more rapid pace than you ever could at the field. Most flying sites have one or two nights a week set aside for training; you can get in three or four flights, but that's pushing it. With a simulator you can learn any time you're home—at night, when it's too windy, when it's too cold, when it's raining, or when it's snowing. As long as you have electricity and free time, you can be in the air—virtually.

It's time to jump into flight simulation. I'll tackle this in five steps:

1) Types of simulators that are available today. Please don't confuse this article with a simulator "shoot-out" with one coming out the winner. There will be no side-by-side comparisons. This is more of a buyer's guide; I'll mention all commercially available packages on the market and a few found only on the Internet.

- 2) Computer requirements
- 3) Using a flight simulator correctly
- 4) Using advanced features
- 5) Commercially available simulators



The realism that a simulator delivers depends heavily on your computer. Older, slower systems can't draw photo-realistic scenery fast enough.

Types of Simulators

Types of Simulators: All simulators work basically the same way. They attempt to re-create the experience of flying RC models in a "virtual" world viewed through the computer's monitor. Although this virtual world will look more realistic in some simulators than in others, you'll see the selected model in the center of the screen, scenery surrounding it, and instrumentation to help tell you where the model is.

The simulator is normally controlled with some sort of simulated "transmitter" which is attached to one of the ports on your computer (gameport, USB, serial, or parallel). Other simulators include transmitter interfaces that plug between the computer and an actual RC transmitter. Both systems are good and allow you to become familiar with the "feel" of a transmitter, its switches, its trims, and its controls. (Some simulators allow flying via the keyboard and/or mouse. Although it's unrealistic, it does give you some time in the air.)

No one simulator does it all, even though several are extremely good. Some offer stunning graphics. Others have more realistic-flying models. Still others have strengths in a specific discipline of flying, be it helicopters, park flyers, gliders, etc. Each simulator has pros and cons; shop around to make sure the one you choose has the features that are right for you.

Commercially available packages are usually the more sophisticated programs. They offer the most features and have highly refined flight dynamics, which can be quite realistic. They offer a wealth of features, a large variety of models to choose from, and the ability to tailor the simulator to your liking.

Some simulators include a controller that mimics the size, shape, and feel of an RC transmitter, and, as I mentioned, others go as far as to offer an interface to plug in an RC transmitter and use it to control the simulation. This level of sophistication allows you to get comfortable with your transmitter and develop a “feel” for where the sticks, switches, trims, etc. are positioned.

Free simulator software is usually less sophisticated than commercial packages. Although some free versions offer surprisingly good graphics, the realism and features don't compare to commercial offerings. What do you want for free?

What these free simulators do offer is a great way to see what RC flight simulation is all about without having to pay. They are normally controlled with the keyboard and mouse, but some do offer the capability of using existing joysticks or commercially available transmitter interfaces.

The programmers who make their software available for free are to be commended. A simulator involves an immense amount of programming and is quite time consuming. Even though they may never see a single dollar for their efforts, these programmers continue to help our sport/hobby grow by helping to bring in new people. Keep up the good work!



Photo 1



Photo 2



Photo 3

The wide variety of models allows you to fly gliders, park flyers, Pylon racers, or Old-Timers such as the one shown (1). You can fly Scale models in many scalelike settings, such as this Texan with an aircraft carrier (2), or practice your competition flying with a Pattern model (3).

Computer Requirements: As you may have gathered, all RC flight simulators require a computer. There are a number of titles for gaming consoles such as PlayStation, but they are more games than true simulation.

All simulators on the market these days are written for Windows-based systems; there is nothing specifically for the Windows NT or Macintosh platforms. There are some work-arounds that give Mac users some hope, but they don't offer near what the Windows systems do.

If you have a computer system that is less than three years old, it should be able to run most simulators fine. You may have to upgrade your video card to improve detail, resolution, and frame rate. Also, check to make sure that your computer has the proper port for connecting the simulator's controller. Some use a parallel port, some use a USB port, and others use a gameport/joystick port.

Mac users have two options.

- Purchase Virtual PC. This software emulates a Windows computer system on your Mac; actually, the Mac and Windows systems run simultaneously. Because of this, the Windows program runs slower on a Mac than on a dedicated Windows machine. Although this system will work, it is so slow that it is almost unusable at times.
- At the end of this article is a listing of vendors that includes a free simulator (JVRRC) that runs in an Internet browser and uses a mouse for control. It does not offer the features, sophistication, or flight dynamics of the commercial programs, but it can give you a taste of RC flying.

Regardless of the computer/simulator combination you choose, follow the directions and installation should go smoothly. If you do run into problems, check the Internet for any updates or bug fixes. Now you should be ready for your first lesson—virtually speaking.

Using RC Flight

Using RC Flight Simulators Correctly: Your program is installed, your controller is calibrated, and you're ready to go. Rather than just picking a trainer, slamming the throttle forward, and zipping around the sky, think about how to approach learning on a simulator.

Don't think of this as a game. Although many of the simulators have gaming features, don't use them yet. Don't see how fast you can fly, how big of a crash you can make, or how many things you can hit with the airplane. A simulator makes it easy to fall into such a routine because you can simply hit the reset button when things go wrong.

Instead, think of each airplane as you would in real life: as an investment. A typical Almost Ready-to-Fly trainer costs approximately \$300 once everything is installed. The trainer you use on the simulator should be viewed the same way. Try to take care of it and keep it in one piece.

As much as the program will allow, try to mimic what you would do in real life; taxi in the correct areas, take off from the runway, don't fly over or behind the pit area, and land on the runway. These skills require time to develop, but taking this approach from the start will be key to your success when you try to fly at your local field.

Almost every simulator has the ability to add wind and gusts. Although these features are not active by default, you should always use them. Seldom will you fly outdoors when the wind isn't blowing. If you aren't used to flying with the wind, you won't know how to compensate for it and disaster is almost guaranteed.

Make a few trips to your local field and take the time to note the wind conditions. From which direction does the wind come? How strong is it? What about wind gusts? Once you know what the wind is like, program the information into your simulator. You will be flying in conditions that are as close as possible to what you'll experience when you fly your real model.

I won't go into the basics of flying here; they are covered in your simulator's manual and, more recently, in MA's "From the Ground Up" series. Instead I'll share a few tips and pitfalls of simulators.

This is not a game. To be successful you need small, smooth stick movements. There will be a time for more radical and exciting flying, but that's not now. Envision that you're piloting an airliner full of people; the smoother you are, the less the ground crew will have to clean up after landing!

Try to keep the model close to you, but not dangerously close. Many make the mistake of flying the airplane so far away that it is a speck in the sky. Keeping it near makes it larger, so it's easier to see in which direction the airplane is going.

A pitfall of the simulator is its lack of depth perception. Regardless of the simulator and how detailed the picture is, it is a two-dimensional interpretation of a three-dimensional environment. Therefore, it is hard to tell distance accurately. Use the airplane's shadow and any on-screen instrumentation to guide you. In time you'll develop a "feel" for this and will rely less on the instruments, but the shadow is always helpful—especially when lining up the model for landing.

Once you've flown the model a few times and have a basic understanding of the controls, it's time to start controlling the airplane. By that I mean making the model fly where you want it to go rather than putting in course corrections when you get into trouble.

Try a simple racetrack pattern. Using the runway as a guide, fly the model parallel to the runway, keeping it roughly 30 feet from the runway's far edge. Fly the entire length of the runway. When you reach the end, make a gentle 180° turn away from the pit area and fly back across the field, again keeping the model parallel to the runway. When you reach the end of the runway, make another 180° turn back toward the pit area.

If you do this right, your model should end up back where it started. Try to keep the airplane at a consistent altitude and fly it at a consistent speed throughout the pattern. When you're feeling fairly confident flying the racetrack pattern, fly it in the opposite direction. Try figure eights and 360° turns, again keeping consistent altitude and speed.

Another one of the simulator's pitfalls is limited viewing angle. The human visual system can see roughly 180° horizontally and 140° vertically. However, most simulators have a field of view of approximately 30° in each direction. Because of this limitation, it is easy to lose track of where the ground is. This can be frustrating during landing.

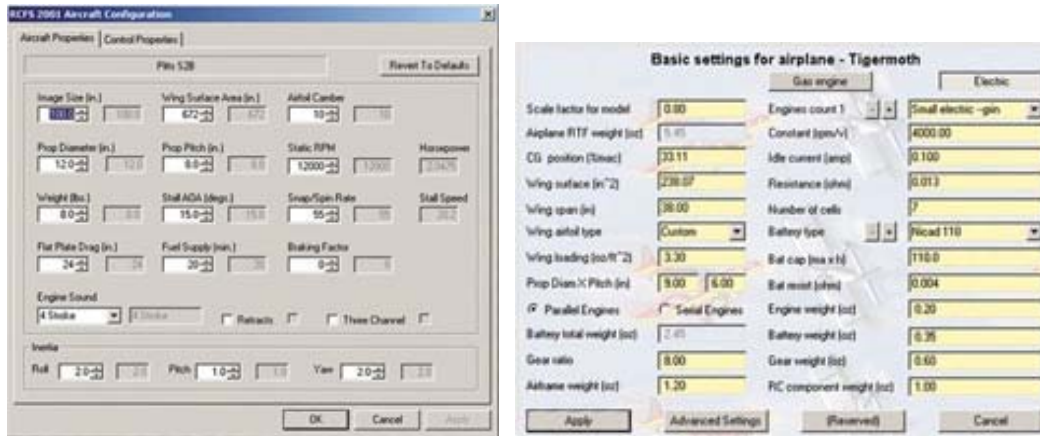
Some simulators have features to help with this, such as grids in the sky, wide-angle views, automatic zooms, etc. Regardless of the features, this limitation is something you'll have to get used to.

Regardless of what you try with the model, you'll eventually have to land it—by choice or by running out of fuel—which is the last of the simulator's pitfalls. Landing is the hardest maneuver that a newcomer has to master.

Most simulators will allow you to land anywhere and at almost any speed. In real life you can't taxi at 100 mph or land as hard as you want; you'll tear the model apart. With a real model you need to aim for the runway and land at speeds just faster than those at which the model will stall. Work on doing the same thing with the simulator.

Simulators give you the chance to make mistake after mistake when landing, with the hope that you will learn how to improve for the next time. Soon you'll learn that there's more to landings than cutting the throttle and diving for the runway; it's all about managing airspeed and being smooth.

I've covered all of the basics. If you keep practicing everything I've mentioned up to this point, something will happen without you realizing it. The more you practice, the less you'll have to "think" about what to do. This thinking will be replaced with automatic reactions that are learned. When this happens, you have "arrived" and it will be time to move on to more advanced flying.



Setup screens enable you to tailor models to fly more to your liking. You can also program in settings from real models and fly them.

Advanced Simulator Features

Advanced Simulator Features: Congratulations. Now that you have become a pilot, let's explore the more advanced features of RC flight simulators. It's time to have some fun!

- Explore the models. Yeah, I know that the trainer is far from the most inspiring airplane. Now that you can fly, choose some of the other models available to you. Although the types of airplanes will vary from simulator to simulator, most will have Aerobatics models, gliders, a Scale model or two, park flyers, and maybe even a Pylon racer and a Pattern model. Each model will fly differently; some differences are subtle, but others are quite a change from the humble trainer.

- Try new maneuvers. With each new model you explore, you will have the chance to try something new. It could be loops and rolls with a Scale model, riding the wind with a glider, precision maneuvers with a Pattern or Aerobatics model, or having fun with a park flyer. Regardless of the model you pick, fly within the rules I set up earlier; fly as though it is a real model and do your best to bring it back in one piece.

If you're thinking of enhancing your flying abilities, a simulator is the ticket. Whether you're a competitor, a sport flier, or anywhere in between, the simulator allows you to practice at your own pace and become familiar with new techniques.

For instance, if you've wanted to try the 3-D flying that's all the rage these days, you can learn how to torque roll, hover, etc. on some of the more advanced commercial simulators. If competition is your thing, learn how to do each maneuver successfully and put them together in a sequence.

- Experiment by customizing aircraft. You don't have to be content with the airplanes that come with your simulator. All simulators give you the capability to edit the models' parameters. Change engines or motors, propellers, airfoils, etc.

If you've had your eye on a certain aircraft, start with a model that is close to it and edit all of the parameters to match. If you've done your homework, you'll end up with a virtual model that should fly similarly to the actual model.

Many of the simulators have instructions on how to edit the model "bitmaps," which are the graphic files that give a model its color scheme. By using an editor built into the simulator or a third-party painting program, you can decorate the airplane with any color scheme you can concoct.

- Change your flying field. Chances are that the default flying site in your simulator has little in common with your local field except for grass and a runway. Look through any other fields that

are available and find one that more closely matches yours. Some programs will allow you to move trees, buildings, and terrain to make it more to your liking.

- Use the interactive features. Not all simulators have interactive features, but some of the more popular programs have two types: those you can use in your virtual flying field and those that let you fly with other simulator owners.

Objects you can use in your virtual field can be added with a keystroke or selected from a menu. Add pylons for racing, limbo poles to test your nerve, and even other models that can fly in the sky with you.

Some of the latest simulators have the ability to connect to other simulator owners via a local network or the Internet. This opens the door to interesting possibilities. Imagine helping someone through a maneuver when the student is in one city and the teacher is in another. You could hold a virtual fun-fly with competitors logging in and participating from the comfort of their own homes. Show teams could practice formation flying and perfect their timing. In each case every pilot must use the same make and version of the software to ensure compatibility.

- Purchase an add-on package. Several simulators have add-on software that increases a program's ability. Some are sets of additional models—maybe park flyers or Scale aircraft. Others add features to the simulator, such as better graphics and/or extra flying fields. With more of these add-ons coming onto the market, you'll always have new options to explore.

I hope you have a better understanding of what RC flight simulators are and how they can make you a better pilot than you are right now. They are amazing pieces of technology; some are better than others, but all will do a fine job of teaching you how to fly.

As with anything you're shopping for, do your homework. Look into what best meets your budget and what will run on your computer system. Remember that all simulators are not the same; they don't all have the same features nor can they all mimic the same types of flying.

Once you've made your choice, use it properly. The only way to learn to fly with a simulator is to practice and approach every flight like it's the real thing. Takeoffs will seem easy, and landings will take longer to master than anything else. You will crash and you may get frustrated, but don't give up. Learn from your mistakes, and you'll be a better pilot for it. MA

Mark Lanterman

5655 David Pl.

Fairfield OH 45014

mark@airbornemedia.com

Free simulators:

JVRRC (Japanese site)

www1.jawink.ne.jp/koji-y/trash/t010/java.htm

FMS (Flying Model Simulator)

http://n.ethz.ch/student/mmoeller/fms/index_e.html

FlyRC

www.pivot.net/~acarr/ron/ron.htm

PRE-Flight

www.preflightsim.com/

Flight simulator for R/C model

<http://laurent.saintmarcel.free.fr/simulator/>

RC-AirSim

www.fabricated-reality.com/RC-AirSim.htm

Commercially available RC simulators

AeroFly:

Ikarus USA
5876 Enterprise Pkwy.
Billy Creek Commerce Center
Fort Myers FL 33905
(239) 690-0003
<http://ipacs.de/afold/>
\$49.90 for software only
Minimum computer requirements:
Operating system: Windows 95 or 98
Processor: 100% Pentium-compatible processor with at least 133 MHz
Memory (RAM): 32 MB
Hard-drive space: 20 MB
Video card: Graphic card with at least 2 MB
Other: CD-ROM drive; if joystick control, 100% DirectX-compatible joystick; if transmitter interface control, serial port and transmitter with trainer port

AeroFly Professional:
Ikarus USA
5876 Enterprise Pkwy.
Billy Creek Commerce Center
Fort Myers FL 33905
(239) 690-0003
<http://ipacs.de/aerofly/>
\$149.95 for software only
Minimum computer requirements:
Operating system: Windows 98/ME/2000/XP with DirectX version 8.0a or higher
Processor: 100% Pentium II-compatible processor with at least 450 MHz
Memory (RAM): 64 MB
Hard-drive space: 160 MB
Video card: OpenGL ICD-compatible graphic card with at least 16 MB
Other: CD-ROM drive; if joystick control, 100% DirectX-compatible joystick; if transmitter interface control, serial port and transmitter with trainer port

Cockpit Master:
MachineWorks Northwest
1813 Boulder Ridge Ct. N.W.
Salem OR 97304
(503) 581-4840
www.cockpitmaster.com/
\$199.99 for software with transmitter, \$79.95 for software only
Minimum computer requirements:
Operating system: Windows 95 or 98 (DirectX 7A or above)
Processor: —
Memory (RAM): 32 MB
Hard-drive space: —
Video card: 3D accelerated video card
Other: —

Cockpit Master Backyard Edition:
MachineWorks Northwest
1813 Boulder Ridge Ct. N.W.
Salem OR 97304
(503) 581-4840
www.cockpitmaster.com/
\$50 for software with interface cord, \$29.95 for software only
Minimum computer requirements:

Operating system: —
Processor: —
Memory (RAM): —
Hard-drive space: —
Video card: —
Other: —

CSM V10:

Horizon Hobby Distributors
4105 Fieldstone Rd.
Champaign IL 61822
(217) 452-1913
www.rcmodels.org/csm/csm_simulator.htm
\$159.95

Minimum computer requirements:

Operating system: DOS 4.00 or later or Windows 95
Processor: Pentium 120 or faster
Memory (RAM): 1 MB
Hard-drive space: —
Video card: Fully VESA compatible (Version 1.02) SVGA with 1 MB of VRAM
Other: Parallel port

Easyfly:

Ikarus USA
5876 Enterprise Pkwy.
Billy Creek Commerce Center
Fort Myers FL 33905
(239) 690-0003
<http://ipacs.de/easyfly/>
\$69 for software with transmitter interface

Minimum computer requirements:

Operating system: Windows 95/98/ME/2000/XP with DirectX version 8.0a or higher
Processor: 100% Pentium II compatible with at least 300 MHz
Memory (RAM): 32 MB
Hard-drive Space: 20 MB
Video card: OpenGL ICD-compatible graphic card with at least 8 MB
Other: CD-ROM drive; if joystick control, 100% DirectX-compatible joystick; if transmitter interface control, serial port and transmitter with trainer port

Piccofly:

Ikarus USA
5876 Enterprise Pkwy.
Billy Creek Commerce Center
Fort Myers FL 33905
(239) 690-0003
<http://ipacs.de/piccofly/>
\$64.90 for software with transmitter interface

Minimum computer requirements:

Operating system: Windows 95/98/ME/2000/XP with DirectX version 8.0a or higher
Processor: 100% Pentium II compatible with at least 300 MHz
Memory (RAM): 32 MB
Hard-drive space: 20 MB
Video card: OpenGL ICD-compatible graphic card with at least 16 MB
Other: CD-ROM drive; if joystick control, 100% DirectX-compatible joystick; if transmitter interface control, serial port and transmitter with trainer port

RCFS2001:

Dave Brown Products
4560 Layhigh Rd.
Hamilton OH 45014
(513) 738-1576
www.dbproducts.com
\$139.95

Minimum computer requirements:

Operating system: Windows 95/98/2000/XP/ME
Processor: Pentium 266 MMX (or equivalent)
Memory (RAM): 16 MB
Hard-drive space: 50 MB
Video card: 4 MB 3D graphics accelerator (with Direct-X support)
Other: Gameport, 4X CD-ROM drive

RC Plane Master:

RealityCraft Limited UK
North Lodge
Capel Dewl
Aberystwyth
Ceredigion
SY23 3HR
UK

www.realitycraft.com/

\$47.50 for software only

Minimum computer requirements:

Operating system: Windows 95/98/ME/2000/XP
Processor: 300 MHz Intel Pentium or equivalent processor
Memory (RAM): 64 MB
Hard-drive space: 25 MB
Video card: DirectX 8-compatible 3D Accelerated Graphics Card with 8 MB video memory
Other: —

RealFlight G2:

Great Planes Model Distributors
Box 9021
Champaign IL 61826
www.realflight.com
\$199.95

Minimum computer requirements:

Operating system: Windows XP/2000/ME/98 (local administrator access required)
Processor: Intel Pentium 300 or equivalent
Memory (RAM): 64 MB
Hard-drive space: 500 MB
Video card: 3D accelerated Direct X with 8 MB
Other: USB Port, 4X CD-ROM drive

RealFlight G2 Lite:

Great Planes Model Distributors
Box 9021
Champaign IL 61826
www.realflight.com
\$129.99

Minimum computer requirements:

Operating system: Windows XP/2000/ME/98 (local administrator access required)
Processor: Intel Pentium 300 or equivalent

Memory (RAM): 64 MB
Hard-drive space: 500 MB
Video card: 3D accelerated Direct X with 8 MB
Other: USB Port, 4X CD-ROM drive

Reflex R/C Simulator:

Great Planes Model Distributors
Box 9021
Champaign IL 61826
www.hobbico.com

Price to be announced

Minimum computer requirements:

Operating system: Windows 98/ME/2000/XP

Processor: Intel P3 600+

Memory (RAM): 32 MB

Hard-drive space: 25 MB

Video card: DirectX compatible with 8 MB

Other: CD-ROM drive, USB Port, four-channel+ FM radio with trainer port

Ripmax RC Simulator:

Great Planes Model Distributors
Box 9021
Champaign IL 61826
www.greatplanes.com

\$49.99 for software with interface, \$14.99 for software only

Minimum computer requirements:

Operating system: Windows 95/98/ME-compatible computer system (including DirectX 7)

Processor: 300 MHz Intel Pentium compatible

Memory (RAM): 32 MB

Hard-drive space: 50 MB

Video card: 3D video card with 4 MB RAM

Other: Gameport

Tru-Flite:

Miniature Aircraft
31713 Long Acres Dr.
Sorrento FL 32776
(352) 383-3201

Fax: (407) 292-4296

minair@earthlink.net

www.x-cellrhelicopters.com

www.tru-flite.co.uk/simulator.htm

\$189.95

Minimum computer requirements:

Operating system: Windows 95 with DirectX (7.0 or higher)/98/ME/XP/2000

Processor: Pentium 400 MHz

Memory (RAM): 64 MB

Hard-drive space: 25 MB

Video card: 3D-capable video card with 16 MB or higher onboard video memory

Other: Spare 9- or 25-pin serial port or spare USB port, depending on hardware version you require; compatible radio-control transmitter in PPM mode with buddy box or DSC socket.