

Why and how use a model flight simulator?

This is a collection of knowledge and hints in a question-and-answer style. It's meant for those who want to learn model flying and wonder what a simulator would help. Questions asked in Web forums are answered and some not asked as well. Please read sequentially at least for the first time.

Simulator?

Q: Do I really need a simulator?

A: No, but you will want one. It really helps you learning faster, avoiding frustration, and saving money – assumed you want to learn model flying. And it really helps you gathering lots of stick time for practice or just for fun – assumed you just like model flying. Finally, it's a tool for regularly brushing up the skills you'd need in an emergency – in reality.

Q: Isn't a simulator a computer game?

A: You might see it that way. But maybe you'd find a good simulator a too expensive game for 100 or even 200 bucks. And why should more than three top simulators worldwide compete for realistic flight behavior if it were just for a game?

Q: So why use a simulator?

A: The short answer is because we can do things in a simulator we can't do in reality. The long answer is a list of these things:

- Fly in an environment perfectly suited to learning.
Think of a nice landscape, fine weather, no wind, sunshine from behind, a huge area of mowed lawn or a big tarmac runway, and no other people bothering you.
- Fly a perfectly set-up model.
Is your real model built symmetrical, is the center of gravity in it's centerline and the right amount behind the wing's leading edge? Are all controls linked without slop and deflecting the right amount?
- Crash a model without cost.
You'll lose no money for spare parts and repair and no time for going back home and repairing. You press a key or just wait for the virtual model coming back intact. Learn from your mistakes.

Or the other way around:

- Fly in an adverse environment.
Learn to land in gusty crosswinds. Find out how easy it's to lose a model in bad visibility, backlight, or distance. Trees can be so

attractive for your model, like a magnet! Why is the runway so short and narrow, and wasn't there a centerline? Why should you avoid to fly over your buddies' heads in the pits, and why should you stay in the aerobatics box? Try it out!

- Fly an unruly model.
Did you fill the tank or charge the battery before flight? Good, but be aware of engine failure, especially with multi-engine models. Do you know what flight behavior you get from sloppy control linkages? What does a rear center of gravity mean? How about a C/G slightly left or right of the centerline? How to fly a heavy and/or poorly powered model, or an overpowered one?
- Avoid any crash.
Not flying is absolutely safe, flying is risky – more or less. Practice risky situations you would never try in reality. Practice until you're safe also in reality.

Yet another aspect:

- Fly virtually when you can't really.
Rain, snow? Cold or dark? Windy? How long is the summer, and how often the weather is fine? No gym to fly in?
- Fly more.
No refueling or battery charging, no driving to the field and back, no model assembly and disassembly. No building, covering, cleaning repairing, engine break-in. Just installing the simulator on your PC, starting the program, and flying. Even if you are short of time.
- Fly expensive.
How many different models can you afford? Ever owned a jet powered model, or could borrow one? Where's the nearest really good airfield?

Chances are that you'll have most of your flight time in the simulator. Just that's why the rest in reality will be more (or most) rewarding. This rest isn't smaller than without a simulator, virtual flight time is in addition (at least if you don't become a simulator addict).

Q: But why not simply get by with some fun flying in reality?

A: Good point. But maybe there is fun only if you are a proficient flier, and what do you think how many hundreds of hours stick time you will need to become one? A simulator will get you to the fun stage soon.

Q: What are you talking about?

A: Model flying. A simulator is just a tool and won't tell you what it is. Read about it (see next section), ask people who know how to do it, search for help. Then come back and try simulators.

Q: But isn't a simulator too easy to be prepared for reality?

A: It even has to be easier than reality in the first place, that's how it makes it easier to learn the basics. After that, a good simulator lets you add many troubles (gusty wind, vicious model – just re-read my third answer above), even more than you will likely experience in reality. That's how it makes you ready for reality, or rather you have to use it sensibly for that. Only a moron would fly in reality after learning the basics only.

Q: What about the adrenaline factor I heard of?

A: Yes, it does exist. It means you are more nervous in reality so you will make more mistakes. It does *not* mean, though, that the simulator is useless – just the contrary: What do you think how high your adrenaline level would be without having practiced in the simulator? Same point as in the previous answer (and same advice – just re-read my third answer above): The simulator makes you ready for flying in reality, it's well-nigh meant to *lower* your adrenaline level in reality.

Q: So you think a simulator is realistic?

A: Simply yes. From the outset, simulators have been realistic enough for learning. Even the really primitive simulators of the 1980s *had been made* to replace the dangerous (and costly) first 80% of learning in reality. Today they are good enough for any practical purposes.

Q: Why is it that the simulator seems to be different from reality then?

A: It's the visual impression. Even if a simulator model behaves like a real one, its flight behavior may be *perceived* as different. That's hard to believe but an empirical fact. The simulator's camera is set to wide-angle to have some field-of-view for orientation, but now the model seems to be smaller than in reality. Still the field-of-view is by far not as large as in reality and the scenery is moved in front of your unmoved eyes. With a VR headset, you have a wider field-of-view, move your eyes, turn your head and even your whole body standing on your feet – like on the flying field. So with modern VR headsets for better visual impression and looking around, even *perceived* realism may approach the 100% mark.

Q: So should I use a simulator without a VR headset after all?

A: Yes, you should! There are still so many benefits even by a – visually – simple simulator. Just see it as the tool that it is and use it sensibly. If you intensely learn in the simulator you may get a reality shock when exposed to real flying circumstances. Then again, if you learn extensively – in as many different circumstances as possible in the simulator – you won't be surprised by the visual circumstances in reality – they will be new to you but just yet other circumstances in which you successfully fly the model.
Be cool!

Make up your mind!

Q: How should I learn to fly helicopters?

A: By visiting a helicopter flying school. Seriously! I recommend [Michael Pfenning's Heli School](#) and [John Salt's Flight School](#). There's not really new (1995 – 1997) but still valid [technical information](#) by Colin Mill, creator of the early but very realistic CSM model helicopter simulator. The following general information is valid also for helis. Then comes information applying to airplanes only, but finally my own helicopter simulator experiences are described in a comprehensive chapter (beginning at page [40](#)).

Q: Where should I look for learning to fly airplanes then?

A: Instead of reading books to learn the basics of model flying, you may visit the [AMA Flight School website](#) or the [R/C Airplane World website](#). You should visit [Ed Moorman's RC University](#). Years ago, he was running a very good website where he offered a wealth of information in a pragmatic manner. Thanks to the Way Back Machine, we can still read his articles. You should also take some interest in [how to fly aerobatics](#).

Q: Should I really learn aerobatics as a beginner?

A: Sure. That doesn't mean the so-called 3D aerobatics, which have little in common with normal flying. Old-school aerobatics are just a high skill level of normal flying, including landings. You'll get to know the limits of your model and your own limits as well. You'll acquire reflexes which might help you out of trouble. And you might even become a really good pilot if you master [low power aerobatics](#).

Q: Do I need an expensive simulator?

A: It depends. If you're a rank beginner, a cheap or even free simulator (R/C Desk Pilot, PicaSim) will suffice, even though you might appreciate a better and more expensive one. But before you go to reality you'll just need one because you won't really learn landings without one.

Especially for slope soaring and thermaling, there are very good free simulators (sss, PicaSim, and crrcsim). But if you want to fly powered models and fly realistically and precisely or to the limits, you'll need one of the more expensive ones (REFLEX XTR², aeroflyRC, RealFlight) or [SeligSIM](#) (formerly FS One), which is free (since 2022) but has no helicopters.

Q: So which one do you recommend?

A: REFLEX XTR². This is no ad, I'm not paid by them. It's just that I'm expert in REFLEX XTR² and able to guarantee that it's very well suited to learning and practicing. (And it's easily available in a [web shop](#).)

Q: Is REFLEX XTR² the best simulator?

A: I just don't know. As much as I'm expert in REFLEX XTR² as little I know about the other simulators. But that's not the point. REFLEX XTR² is very well suited – no doubt at all. You might take one of the other simulators as well, but in that case I couldn't help you anymore.

Q: But why not use an even better simulator?

A: Nobody knows what the best simulator is. No simulator is completely true to reality, it's only similar, hence the name. All great simulators have their strengths and weaknesses, but you would notice these only as an experienced pilot, if at all. REFLEX XTR² is primarily meant to be a tool for learning and practicing. There are no gimmicks just for fun, but the learning environment is nearly perfect.

Q: What makes for a good learning environment?

A: It must make you believe it's real. That actually says it all but still has to be explained. Of course, the flight physics must render all aspects of a model's flight behavior. You would wonder how much you are influenced also by a model's appearance, which therefore should be rendered nearly photo-realistic. Even the model's sound is important for your experience. Last but not least, the scenery should show all objects on the ground and in the sky with realistic lighting and other physical properties. All that does not have to be perfect, just good enough to make you feel like in reality and concentrate on your flying skills.

Q: What about people complaining of bad flight characteristics?

A: They might be even right. There are quite a few bad models for REFLEX XTR², but that doesn't mean the simulator is bad. It's just very hard to render a model's flight characteristics correctly, and most people don't want to do such hard. Even some models coming with REFLEX XTR² are not perfect. Actually, the really hard part is to avoid the self-delusion adjusting flight characteristics you wish to be real. This, in general, will need measurements, aerodynamic calculations and/or the real model for comparison – and a clear and unbiased mind, at least as far as possible.

Q: You mean the simulator is good but only the models are bad?

A: Not quite. On the one hand, no simulator is perfect and should get better with every new version. REFLEX XTR² is by far good enough for learning and practicing purposes and has the potential for really good models – there are just not that many. On the other hand, there are even several models by far good enough for learning and practicing purposes – you just have to find them.

Q: And where can I find these good models for REFLEX XTR²?

A: You just found some – no kidding! What do you think why I wrote this text? Obviously, because I have to offer something you should notice. It's the chance to learn and practice flying model airplanes in a simulator – even if it's just REFLEX XTR² and not another one. See the last section at page [57](#) for ready-made packages with beginner and trainer models and look at [my download page](#) for these beginner and trainer models as well as for more advanced models.

Q: Why should I believe that?

A: You don't have to believe – just try! It's only an offer to use my models. If you still wonder if you should buy REFLEX XTR², you have the opportunity to try it before in a [free trial period](#). It may help you knowing that even though I'm not a professional, I professionally built and adjusted my models. (In fact, I'm a full-scale pilot and flight instructor and an engineer and very critical.) And there are even more good models.

Q: But you don't have my model for the simulator, or do you?

A: Most likely not, but that doesn't matter at all. If you have one of the common trainer models, you will find a close match for the simulator. If you even have a more advanced model that you won't be able to fly yet, you shouldn't think the simulator is just right to learn flying that model without further ado. You have to generally learn flying in the first place, and you will be glad to find very typical models for each learning step in the simulator. It will help you immensely to master just different models step by step, one after the other. In the end, flying your model in reality will be a piece of cake for you. Only if you are a professional practicing for contests you *may* need an exact copy of your real model in the simulator.

Q: There is even my model for the simulator, but why is it not realistic?

A: You mean it doesn't fly like your real model? Wait a minute! There are several possible reasons: (1) It's a bad simulator model. (2) It's good but set up differently, most likely intentionally. You might wonder at how different the same model can behave. (3) You only think it's not realistic because your impression of a model's flight behavior is different in the simulator. (4) You expect the model to behave in a certain way, but you are plain wrong. You are a beginner and just not yet able to criticize that. Find out *why* models behave differently, and why their owners might even want that, then you can. Learn flying!

Be prepared!

Q: What's needed?

A: You need the Simulator and an R/C transmitter (TX). Of course, you must have a PC with good 3D video (this does not mean stereo view) and a fast display. Any PC suited for computer games is good. Avoid the very simple TXs and buy a reasonably priced "computer TX" with expo, simple mixers, and at least 6 channels. It will do nearly all tricks you'll ever want to do. Simulator is REFLEX XTR², for which you need a game-controller compatible interface to connect the TX to the PC. Nowadays these are preferably wireless, effectively a receiver in or on a USB stick.

Q: Anything more needed?

A: Indeed, additionally you'll need some basic computer skills. Installing REFLEX XTR² is easy. You have to check the prerequisites before and select a suitable graphics mode after. Selecting one of the pre-installed models and sceneries is easy, too. To select one of my models, though, you have to download and install it before. See the last section at page [57](#) for how to easily download and install ready-made packages with beginner and trainer models. Learn these skills before trying the simulator.

Q: How should I begin?

A: Hook up the TX to the PC using the USB interface. Switch on your transmitter and start the simulator. Follow the instructions to calibrate and assign controls. It should work, but otherwise you have to read the REFLEX XTR² help and your TX's manual. Maybe you also have to adjust your TX's mode.

Q: What the heck is MODE?

A: It's the way the airplane's controls are assigned to the TX's two sticks. There are standard modes numbered 1 to 4 (or even more). Basically, it's about ailerons, elevator, rudder and throttle (power) of the model and the two sticks of the TX. You may look [here](#) in the Web for basic information.

Q: What mode should I choose?

A: A lot of people are happy with mode 2, which means the "primary" controls (aileron and elevator) on the right stick and the "secondary" controls (rudder and throttle) on the left one. That will allow flying with one hand only. Presumably you'll like that because it's easier to coordinate the two primary controls with only one hand and that should be your dominant hand. Left-handers please read [Ed Moorman's hints](#), but they are very interesting for right-handers, too.

Q: Isn't mode 1 better?

A: Some people claim so. It means rudder and aileron exchanged. It's intended that the primary controls are separated so they don't influence each other. This should make for more precise flying and could pay if you're an experienced and skilled pilot, maybe flying jet models requiring precise control inputs. But I think in most cases these are not required and it's harder to learn in mode 1. You might nevertheless try it; it's all up to you.

Q: How to hold the transmitter?

A: Good question, but how to hold the sticks? Some aficionados have a TX with a big desk case. They rest their hands on it and hold the sticks between thumb and index finger. Some do that even without a desk case suspending their transmitter from a neckstrap. They are striving for precision, several even using elongated sticks. I think that's overkill at least for a beginner. You should have a lightweight handheld TX with short thumb sticks. Hold it relaxed and let your thumb tips rest easily on the stick tops (which are toothed to this end).

Q: Do these decisions fix me forever?

A: No, they are only likely to stay unchanged. You won't depend much on these things with time and practice. You might switch to a different mode later, and even though it may feel hard to re-learn, it will be easier than the initial learning. You might switch to a long-stick desk-case TX without any effort. But even world champions are using handheld thumb-stick TXs in mode 2. World-known glider champion Joe Wurts is able to steer with his big toe, and there's a guy who is able to fly helicopter aerobatics while riding a monocycle. There are many aims to strive for.

Q: What's going on now?

A: Keep it simple (if you're not stupid)! Forget all these complicated things and, above all, try to stay relaxed. Watch yourself! If you are making mistakes you are most likely not relaxed. If your hands are clenched and your thumb tips become white, something is wrong. Of course, in reality you just can't stay cool because there is some real risk. One nice thing about a simulator is that there is just *no* risk and you really *can* stay cool. Relax and notice you're flying better and making fewer mistakes. Now you're ready to fly.

Let's go flying!

Q: Which model to begin?

A: You should know the basics, what the upper and lower side of an airplane is, what side is front and what side is rear. Take for granted that there's a propeller up front and avoid planes being different. There are still plenty of nice models you could be tempted to try. Do yourself a favor, control yourself, take the cheapest, simplest, and ugliest model we have for REFLEX XTR², as you should do in reality. Take the GWS Slow Stick!

Q: Ready now?

A: Not quite – mind the environment! Familiarize yourself with the simulator's scenery and simulation settings. Select a scenery you like, but pay attention to the lighting and the surroundings. Imagine what backlight or fences and trees could do? Set wind and thermals to zero, what means absolutely calm weather. Set camera zoom to zero and camera field-of-view to 90 degrees. Set full-screen mode and your display's native resolution. Select a model position you like. Set the most easy conditions for your first steps – ah, flights.

Q: But now?

A: Yes! The Slow Stick in front of you in your favorite scenery, nice and calm weather – but wait!

First, pull the throttle stick back, then switch the TX on and hit F4 or double-click in the window to start the simulation.

Slow Stick is not only an electric model but also a so-called rudder-and-elevator one (or RET for rudder, elevator, and throttle). It has no ailerons but is flown with rudder instead. We want to have the main controls assigned to the right stick of the TX. Your "computer" TX has a switch called "combi" or similarly. Now you have to set it "on" so any aileron movement with the right stick will automatically move the rudder. You may have to set this behavior in the TX before.

Q: Anything else?

A: You're so patient! Now simply set full power with the left stick and let the model gain some height. Then gently take the power stick back to less than 50% and wait a few seconds. The model will establish on a straight and level flight path. Let the left stick alone and use only the right stick. Any control input will disturb the model, but you'll want to fly some turns.

Q: So how can I do it?

A: Try with rudder, but very carefully – that means start with very small stick deflections and watch what will happen. The model will make only wide turns, but with bigger deflections it will go out of control. At least it will drop its nose and get faster. Now you know what the elevator is for. Pull it really carefully to hold the model's nose up. If you've overdone just release the elevator and wait for the model calming down. Even if not flying turns you may need the elevator to maintain level flight. Practice!

Q: Is it really so easy?

A: So far, but remember landing. There's enough flight time to prepare for this highlight of each flight, but you *should* prepare. Try to line up the model with the "runway". Even if there's no runway at all you should imagine one in the scenery. In the simulator, it's harder to keep orientation than in reality. If you don't manage to line up the model, go around and try again, as often as you need.

Q: And now?

A: The model is flying in the direction of your runway at some moderate altitude and at some distance from the intended touch-down point. You didn't intend to touch down on a certain point? You'd better do, but for now just cut power and watch what will happen. The model should commence a glide and eventually settle on the ground on its own.

Q: Didn't you say landing is hard?

A: Yes, that's right, but didn't you notice that Slow Stick did it for you? Actually, it plopped down. You have to help it making a smoother, which is a better landing. Anyway, it's your task now to practice what is called traffic patterns – take-off, climb, departure leg, downwind, base leg, approach, landing. And landing *is* the highlight of each flight because it will turn out well only if the preceding steps succeed. So practice landings as much as you can – and be demanding!

Q: Any hints?

A: Of course. Remember you're the only reason for the model to behave strangely. So try to curb your movements on the sticks, the model is still better than you. On the other hand, many beginners only *pull* the elevator. You might also use down elevator to correct a strange attitude of the model. Whatever, pay attention to the model's attitude, which means its inclination, and its effects. You should notice that the elevator controls the model's attitude and thus altitude in level flight (with cruise power) but speed in glide (idle) and climb (full power). Learn to only direct the model's movements by its attitude, not to move it directly yourself.

Q: Slow Stick is boring, what next?

A: If you feel perfect try walking over water! Are you really able to fly a precise traffic pattern and land smoothly? Every time without any error? OK, you don't have to be perfect, but be demanding and self-critical! You may step forward and try another model, but be prepared to step back if you couldn't handle it. You want to learn model flying, but I can't really help you. You must help yourself and should not overstretch your abilities. Find out your talent and behave accordingly. Have fun!

More flying!

Q: Couldn't I fly in reality now?

A: If you have a Slow Stick and the weather is really calm, why not? But for now you only learned to fly a Slow Stick and not to fly generally. You don't know what even the lightest wind would do to your model, and you are used only to your virtual flying field. You need to generalize your skills.

Q: What do you mean?

A: Vary virtually every parameter of your flying situation. Take different models, fly on different fields, even some with adverse lighting conditions and obstacles, set wind and gusts, try crosswind of different strength, try landing in thermals, try wrong center of gravity and sloppy control linkages of the model. By varying only one parameter at the same time, you'll soon master it's effects. By combining two or more parameters you'll come closer to real situations.

Q: So should I be perfect before going to reality after all?

A: Remember a fact of life known as the Pareto law. In my words: You'd need only 20% of the time required to become perfect to reach yet 80% of perfection. You'd have to practice the other 80% of time to become a perfect pilot and maybe world champion. But 80% of perfection will be enough for most of all practical purposes. You might still wonder how long the 20% of time really are.

Q: How do I recognize these 80% of perfection?

A: Just answer yourself some simple questions: Is my real model less demanding than the models mastered in the simulator? Is the real flying field better than the ones used in the simulator? Is the real weather better than the simulated you tried successfully? Better should be really better and not only equally good because you have to allow for the "adrenaline factor". You just can't hit a "Del" key and have a new model after a crash

in reality. But if you are really able to answer these questions (not only guessing) and all answers are "yes", then go out flying! There's nothing better and more satisfactory. Learn to answer these questions and avoid sitting in front of your PC when real flying conditions are good.

Q: What next model do you recommend?

A: Good question. Next step could be the Miss 2 parkflyer. It's not as lightweight and slow as a slowflyer but it will take some wind. Rudder and elevator are so small that you may panic and the model will still stay calm despite of full control deflection. The power-to-weight ratio is low for the same reason. The same is true for Graupner Taxi, which is a glow-powered model but which is even faster due to its weight. If you can fly and land these two, try Brummi parkflyer, which is essentially the same as Miss 2 but has bigger controls. You might appreciate the better controllability when exploring thermals.

Q: What next, come on!

A: Did you practice all the new things mentioned in the previous paragraph? OK, now it's time to try ailerons. It's not about one more stick function. Actually, rudder is now *replaced* by aileron, and you'll feel how *real* flying is at all. Steering with rudder was facilitation as far as the model was sluggish. Steering, or more correctly controlling, with ailerons makes the model twitchier. Compare the Super Miss to Miss 2 and even Brummi and compare Calmato 40 Trainer to Taxi. You don't have to apply rudder because it could be actuated automatically by combi mixer (Super Miss) or is replaced by aileron differential (Calmato 40 Trainer).

Q: What next models do you recommend?

A: The most well balanced model might be Taxi with ailerons and flaps. It's rock-steady and will teach you flap landings and basic aerobatics. Calmato 40 Trainer is a good and common trainer but a bit twitchier. Super Miss is a very capable but twitchy enhancement of Brummi. Now or as your first aileron model you should try Das Ugly Stik in the mild version. You'll learn to fly a somewhat heavy and sluggish model and low-power aerobatics including inverted maneuvers. The wild and especially the hot-rod version will show you complete classic aerobatics including spins and snap rolls but still land like a trainer. Only after mastering this you should try a low-wing model. Kwik-Fli Mark III and Mark IV will teach you not only just aerobatics but also a decent flying style. It's a long way to a classic aerobatic sports model!

Q: Why do you recommend so many different models?

A: Well, if you like a change it's always good to practice with different models. You will learn the essence of flying by seeing what is specific to a model and what is flying in general. If you like constancy you might as

well use one single model to learn all aspects of normal flying. I made the WingMaster in a basic and acro version for this purpose. You will learn with ailerons from the beginning and won't have to get used to new conditions. WingMaster shows the essence of flying because it behaves so typical. After mastering basic aerobatics, you may change directly to the Ugly Stik and after that to the Kwik-Fli. That would be a classical way, the WingMaster being your first model, Ugly Stik the second, and Kwik-Fli the third and the first low-winger.

More model airplanes!

Here we stop the question-and-answer play and start looking at some airplanes and what they can teach us. You might additionally go to the [AMA Flight School website](#) and to the [R/C Airplane World website](#) for more information and help.

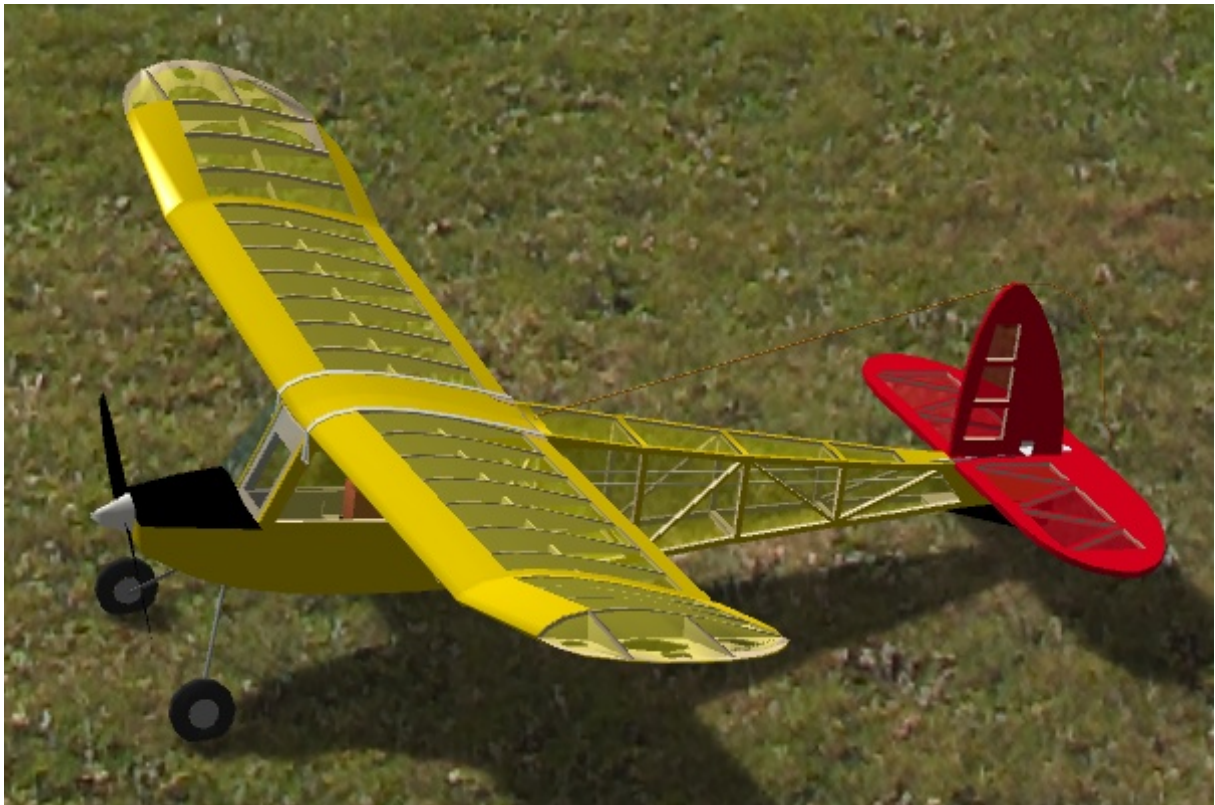
The last section at page [57](#) holds detailed instructions to download and install ready-made packages with all models presented here.

Why and how use a model flight simulator?

Slow Stick



Miss 2



Why and how use a model flight simulator?

Brummi



Super Miss



Taxi

This was a very well known beginner model by market-leading company Graupner (at least in Germany) from 1966 till the 1980s. As usual back then, it has no ailerons. It's very solid and sturdy and rock-stable in flight. It may be over-loaded and will still fly well. This excellent REFLEX XTR² model was made by Bo (Jörgen) Strömberg.



The model glides well and will teach you a decent speed management on approach for landing. It floats on landing and gives you time to observe what's going on and to practice a correct flare without ballooning. These abilities are basic for all further flying.

Just for entertainment, you may come back later and try some crude aerobatics. In the old days when R/C equipment was expensive, many modelers had only rudder-and-elevator planes. Nevertheless they did rolls and stall turns with them.

Bo Strömberg even made a low-dihedral version with ailerons and flaps. It's nice for learning to handle these things and even for real basic aerobatics.

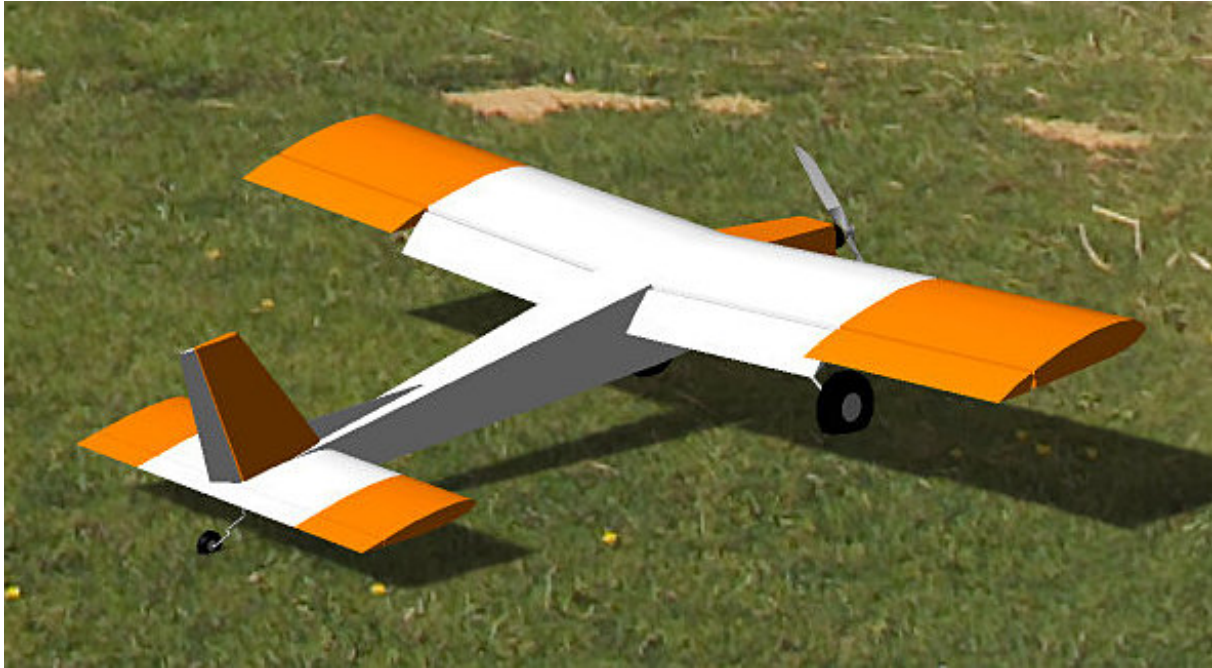
Why and how use a model flight simulator?

Calmato 40 Trainer



WingMaster

Actually, this is not a real model but only a virtual one. Originally a mere rudder-and-throttle (RT) model built in reality in the late 1960s after a design sketch, the full-fledged electric version in the simulator is now an excellent beginner model (and might be even in reality).



It may be the very first model to be used in the simulator and will teach real flying with ailerons from the beginning. All aspects of normal flying can be practiced like take-off and landing, climb and descent, level flight and turns. Standard maneuvers like traffic patterns, holding patterns, landing approaches, and touch-and-goes are easy to learn with this calm and steady flying airplane.

There are no bad habits at all. No rudder is needed against adverse yaw, no top aileron in turns, though both still won't hurt. There will be no tip stall and even no stall at all. But the flaps may be deployed to make the model fly as slow and land (nearly) as short as a parkflyer.

And the model is able to fly basic aerobatics, namely loops, rolls, and stall turns, and even to fly inverted. Of course, spins and snap rolls are not possible though some other stunts like sideslip or tailslide. And the model will stay unswerving even in gusty wind. Therefore it's easier to handle than a slowflyer or parkflyer.

So this airplane might be a dependable companion from the very beginning to the point where you mastered all aspects of normal flying even in adverse conditions. The model makes this as easy as possible. Now you would look for a model capable to do real aerobatics but just as well behaved. Yet be prepared there are also vicious models which would take you by surprise with their behavior.

Why and how use a model flight simulator?

Just for a bit of variety, you could try the FoolProof and compare it to the WingMaster. (Both are only simulator models, not real ones, and I chose both names.) FoolProof is kind of a generic trainer model of the 1960s, which is here modernized with all controls, flaps, and an electric motor.



Both models are rather similar but FoolProof has a more slender wing with a different cross-section profile (airfoil). The latter makes it virtually unable to fly inverted but it makes for good short take-off and landing (STOL) capability. The strong motor lets the airplane climb steeply and the flaps let it sink steeply. So just doing take-offs and landings could be real fun with this model, even more than with WingMaster.

And just note that this model is more responsive to elevator as well as to gusts (try setting some wind, hit F6 in REFLEX) and glides better than WingMaster. Just a bit, but you may notice it...

Telemaster

The well-known German designer Karl-Heinz Denzin designed this model in the late 1960s. It was produced in three sizes of which the biggest, *Senior* Telemaster, became popular especially due to its size. Whereas most models had about 60" wingspan this one has even 95". Still it's quite lightweight so its wing loading and flight speed are rather low. Besides, it's well balanced and its flight behavior is just amazing. You may try this model as a pleasant and interesting excursion from your learning career.

The model is well suited to beginners even if not to rank beginners. See it as a WingMaster complement, not a replacement. The Telemaster has high-lift airfoils even for the horizontal stabilizer. Weight and thus wing loading are very low. So the model flies slowly, and besides very smooth and steady. It glides quite well so you'll appreciate flaps which produce some drag to make the glide path steeper. But you'll have to cope with substantial adverse yaw, either by using the transmitter's combi mixer or, even better, by flying coordinated turns (aileron-rudder coordination).



Select the "Senior .45 glow flaps" (two-stroke engine) or the "Senior RCV 58-CD flaps" (four-stroke engine) for trying. The quite small engines are well sufficient for just vivid flying. You'll experience the slow-motion flying the Senior Telemaster is known for, and its smooth flight behavior. With flaps down (30 degrees) the model is still completely under control and even climbs at full power.

Even though you might think this is a perfect beginners airplane it is not. Yes, it's slow, stable, steady, smooth, honest, but it's well balanced and neutral as well. The former makes it suited to beginners, but the latter means not to rank beginners.

Why and how use a model flight simulator?

Your excursion may go even further with the original version of this model airplane. In 1975 it was promoted by the Radio Control Modeler (RCM) magazine. Presumably they wanted to demonstrate how lightweight it is so they did a reference build to only 104 oz (2.95 kg) all-up weight with a .60 glow engine. They even tried this prototype with a small .20 engine (what made it even lighter, 92 oz / 2.61 kg) and it flew well enough.



This version is rendered here as the "RCM Senior Telemaster .20" to show you how an airplane flies whose wing loading is very low and whose drive is just powerful enough to fly well and even take-off from grass (generally called "raise off ground" – ROG – in contrast to hand launch). It has no flaps so you have to plan for long landing approaches, but you can always apply power to reach the runway if you are too low and far away. Other than that it's the same as with the previous version.

And you can always achieve a steep approach without flaps by making the airplane very slow (pulling elevator). This model stalls so gently that you can slowly and carefully pull just so much elevator that it really plummets down to the runway. To avoid a hard hit, you have to release the elevator by a certain amount before coming close to the runway so the airplane can pick up speed again, just enough to make its glide path flatter, and then flare and touch down. This pulling to make it fly steeper and pulling less to let it fly flatter again is counter-intuitive and needs getting used to!

Another, traditional way to steepen the glide path is side slip. It needs getting used to as well because it requires some coordination of controls. Start at some altitude and try full rudder deflection to one side and – nearly in unison – some aileron deflection to the opposite side (called "crossed controls"), just enough to keep a straight flight path. This will be not stable, you have to correct all along. And the airplane will lower its nose so you have to pull a bit elevator lest it will pick up speed. Stop this maneuver before coming close to the runway (just let go rudder and ailerons) to establish normal flight again, then flare and touch down.

Why and how use a model flight simulator?

A Telemaster is a utility airplane because it's easy to handle for the seasoned pilot. He wants to concentrate on the real task, which may be glider or banner tow, dropping candies, or aerial photography and video. He appreciates the slow and smooth flight and the fact that the model maintains a certain flight path, may it be a turn or straight and level.

The rank beginner needs a model that flies on its own. Even when he has upset the plane it should return to normal flight after leaving the transmitter sticks alone. As an advanced beginner, you are flying your airplane, not the airplane is flying you. So you might well explore the flight behavior of a utility airplane.



Select the "Giant electric flaps", the "Giant 26ccm gas flaps", or the "Giant FA 125A flaps" version to do this. The Giant has 12 ft wingspan whereas the Senior has only 8 ft, but the Giant has still the same wing loading as the Senior. So flight speed and landing distance are the same, but the Giant *seems* to be even much slower.

In fact, it's a real STOL airplane (Short Take-Off and Landing). The big flaps make for a lot of drag, needed for a steep descent and approach. Add to this a moderately powerful engine that makes for fast climb. Now you know how to accomplish short turnaround times in airwork.

But you will as well notice that the airplane doesn't accomplish that on its own. You have to fly it, and especially the Giant Telemaster is an excellent airplane to learn and practice STOL and airwork – as well as coordinated turns.

Now let's get back to the Senior Telemaster. Only in 2011 they brought out a modernized Version, the Senior Telemaster *Plus*. It features a wider fuselage, big ailerons, big flaps, and a different setup. The latter is the reason why it is presented here.



There is less "decalage", that is the difference between the wing's and the horizontal tail's (stab's) incidence angle. Quite big decalage makes classic Telemasters "speed-stable", meaning if you increase power to make them faster they will get not much faster (or even slower) but climb instead. And if you lower power they will get not much slower (or even faster) but descend instead. Less decalage means the *Plus* will climb not that much with more power and speed, and it will sink not that much with less power and speed. Its flight behavior tends more to "neutral".

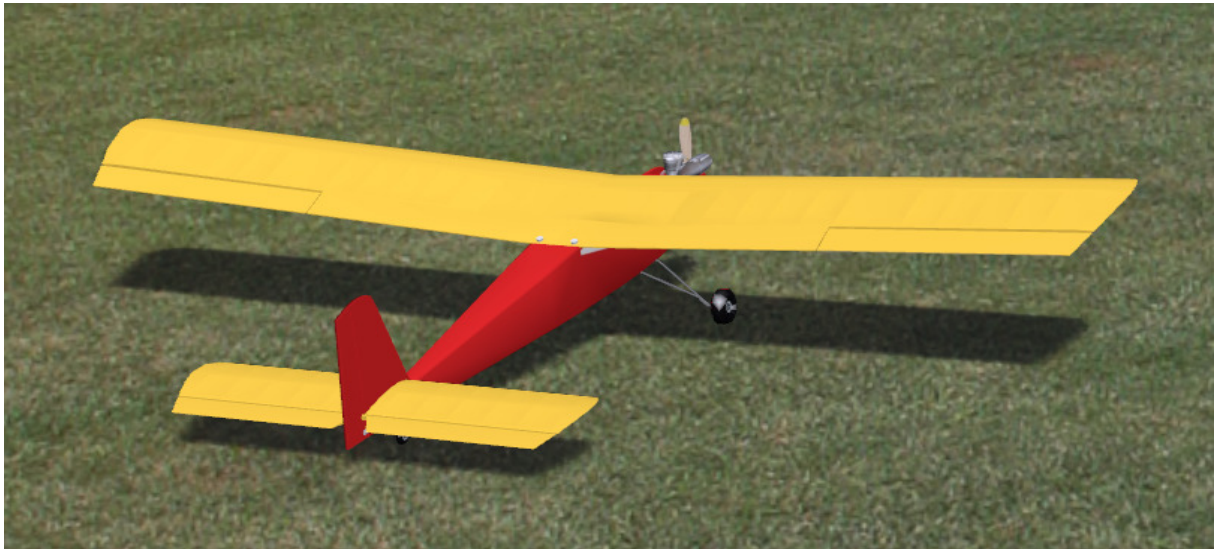
Besides, its "dihedral" (how much the wings are angled up) is half as big as that of the classic Telemasters so there is less of a kind of roll stability. You will notice that when flying turns or even circling. At bank angles of 30 degrees or more, the *Plus* tends to roll "into the turn" and needs a tad aileron deflection to the opposite direction, called "top aileron".

All that is "modern" flight behavior, it makes aerobatics easier, and the airplane is less gust-sensitive. Then again, you can't leave it alone and have to correct more frequently.

The big flaps are again good for airwork (like on the Giant Telemaster) but you can also use them to set more decalage. Deploy flaps to 20 degrees for take-off and approach or just when you want a slow-speed and speed-stable trim like with a classic Telemaster. Deploy full flaps (45 degrees) for a lot of drag in addition, used for steep descents and short landings. These are done by setting a lot of power to overcome the drag and haul the airplane to the runway, then cutting power for immediate touch-down.

Why and how use a model flight simulator?

Finally and again just for a bit of variety, you could try the original Engel Telemaster and compare it to FoolProof and WingMaster. The latter two are only simulator models, not real ones. FoolProof is what Karl-Heinz Denzin sketched as a perfect beginner model on page 11 of the 1967 Engel catalog, WingMaster is what I made of it. Both have all controls (and even flaps) here so they are comparable to the original Telemaster, which is the result of Denzin's design process in 1968: probably the first "full-house" beginner model with rudder, elevator, and ailerons.

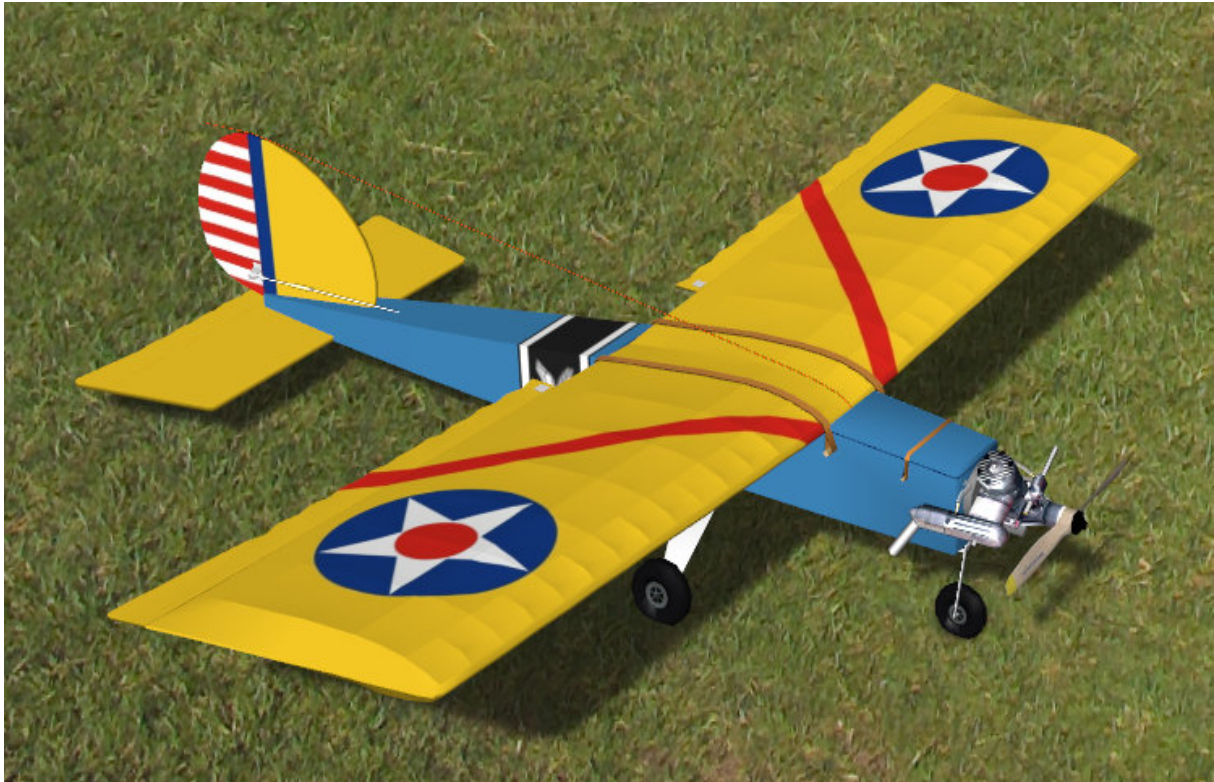


Telemaster resembles FoolProof aerodynamically while it's bigger and weighs more. Still it has a lower wing loading so it flies slower and lands easier. The difference is small but you may notice it...

That was the excursion, now back to your aerobatics learning career.

Das Ugly Stik

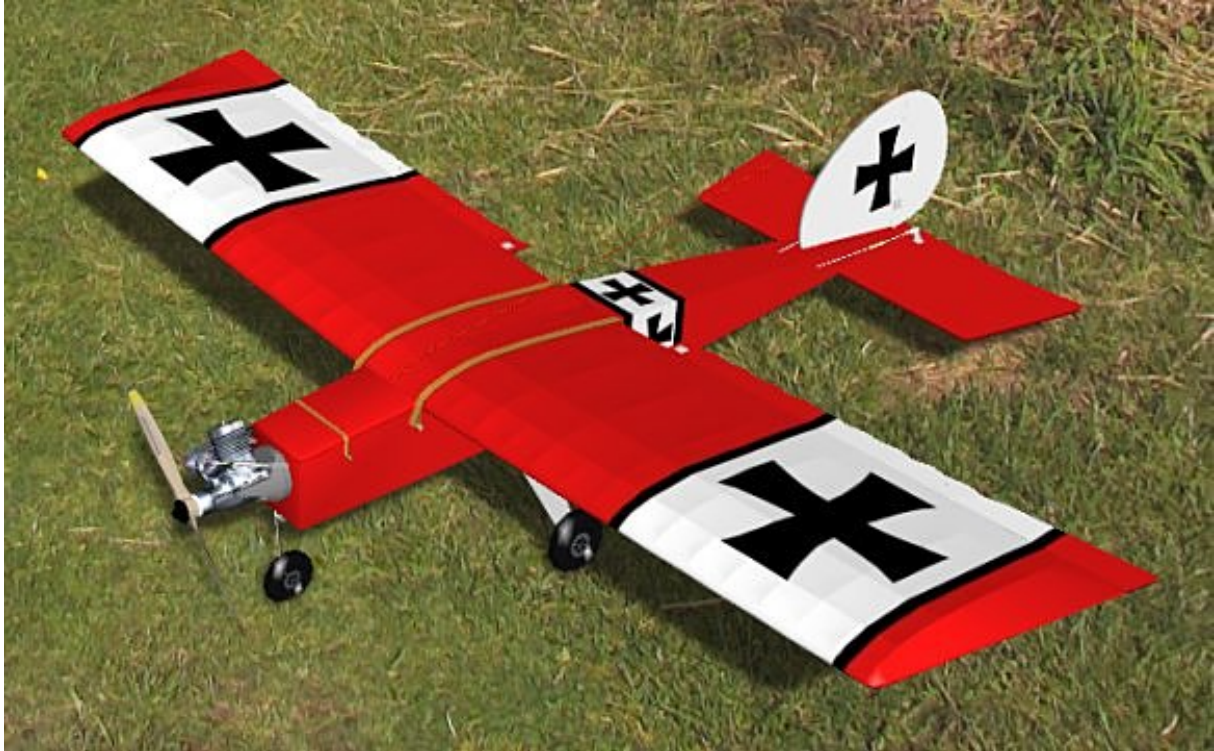
Designed 1964/1966 by the world-famous Phil Kraft and his friend George Walker, Das Ugly Stik soon became world-famous as well. It may be ugly but it flies very well. It's a simple but effective design needing no special things like flaps or retracts. Still it will teach you all main aspects of flying including classic aerobatics. It will do that in at least two steps: basic and advanced. There's a "mild" and therefore safe version, and there's a "wild" and therefore capable version.



Here it's liveried as a mild and safe basic trainer. It will stall but very well behaved. It won't spin or snap because it lacks the control authority and engine power needed for that. Even if you pull full elevator, the model will never drop the nose or a wing. So you can push it to its limits, especially on landings, without being afraid of bad consequences. This way you may really learn landings and aerobatics.

Why and how use a model flight simulator?

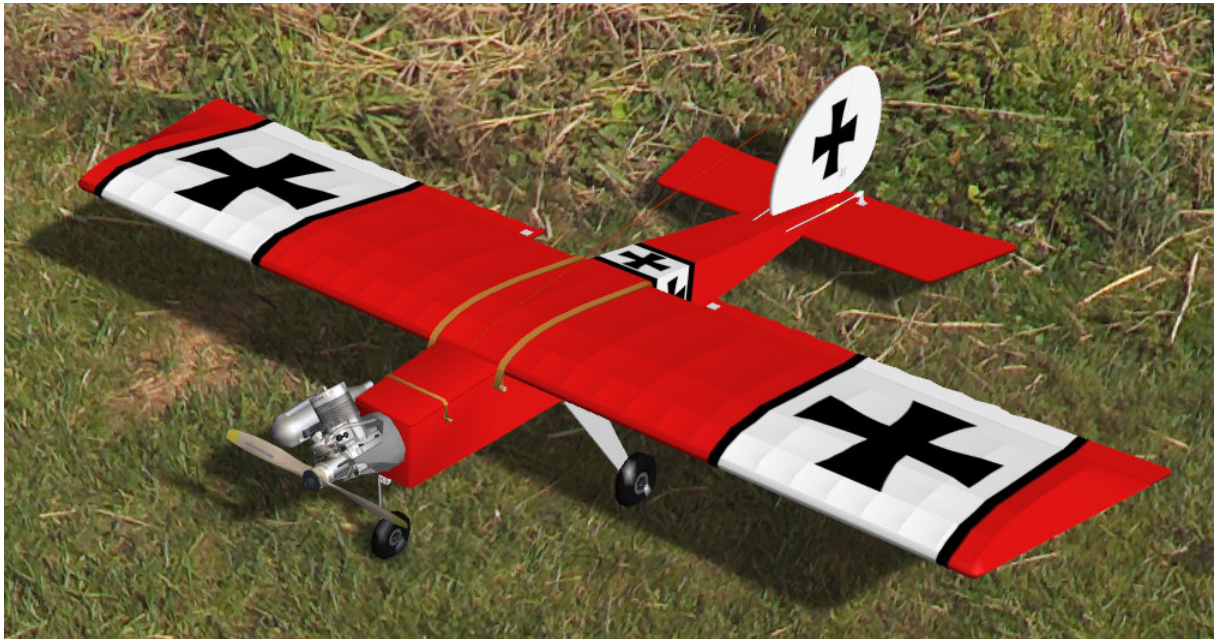
Doing so, you may later even prefer the “wild” version. The higher engine power may cause trouble if you are not used to fast flying. But if you are you will instead find the power helpful to get out of trouble, for instance to pull out of a maneuver started too low.



Here Das Ugly Stik is aptly liveried as a (sort of) wild and aggressive advanced trainer. It simply has more engine power and control throws. Main advantage is more powerful aerobatics, but still no stall maneuvers.

Why and how use a model flight simulator?

For that, there's a "hot rod" version featuring an even more powerful engine and a nearly "neutral" setup for all sorts of pattern. But this setup makes it unsuitable for a beginner.



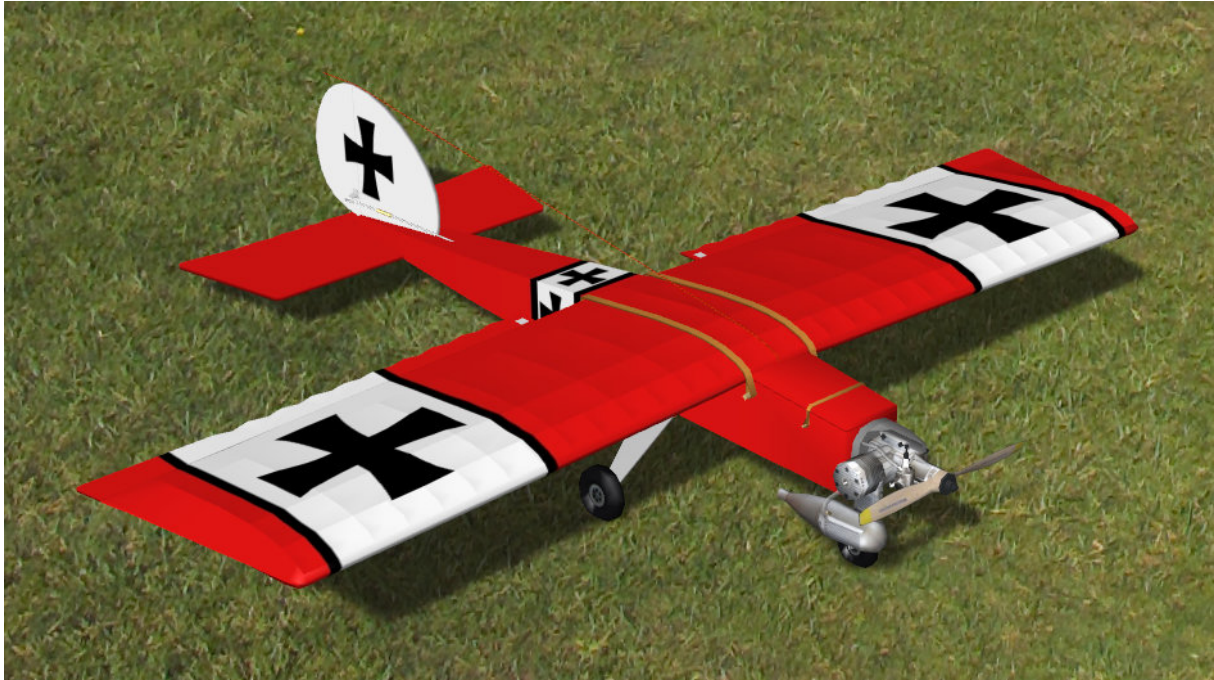
Spinning and snapping (stall maneuvers) is achieved by a trick. The rectangular wing planform and the special wingtips make for an actually tame stall behavior. So if stall happens at all it starts in the middle of the wing and proceeds to the wingtips.

But if full rudder is applied shortly before stall, one wing is swept back and will stall first. A spin is initiated by applying full rudder when approaching stall, a snap roll is initiated by applying full rudder and elevator at the same time, with the rudder slightly leading the elevator (preferably left rudder because the engine/propeller torque helps then). You can still be unconcerned on landings as long as you avoid abrupt rudder.

The straight wing (called "without *dihedral*") of this version contributes to a more "neutral" flight behavior. That means there are less couplings than with the previous versions that have dihedral: When you apply full rudder for yaw there will be only little roll – yaw-to-roll coupling. There will be also little yaw when applying ailerons – roll-to-yaw coupling, also called "adverse yaw" because when the ailerons are deflected for roll in one direction there will be yaw in the opposite direction.

Why and how use a model flight simulator?

Finally, there's a "hot rod anhedral" version. The only difference to the previous version is its wings: they are drooping by 2 degrees each (called 2 degrees *anhedral*). That virtually eliminates all couplings.



Pattern pilots say this is an airplane that flies where you point it – it does nothing on its own, not even correcting its flight attitude. That makes it actually easier to fly precise patterns, what is called precision aerobatics. At least this is a suitable trainer for it and you may try it to see if you already have a sense of the subtleties of flying.

Kwik-Fli

Phil Kraft designed the Kwik-Fli as his own competition model and won the 1967 aerobatic world championship with the Mark III version. But that doesn't mean it is out of question for you. The name doesn't imply a fast flying airplane but a model that is quickly built and thus flying soon. As a matter of fact, Kwik-Fli is a slow flying airplane with its thick wing airfoil, boxy shape, and low weight. The simple design actually contributes to good and honest flight characteristics.

After all, 1967 pattern competition wasn't that spectacular. There were no flick (snap) maneuvers, and the thick-airfoil square-planform wing makes them hard to fly. But such a wing and a low weight make a good first low-wing model. Additionally, Kwik-Fli is a remarkably smooth-flying airplane. While a "hot-rod" Ugly Stik flies all maneuvers simply by brute force, Kwik-Fli may teach you a decent and graceful flying *style*.



This is the original world championship model, but you are allowed and even encouraged to fly it in the simulator. It is very forgiving of flying mistakes and easy to land. But as all these tricycle-landing-gear models, it likes to fly from paved runways, so choose an appropriate scenery.

There are two different setups of this model. The "Mark III original" setup has the center-of-gravity and the wing incidence angle as recommended in the plan, but like most plans and kits it's over-stabilized. On the other hand, the "Mark III *crisp*" version is set up like a world-champion model, so just use this one to practice aerobatics. And there's another choice...



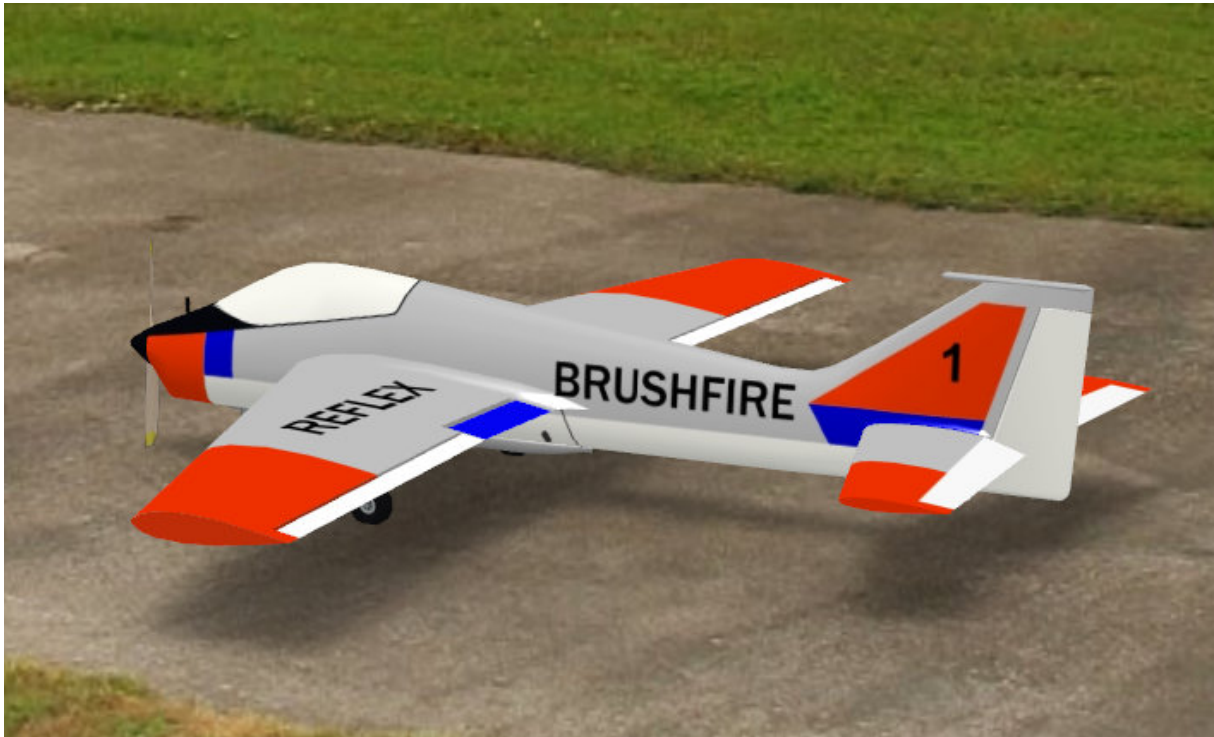
Phil Kraft designed and tried a tapered-wing version, the Mark IV, though he never used it in competition. But others appreciated the flick (snap) ability and maybe the slightly lower drag. I couldn't resist making it a modern electric sport model.

This "Mark IV electric" version flicks easily at nearly any flight speed using only elevator and rudder (the old-school method), especially because it has the suitable balance. It even flicks with elevator only, but one has to really snap it to full deflection to accomplish that. And a stall immediately stops when elevator is slightly released. Thus the model is still not vicious and is actually the better version.

Weight is only a bit higher with the strong electric drive, but speed and aerobatic performance are very good. Landings are still quite easy. You will like this model once you've mastered the Mark III.

Brushfire

Ken Bonnema designed the Brushfire as an aerobatic competition model in 1978. This was the era of the "ballistic" pattern style and the models were called "rocket ships". They flew big patterns at high speed like full-scale military jet aircraft, and the models looked a bit like those.



The engines had a tuned pipe (instead of a simple muffler) for more power and a high-pitch propeller for more speed. The landing gear was retracted in flight for less drag and smoother flying. The weight was more than 9 lb compared to less than 6 lb of the Kwik-Fli. Sometimes air brakes or flaps were used to enhance the landing behavior of the fast and heavy models.



Now why a ballistic pattern model and especially the Brushfire in a flight training course? You are quite far in your flight training now and have to experience just what a "rocket ship" does best: flying fast! Brushfire does it perfectly but is yet able to do slow landings, all without any bad habits.

Brushfire is a typical example with its jet-like shape and its swept wing and empennage. The latter is not that typical because many rocket ships had unswept wings for some reason, while the swept-wing models aimed for good roll characteristics. You will notice that with Brushfire, but maybe you won't notice that it's harder to keep track in looping maneuvers. The differences are subtle even for the expert and shouldn't bother you.

Really typical is a very "neutral" flight behavior with very few and little "couplings". Take the Kwik-Fli and apply full rudder and you'll get not only yaw but also a lot of roll and pitch – yaw-roll coupling and yaw-pitch coupling. Brushfire has very little couplings, if any. Like Kwik-Fli or even more, it will fly where you point it and fly smooth, just at low *and* high speed.

Brushfire's wing flaps were actually meant as maneuver flaps (to augment positive and negative looping maneuvers) but in the simulator they can be used as landing flaps. Anyway, due to its big wing – aided by the flaps, but also without them – Brushfire may slow down to a surprisingly low speed. Besides landing slowly, it may even fly low-speed patterns. In any case, you can be unconcerned of unintentional stalls or other bad habits – Brushfire is easy to fly. That's why it's suited to a kind of flight training.

Let's assume you are able to fly consistently precise patterns, not only aerobatic but also traffic patterns and landings. When you switch from Kwik-Fli to Brushfire, probably the airplane will be ahead of you, just too fast for you. At full throttle, it will accelerate to high speed and you won't get worked out a traffic pattern. You have to throttle back and establish on a deliberate flight path and speed.

You have to learn not only thinking faster – ahead of the airplane. You have to learn also deliberately setting and maintaining flight modes. The main means is power setting, and the main difficulty is to cope with different pitch attitude and control response. You can make good use of the flaps for approaches and landings, even though it's another complication in addition to the retractable landing gear. Such a rocket ship is a handful, even if it's well mannered and not vicious.

Then again, flying a fast model is a learned skill like others. After a bit practice you may find it very satisfying to put it through its paces, the model faithfully following your control inputs. It may scream in fast and big patterns, purr in slow and close-by patterns, do an amazingly slow traffic pattern and landing approach, and a quite slow and short landing.

By the way, a paved runway is absolutely needed.

Why and how use a model flight simulator?

You see that in the next picture where the propeller has hardly any ground clearance. Besides, the wheels are rather small (to save weight, and room for the wheel wells for retraction).



This is a modernized version for the simulator, but quite realistic. (I just fancied this paint scheme for good visibility.) It has a slightly more powerful electric drive – than the version above has – which makes for slightly less overall weight and drag. As a result, this version has more energy to spend and loses less energy in patterns what makes them smoother and easier to fly. (Higher flight speed is possible as well but irrelevant here.) You may just try and see if you notice the subtle differences (even if in only 7.5 minutes flight time).

Sundries

Landing gear

Do you wonder why vintage models have this "tricycle" landing gear? Not quite true, the Calmato 40 Trainer has it as well. But aren't modern models "taildraggers"? Again not quite true, the WingMaster is one, too. So what is the reason?

In the old times, a "full-house ship" with all controls was quite heavy because the R/C equipment was heavy. It needed a powerful engine, which not nearly gave a thrust/weight ratio of 1 though. Therefore the models were fast (three to four times as fast as a parkflyer) and aerobatics had to be flown with a momentum instead of engine power.

At high landing speed, a taildragger tends to swerve out of line because the center-of-gravity is behind the main wheels. Small obstacles on the runway can make the model go nose-over. A tricycle landing gear is steady after touch-down and prevents the model from going nose-over.

That's why the old pattern models had one; after all landing was rated in competition as part of the maneuver schedule. And that's why old beginner models had one, after all a beginner is tempted to simply push a too fast model on the runway to force the touchdown (but a forced landing is still something different). Really old or small beginner models from the 1960s were even lacking an elevator.

A taildragger has also advantages. The landing gear weighs less, has less drag and is more robust. The propeller clearance on the ground is better. And if the pilot is able to touch-down the model in a nose-high attitude, there's no swerve-out-of-line problem. If he is not able, it helps if the model flies slowly anyway. WingMaster is a taildragger because it is slow, but Calmato has a tricycle landing gear because it is faster.

Brushfire typically had a tricycle landing gear, but sometimes it was modified to a taildragger to have the nose landing gear out of the way of the tuned pipe running inside the fuselage under the wing. There's no problem because the model can do slow landings, anyway. So the choice between tricycle or taildragger may be a matter of convenience or even taste.

Flaps

Do you know what the wing flaps really do? Many model fliers dismiss them as unnecessary, and in some way they are even right. In fact you may well do without flaps, but they may come in very handy and convenient. Let's take Telemaster and Brushfire for typical examples.

Both models have big wings and don't really need more lift. On the contrary, they both glide well and you may find it hard to get them down and on the ground. That's why some fast models have air brakes to slow down and others even deflect their ailerons a bit *up* to reduce lift. So the most desired effect of flaps may be their drag, but obviously in conjunction with other desirable effects.

Think of flaps as a means to increase the wing's airfoil camber and angle-of-incidence at the same time, in effect giving more drag, lift, and decalage (the angle between wing and stabilizer). Deflections of up to 25 degrees will mainly give more lift and decalage but not much drag, while more than 30 degrees will give nearly only more drag. So even a rather small deflection of flaps will make for a new *balance* of the model.

That's why both Telemaster and Brushfire manage on rather small flaps. Their additional lift may be just big enough to compensate the down force of the horizontal stabilizer. They are just big enough to give the desired "more stable" and "slower" balance and some drag. And that's why both models behave similar even though they are very different, Telemaster being a stable high-wing floater and Brushfire a neutral mid-wing rocket.

Flap deflection shifts the lift rearward making the airplane nose-heavy, but the wing downwash hitting the horizontal stabilizer makes it tail-heavy. The thrust line above the flaps with their drag makes nose-heavy, thrust line below flaps makes tail-heavy. Which effect prevails? It depends to some extent on airplane configuration, but there is more:

Just consider the big decalage, making the airplane very stable in the pitch axis, that is very sensitive to flight speed. So with flaps deployed it is balanced for much less speed than normal, which is why it will pitch up if flaps are deployed at high speed. After speed is dissipated, the airplane will lower its nose and settle on a low, stable speed. Full throttle will let it pitch up and climb, idle power will let it pitch down and settle on a steep glide path. A certain low power setting will give slow level flight. All is conveniently stable and damped due to the big drag.

Flaps make Telemaster a real STOL airplane, even needing a short stroke of throttle/power to touch-down in three-point attitude. Brushfire benefits from flaps because it can pitch up only about 5 degrees before the protective tail skid hits the ground, and because the flight behavior is more stable and damped at low speed.

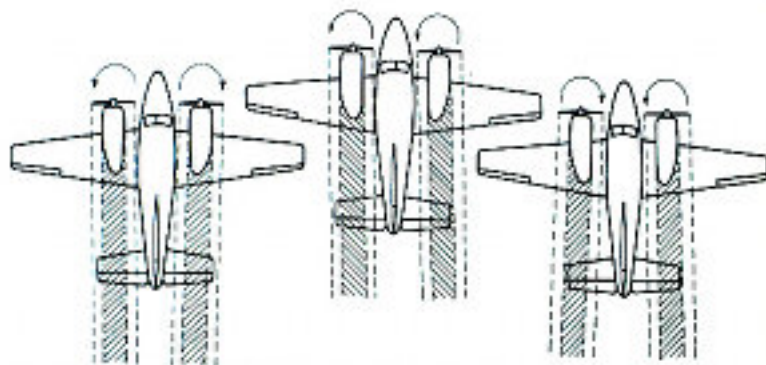
Right and down thrust

Down thrust is easy. Remember the effect of decalage? If the airplane pitching up and climbing at full power is not desired, or not that much, simply tilt the engine's thrust line down a few degrees.

Right thrust is a bit obscure, however. It's said to counteract the effects of the engine's or propeller's torque, respectively. But how at all can a yaw effect relate to a roll effect? This mystery is usually unraveled by introducing the "corkscrew effect". It means that the slipstream of a propeller turning clockwise is rotating clockwise as well. It hits the vertical tail on the left side, pushing it to the right side, and that's what turns the airplane left. Even though this effect undoubtedly exists, it's not the only one.



The "corkscrew" explanation even fails for a twin-engine airplane with a single vertical tail. Even though it's not hit by any slipstream, there is still a yawing effect of the slipstreams or propeller torques. One explanation is P-factor, that is the propeller's thrust shifted to the right side if the airplane is pitched up and the propeller is inclined. But there is yawing even if the airplane is level.



A good explanation for this case is obtained by considering the rotating slipstream to be a gyro. When it streams across the wing, it is deflected downward like any air flow that is streaming across the wing. After all, the wing produces lift by pushing the air down-

ward. But deflecting a gyro has a side effect. If a slipstream turning clockwise (seen from behind) is bent downward, some gyroscopic forces will also bend it clockwise seen from top. Like pushing (accelerating) air downward produces lift, bending (accelerating) the slipstream clockwise makes for a torque yawing the airplane counterclockwise.

That might explain why some pattern models don't have any right thrust. In fast level flight, the slipstream isn't blowing and turning that fast, and the wing is deflecting the air only a small amount (small angle-of-attack AOA). When the airplane enters a loop, however, the prop has to pull hard and the AOA has to be big. The resulting left-turning tendency has to be canceled by substantial right rudder. On top of a big loop, though, the airplane flies inverted and may even need substantial *left* rudder to keep on track. So if you have to apply alternating rudder, anyway, why bother with a fixed right thrust.

But why all stable non-pattern airplanes do have substantial right thrust, as well as down thrust? Their weaker drive has to pull harder, producing more slipstream twist, and they fly slow so the wing has a bigger AOA. Their power and speed range is not that big so a fixed right thrust may well cure any left-yawing tendency.

Besides, there *is* a propeller torque to be canceled on any airplane. On the Telemaster, for instance, the right thrust makes for some yaw to the right, giving a roll tendency to the right, which cancels the left-turning propeller torque. That's a desired effect of yaw-roll coupling, also called proverse roll, and that's why "normal" airplanes have that coupling by means of wing dihedral.

Pattern airplanes, on the other hand, should not have any coupling and have next to no dihedral. Right thrust would be useless for counteracting the torque and the pilot has to apply varying aileron deflection, anyway. Several pattern competition models yet have right thrust, but the reason why is a secret of their owners (read: not known to me).

Sceneries

There are several REFLEX XTR² stock sceneries which are suitable for learning and training to fly model airplanes. Most popular seems to be "FTG Borstel-Hohenraden e.V." in Germany. It's liked for its long, wide, and smooth grass runway as well as for its convenient light. The trees on both sides of the field are more of a challenge (to avoid them) than an obstacle.

Be that as it may, I've more or less given up all stock sceneries in favor of some sceneries made by independent authors because I just like them better now. They have even more room with even less obstacles, an even nicer ambience, or they have paved runways. There are paved runways in some stock sceneries but these have less than perfect lighting or the runways are a bit remote.

Grass runways seem preferable for basic and intermediate training but for advanced training, with models that have tricycle landing gear, paved runways are preferable or even necessary (for the Brushfire).

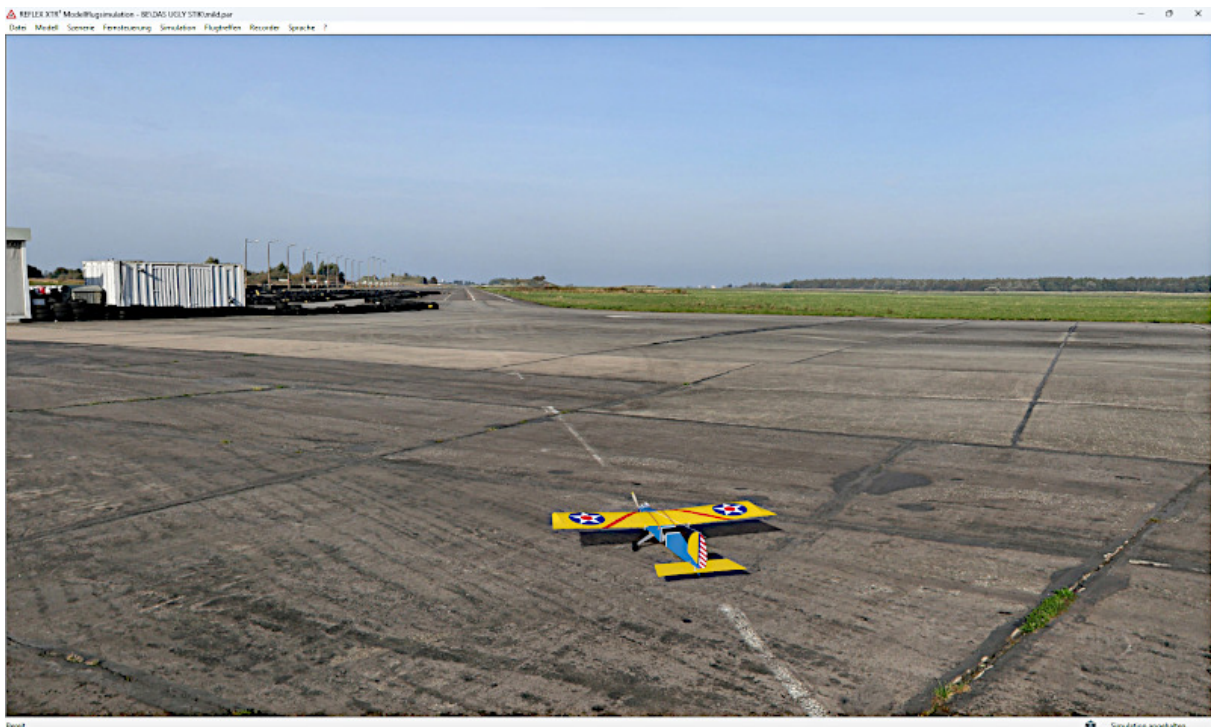


"MFC Silbergrube Flächenplatz" in Austria (by Martin Kneth) is a big, smooth grass field sloping down from east (seen in the picture) to west. The sun is in the pilot's rear. The terrain is sloping down in the pilot's front behind the runway so there's plenty of room for aerobatic maneuvers and the hills in the background are visible as reference most of the time.

Why and how use a model flight simulator?



"Fischen im Allgäu" in Germany (by Ronald Bankert) is actually three sceneries. There's a summer scenery with lots of grass around in sunlight, a winter version with snow in clouded sunlight, and the latter as a (faked) night version in full-moon light – all the same place. So you can practice in normal as well as quite unusual visual conditions.

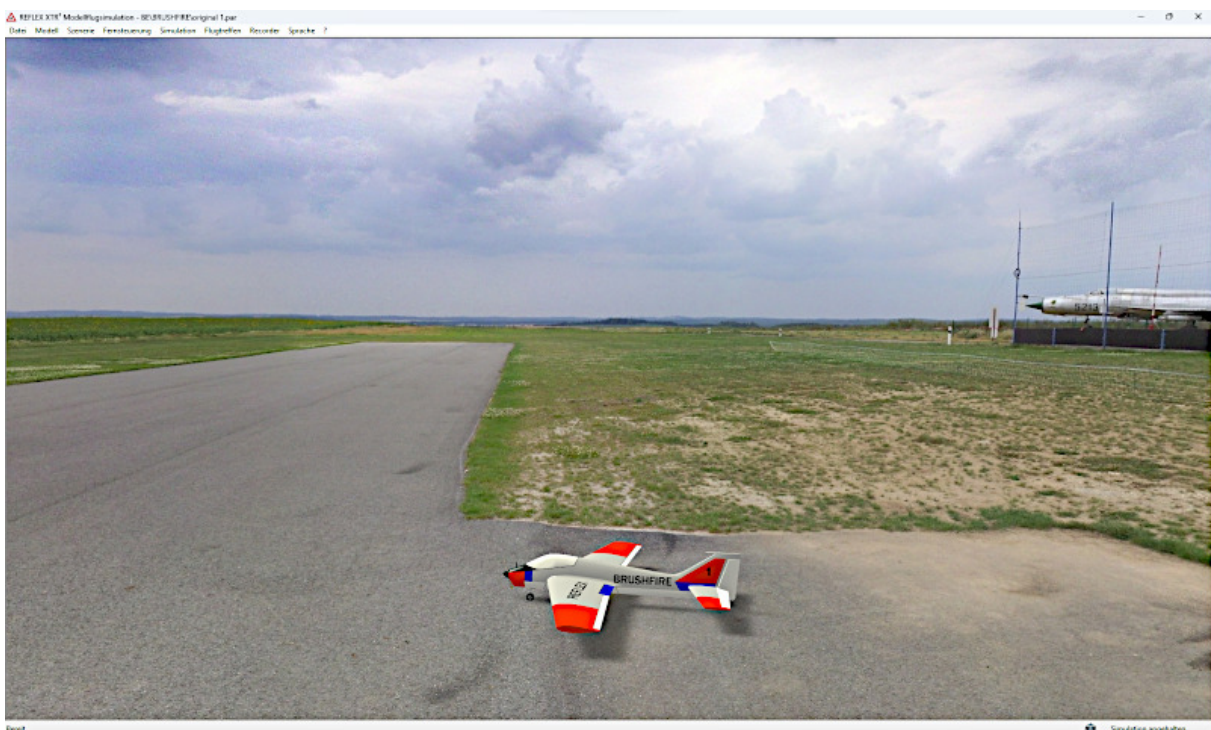


"Flugplatz Peenemünde" in Germany (by Harald Bendschneider) stands out for its abundance of concrete pavement around the pilot's position. Besides, there is excellent morning sunlight as seen here and very realistic back-light on the far side of this view. You may choose a "runway" at random but you have to mind some obstacles.

Why and how use a model flight simulator?



“MFG Klagenfurt – St. Johann im Rosental” in Austria (by Horst Lenkeit) is an excellent club airfield with tarmac and grass. It’s big enough for fast models. The mountain background is a good visual reference when flying patterns. The thundery clouds make for soft light. The traffic pattern goes actually around the club house but that shouldn’t bother you.



“Modelcity” in the Czech Republic (made by [Modelcity Airclassics s.r.o.](#) as advertising) is a commercial model airfield with a big tarmac runway and grass around it. There’s soft light due to a clouded sky reducing direct sunlight, so no visibility problems. No obstacles except in the pilot’s rear.

Helicopters

Finally, here are my experiences and suggestions in case you want to learn flying a helicopter. I'm an airplane guy and still a beginner as a helicopter pilot. You have to keep that in mind when reading the following. In case you are a rank beginner and starting with helicopters – without having flown airplanes before – your approach may be different.

In any case, you should use at least one of the helicopter schools in the Web (see page 4 above). This text is supplemental to a helicopter school, adding general learning experiences as well as suggestions for helicopters and sceneries especially in REFLEX XTR². You have to find your own way of learning and to this end see what matters most.

Flying

For me as an airplane pilot it was obvious: helicopter flying is all about hovering. I didn't need the simulator to learn left and right, going and coming, up and down. Even so, I had to start with hovering tail-in (the helicopter's tail pointing to me) and only then try different angles until I mastered the dreaded nose-in after a lot of practicing.

In turn, learning to hover is all about visibility. What you have to learn is also called eye-to-hand coordination, and that says it all. You have to perceive the helicopter's attitude in the first place to be able to correct it with appropriate control movements. Simultaneously working all four controls is one problem, but perception is an even bigger one at least for me.

Again in turn, training your eye-to-hand coordination is all about variety. Our *conscious* brain isn't in-between eye and hand and it's like learning to play a musical instrument – practice makes perfect. But practicing only one model, attitude, altitude, location, and weather would burn just that into your mind and not what is called helicopter flying in general.

So we start with the easiest options of all these parameters and as soon as possible variegate them again and again until we can fly in all circumstances. Basic prerequisite is a calm training helicopter, which is rather big than small and whose attitude is clearly visible, as well as a scenery with good lighting and without close-by obstacles.

A flat area around the pilot's position where the helicopter may be landed is helpful as well as zero wind (set by parameter). That allows to hover the helicopter at any angle (from tail-in to nose-in) in different lighting (from sunshine over sidelight to backlight). Distance to the pilot as well as flight altitude can be varied, and the helicopter can be gently touched-down at any angle and from any position to practice vertical landings.

Later you may use helicopters which are less easily visible, and some that behave differently in hover than a special trainer model, and some that are even bigger (sluggish) or smaller (squirrelly). On top of that, you can fly in sceneries with a confined flying space, less visibility due to dull light or even haze, and some obstacles, and you may set some wind (by parameter). The simulator has all that available.

Facilities

The simulator provides some facilities for learning (because it had been meant as a learning tool in the first place). They can be useful but then again they are a matter of taste. You should know and try them but there is no definite way how to use them. Instead you have to try out if they are useful for you. You could even try "Hover Training" in later stages of your learning career although it's primarily made for the first stages.

Model Parameters (in the "Model" menu, or hit F5) let you reduce the helicopter's "Swash plate travel", "Tail rotor efficiency", "Lift performance", and "Gyro sensitivity". This way you may specifically calm down reactions of an otherwise agile helicopter.

You could do that in your transmitter as well by setting up the Dual Rate switch. Then you could even switch from full to reduced travel and back, but that would be not model-specific since you should use one single model memory in the transmitter dedicated to *all* REFLEX XTR² models (see below). The same holds for "Expo" settings on all three axes, which I like to set to -30 to -50 for precise control around neutral.

Hover Training is a simulation mode (in the "Simulation" menu) that lets you select which controls of the helicopter you want to work; the rest is worked by the simulator. It lets you start with just one control and end up with all of them. In that case the simulator still watches over the helicopter staying in a "box" shown on the ground while you are trying to hold it over the "bullseye":



That works even on water, which is actually a fake in REFLEX XTR². But the helicopter models on floats are especially made for training and not for flying from water (see section Models below). However, a scenery has to be prepared for *Hover Training* and there are some that aren't. They

need four special “initial positions” defined on the ground where the helicopter is seen from behind, from its left side, from its front, and from its right side (like in the picture above).

Seen from behind is the easiest way to learn hovering. Once that is mastered, the next level is seen from one side. Both sides have to be practiced for they look different because the helicopter is always tilted to the same side when flying. Finally, seen from front is hardest, the dreaded nose-in hovering, so it’s the last stage of hover training.

I just didn’t like this simulator-supported hover training and preferred to do it my own way without it. Of course I started with tail-in as well, but changed to one side or the other with increasing frequency, and occasionally tried nose-in. I ventured to choose various angles, not just the four predefined “square” ones, which are not really good for visibility (!). I didn’t bother to stay in a box. First I used sceneries without obstacles and only later tried sceneries with confined spaces to keep the helicopter in. Mind you – that’s just me. You may well try this feature just to see if you like it and even try it again later (as I did, but I still didn’t like it).

Promenade (or pilot circle) is a simulation mode (in the “Simulation” menu) in which you as the pilot are “automatically walked” around the helipad while you are trying to keep the helicopter in a steady hover, that is in place and at constant heading and altitude. This stunning exercise is possible only in the “scenery with selectable pilot position”, this name telling the reason why. (The photo-realistic, panorama-picture sceneries have a fixed pilot’s position for obvious reasons.)



This scenery is not as nice as a photo-realistic one but it’s not bad at all. There is the nice helipad and even a working wind sock. You can choose the distance to the helicopter as well as circling speed and direction. You may also modify wind and light.

I actually like this exercise because it shows that I really can hover. That said, it's an exercise for one of the last stages of your learning career because it would be just frustrating if you still can't hover well enough. Anyway, I try it only when I'm going strong. I even tried it in reality in a gym. That is harder in that I have to watch the circle on the ground but it is easier in that I can slow down or even halt if things go out of control.

A similar but easier exercise is circling the helicopter nose-in around the pilot. That can be done in any scenery (and place in reality) with a flat area around the pilot's position. It can be just tried in the early learning stages which are spent in such sceneries, and if you still can't cope with it just desist from it and try later.

Crash&Retry Training is a simulation mode (in the "Simulation" menu) in which the simulation is set back by a short time (1.5 sec by default) in case the helicopter crashed. That can be useful when practicing crash-prone maneuvers, even several in sequence. You can immediately try a failed maneuver again, and again and again if necessary. To me that is more like aerobatic training, not basic training as discussed here, but it might be useful when practicing autorotation landings (see below). Anyway, I don't use this feature but it may be good for you.

Models

The usual helicopters have one main rotor and a tail rotor, and that's why they are tilted to one side in flight. Many if not most model helicopters have a main rotor turning clockwise (seen from above). Now the fuselage would yaw counterclockwise if the tail rotor wouldn't blow to the right side. That's why it usually sits on the tail boom's right side so it blows away from it, what's called "pushing the boom". (There are exceptions to this rule.)

Anyway, the tail rotor blowing to the right side would push the whole helicopter to the left side if the main rotor wouldn't be tilted to the right side so there is not only lift but also a balancing force to the right side. The lower the tail rotor is below the main rotor and the more rigid the rotor head is the more the whole helicopter is tilted together with the main rotor. Of course, a main rotor turning counterclockwise flies tilted to the left side and in that case the fuselage is more or less tilted to the left side as well.

That looks different from tilted to the right side and requires some converse corrections in maneuvers, so we should practice also with a "lefty", a main rotor turning counterclockwise. It should be even a training helicopter (or at least one suited for training) so we can use it early in our learning career. Main-rotor and fuselage tilt are more variations in addition to different positions, viewing angles, and lighting. And we have to look also for the main rotor's sense of rotation and rigidity, in addition to calmness, docility, and visibility of the whole helicopter.

Why and how use a model flight simulator?



That's what I used in the first place, a KYOSHO Concept 30 SE, once a typical beginner helicopter with a .30 glow engine (1.16 m rotor diameter, 2.9 kg weight). It has a "semi-scale" Bell 206 Jet Ranger body, as well as cross stripes on the rotor blades, for better visibility. The green version has even better contrast to the background than the blue one below.

Wide undercarriages with inflatable floats made from plastic film were common for rank beginners. On the floats, the helicopter can slide around on the ground without toppling over. More important for me is their good visibility as well as the fact that they are horizontal when the helicopter is hovering and that they show its tilt. Both the floats and skids version have a .30 glow engine sound and two-blade rotor noise assigned.



Why and how use a model flight simulator?



That's an older HIROBO Shuttle Plus 30. This type is kind of *the* standard beginner helicopter with a .30 glow engine (1.2 m rotor diameter, 2.8 kg weight). The HIROBO advertising claims that more than half of all model heli pilots worldwide have learned to fly with a Shuttle. That may be even true, particularly since several evermore modern versions have been sold since 1985. Anyway, this simulator model seems to be especially true-to-original, both in look and flight behavior. It can even fly inverted.

Such a "pod-and-boom" helicopter is not quite as well visible as one with a real body, despite the horizontal tail boom and the red color in the paint. The blue floats are not as visible as yellow ones. Both the floats and skids version have a .30 glow engine sound and two-blade rotor noise assigned.





This is a "leftie" – the main rotor turning counterclockwise and the tail rotor on the left side. I deem it a very good training helicopter with its well-visible colorful paint scheme and cross stripes on the rotor blades. It's quite big (1.5 m rotor diameter) and heavy (5 kg) and set up as a calm flier but still quite agile. The sound of a .90 glow engine and the noise of a four-blade "scale" main rotor are fittingly assigned.

Actually it's not a simulator version of a real model. It's just a "scale" simulator model of the real helicopter used in the [TV series Magnum P.I.](#) (hence it's called "Hughes 500 D Magnum" here). It has the original's interior and even the pilot [T. C.](#) in the cockpit. As a gadget, the right door opens when the landing gear switch on the transmitter is set to "up". The flight behavior is not true-to-original (full-size) but typical for a scale model of that kind and size.

Typical for the model as well as for the original is a quite rigid main rotor head. In flight, not only the main rotor is tilted to the left side but pretty much the whole helicopter. At take-off, the tilt has to be set by the pilot, that is the right amount to make the take-off straight forward. The distinctly tilted fuselage lets the helicopter look distinctly different seen from different sides.



Another "leftie", but with a two-blade main rotor and a not quite as rigid rotor head. The paint scheme is not quite as colorful and there are no stripes on the main rotor blades. It's not quite as big (1.41 m rotor diameter) and heavy (4.5 kg) and set up rather agile. Yet it's far from being an aerobat and I still deem it a good training helicopter, just with the potential for more. The sound of a .90 glow engine and the noise of a two-blade "scale" main rotor are fittingly assigned.

This is a simulator model of a real Graupner Star Ranger model, representing a Bell Jet Ranger in the livery of [Santini Air](#). It has a glow engine with tuned pipe in the rear cabin as well as (vintage) receiver and gyro in the front cabin. The flight characteristics should come close to those of the real model.

The main rotor is not especially rigid but not especially flexible either. That may be typical for model helicopters and means that they tilt noticeably but moderately in flight. Across the main rotor is a flybar with black "paddles" and brass weights, which act as force amplifier for the servos and as stabilizer for the main rotor, respectively. Once that made for good flight characteristics, today achieved with powerful digital servos and a "flybarless" three-axes gyro system.



Another well-known “leftie” – seems most full-size helicopters are lefties while most model helicopters are righties, for whatever reason. Anyway, it’s another good training helicopter with a well-visible paint scheme and cross stripes on the rotor blades. It’s even bigger (1.85 m rotor diameter) and heavier (8.5 kg) and as well set up as a calm flier but still quite agile. The sound of a .90 glow engine and the noise of a two-blade “scale” main rotor are fittingly assigned.

This is a simulator version of a real “scale” model, with servo linkages and mechanical mixers as well as engine with tuned pipe in the rear cabin. The Bell 205 is the civilian version of the well-known UH-1H. The flight characteristics are typical for such a scale model but it has an important characteristic in common with the full-size original:

The Bell two-blade main rotor is like an articulated bar on top of the rotor mast. It’s rather the opposite of rigid, it nearly freely tilts independent of the rotor mast and the rest of the helicopter. I even exaggerated that by setting very low rigidity in the parameters. In flight, the main rotor is visibly tilted to the left side while the fuselage is virtually level (not tilted to the left side). Main rotor tilt has to be set by the pilot but he can do it while the helicopter is still on the ground and then take-off straight forward. The fuselage looks the same seen from both sides but the main rotor does not.



Yet another “leftie” – yet another variation. This is not really a training helicopter with its camouflage paint scheme, and it’s even huge (2.5 m rotor diameter) and really heavy (25 kg) so it’s powered by a 12 kW turbine engine. Accordingly, a full-size turbine sound is assigned which sounds pretty realistic (and even lets the simulator model shake while it’s standing on the ground).

This simulator model is meant to render an existing full-size helicopter but it’s set up like an existing real model. The Mi-24C is a well-known Russian attack helicopter (with retractable landing gear, which actually works but can’t be rendered correctly in REFLEX XTR²). Not knowing the original’s flight characteristics, the model simply got good ones. It is quite easy to fly even for a beginner and that’s one reason why it’s presented here.

The other reason is a peculiarity not found on other helicopters as far as I know. This type’s fuselage is not tilted in flight because the rotor mast and the whole main rotor are tilted to the left side by an amount needed in non-accelerated flight. That has been reproduced on this simulator model. The pilot not even has to tilt the main rotor, the helicopter takes off straight forward without help. The fuselage looks the same seen from both sides but still the main rotor does not.

By the way, that “0815” on the tail is actually and coincidentally the full-size original’s fuselage number. It has no other meaning here.

Of course, there are stock models in REFLEX XTR² that are well suited for beginners. Most of them are "righties":

The Thunder Tiger Raptor 30V2 (1.25 m rotor diameter, 3 kg weight) is another typical .30 beginner helicopter. The excellent simulator model is even a bit more powerful than the HIROBO Shuttle Plus 30 described above, and it's more steady.

The Thunder Tiger Raptor 50V2 (1.35 m rotor diameter, 3.2 kg weight) can be seen as a step-up version of the 30V2. The advanced beginner may use it to enter the world of helicopter aerobatics, which may be mastered with the Thunder Tiger Raptor 50V2 *tuning* version.

You may try also a nice scale model if you like its look and visibility: the CENTURY Bell 47G II (1.36 m rotor diameter, 3.3 kg weight). It's a bit heavier than a 30-class heli, has a .50 glow engine, and is quite agile.

The CENTURY Robinson 22 (1.47 m rotor diameter, 3.9 kg weight) is an excellent 50-class scale model as well but has a more friendly appearance.

Top of this line is the Vario R-22. It's huge (2.16 m rotor diameter, 13 kg weight) and accordingly calm and steady in flight, and it's a "leftie". The simulator model has really true-to-original (model) flight behavior, look, and even sound. Due to its size it may seem a bit sluggish but that's actually typical and another variation in more advanced hovering exercises.

Electrics

All helicopters presented here are powered by a glow or gas engine and not by an electric motor. The only problem you may have is noise, so you might consider "converting" a simulator model to electric. That's easy.

With a helicopter model loaded in the simulator, hit F5 for "Model parameters helicopter". There, set "Exhaust cloud density" to 0 (zero) and select a matching "Engine sound". In most cases there will be no better choice than "Sound Library\700 Electric.rms". Hit "OK" to start flying.

When you later want to switch to another model (and hit F2 to this end), you are presented with the question "Do you want to save the modified model?". If you choose "Yes" you have to specify a model name and hit "Save" to be able to later load the modified model. If you choose "No", the "electric conversion" is lost and you have to re-do it when you want to use it again later.

Transmitter Setup

For helicopter models, you should have a multi-channel “computer” transmitter (TX). Four channels on the two sticks are needed for actual control (roll, pitch, yaw, collective rotor-blade pitch) and one channel on a slider is for power setting or rotational speed setting, respectively. Often one channel on a slider is used to adjust the tail gyro’s effect (see next section) and maybe one channel on a switch to change the three-axes gyro system’s operating mode. More channels would be needed for retractable landing gear and lighting. Good “computer” transmitters have special helicopter programming features for most of these *nine* channels.

There is a “Model specific channel assignment” in REFLEX XTR² to mimic such a setup in the simulator (except three-axes gyro and lighting, so only *seven* channels). It’s even possible to use one single transmitter setup (in a model memory) for a real as well as for a virtual model. That requires the virtual (simulator) model being very true to the real (original) model. It should be clear that this feature is for special applications and certainly *not* for a beginner.

The standard helicopter setup in REFLEX XTR² has four channels on the two sticks (roll, pitch, yaw, collective rotor-blade pitch), one channel on a slider for the tail gyro’s effect, maybe one channel on a switch for a retractable landing gear, and one channel on a switch for autorotation (see below). The latter is important so you need at least *six* channels.

You can and should use one single model memory in the transmitter dedicated to *all* REFLEX XTR² models, no matter whether airplane or helicopter. It should be set up for airplanes, not helicopters! That’s because autorotation is set up in the simulator (not in the transmitter like for real models) and the rotational-speed controller (governor) is in the simulator as well. Assigning and calibrating the channels is done in the simulator; no special helicopter feature setup is needed in the transmitter.

Gyro Setting

Today, most if not all model helicopters have a three-axes gyro (flybar-less) system. It can “lock” the helicopter’s attitude in all three axes. A single gyro to lock the yaw axis attitude, called heading-lock gyro, was commonplace before. This tail gyro may be switched to what is also called damping mode in which inadvertent yawing is not prevented but only retarded, or damped. Besides, the gyro’s effect (gain) can be adjusted.

You need to know that the helicopters in REFLEX XTR² are set up this way and one transmitter channel with a slider or rotary button is assigned to control the tail gyro. The slider has a *center* position in which the gyro is *disabled* so you have to control yaw on your own! Moving the slider to one direction or the other will gradually enable the gyro either in lock mode or in damping mode. Just try which direction enables which mode or set it in the Channel assignment (hit F7). Depending on the model, maximum gyro effect may be too much, usually indicated by yaw oscillations. In that case, reduce gyro effect until the helicopter’s tail doesn’t wag anymore.

Realism

You may notice that all helicopters presented here are powered by a glow engine and not by an electric motor. They don't have a modern three-axes gyro (flybarless) system, either, but just a tail-rotor gyro and a flybar with "paddles" (most of them). They are yet good enough for you. There are more modern helicopters for REFLEX XTR² out there and they are more powerful and more steady in flight, which is why they may even make learning too easy.

At least I would aspire to be able to fly a helicopter in a more direct way, without being reliant on a gyro system. That is I learn without risk in the simulator but I'm glad I have a gyro system in reality that prevents consequences of any mistakes made by me. Due to my practice in the simulator, I rarely make mistakes though and I'm yet quite competent in case the helicopter (or the gyro) doesn't work properly.

Most of my clubmates say flying in the simulator is not the same as real flying. That's an obvious truth, it's only similar. But they mean they won't learn flying in the simulator. Nothing could be further from the truth. It's not only that I learned exclusively in the simulator before even trying in reality (successfully). Model flying simulators have been developed since the 1980s just for learning to fly helicopters. They were really primitive back then but it was yet possible to learn with them, that is enough to go to reality without risking the helicopter too much.

Today, simulators have come a long way to high realism, leaving to be desired only an even better visual impression, maybe even achieved by modern virtual-reality headsets. Anyway, simulators are used to practice risky maneuvers until these are done flawlessly also in reality, including the emergency procedures every (model) helicopter pilot has to be able to cope with (see below). So they are by far good enough to learn the basics of helicopter flying as well as advanced flying, especially emergencies.

The role of the helicopter's visibility has been mentioned before. It's sound contributes to an impression of real flying as well. There are high-quality sounds characteristic for categories of model helicopters, like two-blade main rotor and glow engine. Usually they are not, and need not to be, the sounds of the specific helicopters (like that of the Vario R-22). They are just typical enough to let you feel the model is realistic, and a striking rotor sound would let you know if the maneuvers flown are stressful.

Even characteristic movements of the main rotor are shown. When collective pitch is raised, the rotor blades produce lift and thus bend upwards. The whole main rotor seems to be like an inverted cone and the process is called *coning*. Cyclic pitch will *tilt* the whole main rotor in the same direction as the transmitter stick. These movements are bigger or smaller, depending on how the simulator model is set up by its creator. In any case, they can show you how and how much the helicopter reacts to your stick inputs while it is still on the ground.

Emergencies

Perhaps the most common case of “emergency” is inadvertently flying until the helicopter runs out of fuel or battery charge, respectively. When the motor quits working, the main rotor has still some momentum that may be good to manage a soft landing from low altitude.

At higher altitude, collective pitch has to be set to low or even negative values to keep the main rotor spinning, like an airplane that has lost engine power has to lower its nose to keep or even gain flight speed. Usually it's a good idea to boost the main rotor's rotational speed to have enough momentum for a soft vertical landing. Of course, there has to be quite some altitude (potential energy) that can be converted into rotational momentum (kinetic energy).

When the motor stands still, the main rotor is freewheeling due to the freewheel a.k.a. autorotation clutch. Keeping the main rotor rotating is called autorotation, hence the clutch's name, but it's *not* automatic. The pilot has to lower the collective pitch to an extent that is often not possible without further ado. Transmitters limit low and maybe also high pitch in normal flight modes, and have a special flight mode available for autorotation, in which excessive pitch values are possible.

This autorotation flight mode has to be set up, that is the pitch limits and a switch or pushbutton to activate it most easily. In the simulator, there is a model parameter for the lower pitch limit in autorotation (pre-set by the model's creator) and a transmitter channel to activate autorotation (assigned by you). So in reality as well as in the simulator, autorotation has to be enabled by activating the respective flight mode with a transmitter switch and then controlling appropriate collective pitch. Rotation without motor power is the only reason why it's called *autorotation*.

A consequence is that no tail rotor force is needed, so transmitters and the simulator are set up to reduce tail rotor pitch to zero in autorotation flight mode. The tail rotor is still useful to control the helicopter's yaw or heading, respectively. But on several helicopter models the tail rotor stops turning together with the motor, depending on where the autorotation clutch sits in the gear train. In that case, the helicopter may yaw a bit due to bearing and clutch friction, damped by the fin on the tail boom or even stopped when the helicopter is flying forwards.

That would be one reason why it's advisable to keep or gain some forward flight speed in autorotation. Main reason is that forward speed helps with pumping rotational momentum into the main rotor. Of course, it depends on the situation (altitude, speed, heading, distance, flying field) whether it's possible to gain enough rotational speed for a soft landing.

In many if not most cases, the autorotation maneuver will only partly work out and a hard landing is unavoidable. Sometimes, touching down with some forward speed and skidding on the ground is possible and may reduce the landing shock. In any case, an autorotation landing is just a chance to limit damage to the helicopter. A true crash would be the worst-

case outcome, a soft landing the best case and perhaps rather an exception than the rule.

Anyway, the helicopter and the transmitter as well as the pilot have to be prepared for autorotation. Even if running out of fuel or battery charge is actually foreseeable, it's sometimes unforeseen by mistake and then it's a surprise. Sometimes the motor fails and sometimes even the tail rotor, in which case the helicopter starts yawing uncontrollably. I saw it happen and it was more than a surprise, it was dangerous and terrifying. In that case, the pilot has to switch to autorotation *in order to* stop the motor turning (what this mode also does) and hence the helicopter yawing.

Imagine it happens to you. Then you'd be glad if you had practiced autorotation so you don't have to think about it. There must be no inhibition to switching to autorotation mode, so you should have gotten used to it. An additional benefit would be if you were able to control the autorotation landing as best as possible to keep any damage to the helicopter small and to avoid any damage to persons.

This can be practiced in the simulator only. It would be just too risky and costly in reality. It has to be done regularly to stay in practice. So the simulator is actually a must-have tool for the responsible helicopter pilot.

You may even have it take you by surprise by setting a "Probability of engine failure" or "Probability of tail rotor failure" in the "Simulation parameters" (hit F6). (The "Engine running time" is pre-set by the model's creator in the "Physical parameters / Drive" – if you want to modify it hit F11.)

Sceneries

My favorite sceneries for learning and practicing are made by independent authors, that is they aren't REFLEX XTR² stock sceneries. Some of them don't have all the special "initial positions" required for the Hover Training simulation mode. If I wanted to use this feature I would just use another add-on scenery or one of the excellent stock sceneries which have them.

Why and how use a model flight simulator?



“Flugplatz Peenemünde” in Germany (by Harald Bendschneider) stands out for its abundance of concrete pavement around the pilot’s position. Besides, there is excellent morning sunlight as seen here and very realistic backlight on the far side of this view.

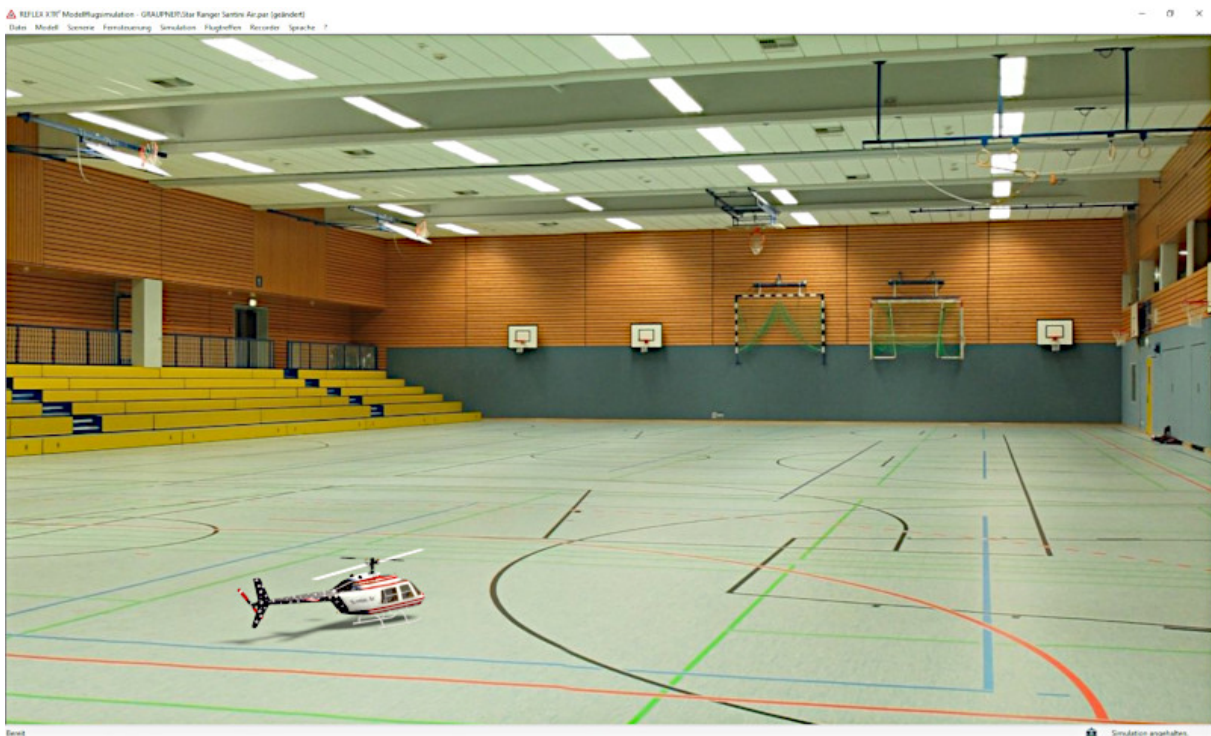


“MFC Silbergrube Heliplatz” in Austria (by Martin Kneth) is a big grass field and has good morning sunlight as well. There is also an equally nice, adjacent airplane field (Flächenplatz) with grass runway and excellent light but with free airspace on three sides only. Take-off and landing are possible on tables and benches in both sceneries, but it’s really hard.

Why and how use a model flight simulator?



“Fischen im Allgäu” in Germany (by Ronald Bankert) is actually three sceneries. The snow in this winter version makes for a bright white background that lets any helicopter be well visible even in backlight. There is a winter night version with full-moon light for practicing in exceptional conditions, and a summer scenery with oodles of grass around in sunlight.



“Sporthalle Rastede” in Germany (by Horst Lenkeit and Dan.) is an unusually long gym (referred to as sixfold gym, 120 m long and 40 m wide) – speaking of confined space. This is a surprisingly good and pleasant place to practice even with an advanced trainer model.

Downloads

Most of the models and sceneries suggested here for training are add-ons to REFLEX XTR² made by different authors. To simplify the task of adding these models and sceneries to your REFLEX XTR² installation, there are two “installer packages” for airplane and helicopter training, respectively.

Download them to a folder on your hard disk where they can remain.

When you run them, you can select models and sceneries for training. There are predefined selections: for basic, intermediate, and advanced training; limited or extended choice of models and sceneries; or simply compact or full selection. You can always select each and any model or scenery directly by ticking it, that’s called custom install then.

When you proceed now, the installer will show you a list of *more* installer packages that have to be downloaded first in order to install the selected models and sceneries. These packages are all ticked already, just for your information, so you can click the Install button right away.

A lot will be going on now, but virtually nothing is shown in the installer window. But you can have Windows Explorer running behind the installer window and displaying the folder where the trainer-installer package resides. Then you will see the additional installer packages showing up after they have been automatically downloaded. You still can’t see that they are automatically run then in order to install the selected models and sceneries. Either way, just *patiently wait until disk activity ends*.

Now you will find the installed models in the Model Selection (F2 key) of REFLEX XTR² in the “Aircraft | Trainer” or “Heli-/Multicopter | Trainer” branches, respectively. This “branch” or “group” is *supplemental* to the groups in which models are actually stored. It just pools the trainer models so you can easily find them, and it holds just “links” to them.

All models, that is variants of a type, are stored in their own groups, named after the model’s or the original’s manufacturer or, in case of my models, in a sub-group of “BE”, named like the model type. You can find and select them there (F2 key) as well, under slightly different names.

All installer packages downloaded to your hard disk will stay in place. One way to run them again is double-clicking them in Windows Explorer. But there should be now a folder named REFLEX in the Windows *menu* “Start | All Apps”. It holds uninstall entries for all installer packages, re-select entries for many of them, as well as links to model descriptions for several of them. So you may easily read about a model, modify your selection of variants, or remove it completely. You can save that for later, though.

For now, just think about running the trainer-installer package again. You will want to do that when you are learning to fly airplanes and want to step-up, for instance from basic to intermediate training, or to extend your model selection. In the former case, the previously installed models are removed from the “Trainer” group and the newly selected ones installed instead. In the latter case, the newly selected ones are just added.

Models you remove from the "Trainer" group by running the trainer-installer package again will remain in their own groups. Even if you substitute *variants* of a model by other variants, the variants removed from the "Trainer" group will remain in the model's own group as well. There you may install more variants of this model by running its own installer package but – as said above – you can save that for later.

For sceneries, there is *no* supplemental group with "links". In the Scenery Selection (F3 key) of REFLEX XTR², you can find them in their respective *country groups*, which are Austria, the Czech Republic, and Germany for the sceneries suggested here. Only two of them have variants to select.

If you are ready now, you may click on one of the two links below to download a trainer-installer package. Your standard browser should open and show a dialog box where you can choose an appropriate folder on your hard disk to store the installer package. If it doesn't and stores into your Downloads folder by default, you can either move the downloaded installer file in Windows Explorer or just leave it in the Downloads folder. In this case, make sure that you do *not* remove it later.

Now you may run the installer directly from your browser (from where it usually displays downloaded files), if you are happy with just waiting until the installer has done its job. But if you like to watch how the additional installer packages are downloaded (like described above), you should run Windows Explorer, display the chosen folder, and run the installer package from there (by double-click).

Download the trainer *airplane* installer package [here](#).

Download the trainer *helicopter* installer package [here](#).

If and when you are more proficient using computers and simulators, you may want to install even more models and model variants. Read on on the next page.

Obviously, stock models and stock sceneries are installed together with REFLEX XTR² and can be selected right away (hit F2 or F3, respectively).

Models and sceneries made by independent authors have to be downloaded. Several airplane and helicopter models are offered at my Downloads page (link below). They come in their own installer packages, to be downloaded to and then installed on your computer. *To begin with, please mind the hints for installation at top of the Downloads page!* Only then go to one of the "models for REFLEX XTR²" sections and download installer packages to a suitable place in your computer.

Sceneries come in their own installer packages as well but from different servers. When you're installing one of the airplane or helicopter models, chances are that some sceneries are offered for download and installation, too. You just have to select some and then – as a service – they will be downloaded (to the same place as the models) and installed nearly automatically. Installers for airplanes and helicopters with float versions offer several special sceneries with water or even snow and ice. Some airplane installers offer sceneries used for demonstration flights. Other installers offer several ordinary sceneries suited for learning to fly, including those mentioned above.

After completing the installation, every installer package will indicate where the model or scenery, respectively, has been installed. *Please memorize this branch of models or sceneries – as well as their names –* so you can later find them in the selection (F2 or F3, respectively). In a pinch, you may disable the preview pictures in the selection (check box left bottom) for a better overview in text form.

Enjoy!

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<http://time.hs-augsburg.de/~erd/Modellflug/textReflex.html>

My REFLEX XTR² airplane models in the latest versions as well as some helicopter models made by other authors are available on my web page <http://time.hs-augsburg.de/~erd/Modellflug/textDownloads.shtml>

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