

Here is some information you might find helpful in deciding if you want to get started in hobby of Radio Controlled flight. We'll try to give you an idea of what it takes to get started in our hobby, some of the aircraft, radios and accessories that you will need as a beginner. And by beginner we are making the assumption that you have no equipment and are basically starting from scratch. We'll list some of the products on the market at the time this article is written. While this list just scratches the surface of the models, engines and radios available, it should provide a guide to what you need to get started. If an item is not listed that does not mean that it isn't any good. It simply means there just wasn't enough room to list it. Prices are given at the time this was written and should be used only as an approximation. You can figure on spending about \$200 - \$400 to get started in R/C flying. Also we are limiting our presentation to what you will need to get started and to trainer models, with "trainers" being defined as "a model that you can learn to fly on".

You want to start with a "40 size" trainer. "40 size" refers to the engine displacement in cubic inches. Normally these models are powered by an engine with approximately four tenths of a cubic inch displacement, hence the name "40 size". The 40 size trainer is what most of us learned to fly on. These trainers have about a five-foot plus wingspan, are easy to see in the air, handle well in the wind and have the largest selection of different models to choose from. You have the largest choice of engines and electronics in this size range and they are the most reasonably priced, with equipment getting more expensive as you go either larger or smaller in size. Start with an ARF (Almost Ready to Fly) trainer. Check out some one of the "complete packages" on the market. These come with aircraft, engine, electronics and radio and usually everything is installed. If you need to keep expenses down look for used equipment. There is a lot of good used equipment available at good prices. But if you go the used equipment route ask some one with experience to help you with your selections

Glow or Electric

One of the questions new people always asks is "Should I go gas (meaning glow) or electric?" Perhaps this should be your first question? Prices shown are just used for a comparison. Radios come with rechargeable batteries and chargers so I won't list them. Some equipment, such as radios and electronics, can be used with both glow and electric models. Other equipment such as fuel or a battery balancer cannot. The list of equipment doesn't include your basic tools, such as screwdrivers, wrench, pliers and something to carry everything in. Since this is aimed at folks just getting into the hobby, who don't have any equipment, here is a brief comparison. You choose.

ELECTRIC: Besides the aircraft, motor, radio and electronics you will need some support equipment to get airborne. Most of the electric models use Li-Poly batteries for power, so you may need an extra battery (\$60), depending on how long it takes to recharge the flight battery. You may need a Li-Poly battery charger (\$100), if one isn't supplied, and perhaps a battery balancer (\$60). Depending on the Li-Poly charger, you may need a 12-volt power supply (\$50).

On the Minus Side: Initial start up costs is higher for electrics. Electrics tend to be built light and may not hold up as well as glow models in a crash. There is a smaller selection of "40 size" trainers. Li-Poly batteries are one of those good news, bad news things. Good news is they're great for producing power. Bad news they do not behave well in extremes of heat (summer car interiors) and cold (fall/winter flying). Li-Poly batteries can catch on fire in a hard crash or while being charged and must be watched while charging. A single battery needs to be recharged between flights.

On the Plus Side: They are clean; there is no oily exhaust so there is little or no clean up after a flying session. No engine adjustment after starting. No engine break-in. Simply insert a charged battery to fly again. The in-plane electronics, receiver and servos, usually run off of main battery, no need to recharge a separate receiver battery.

GLOW: Besides the aircraft, engine, radio and electronics you will need some support equipment to get airborne. A gallon of fuel (\$15). Some type of fuel pump (\$10). Glow Driver (\$5) to heat up the glow plug while starting the engine. An electric starter (\$30) and 12-volt flight box battery (\$20) to run the starter or a "Chicken-Stick" (\$5) to turn the propeller to start the engine.

On the Minus Side: Oily exhaust residue needs to be clean up after a flying session. The engine needs to be broken in before flying. The engine needs to be adjusted after starting and before flying. You need to run the engine dry after a flying session or for prolonged storage. Receiver battery needs recharging after several flights. Glow fuel is poisonous and can spill.

On the Plus Side: Lower start-up costs. Large selection of "40 size" trainers available. Simply refuel to fly again. Models are usually built stronger than electrics to absorb engine vibration. A little harder to start in the winter but not really subject to heat and cold. Receiver battery should be checked between flights but you can get in several flights before they need recharging.

General Guide Lines for Beginners.

- A.** Start with a 'Trainer' model. Most instructions have a warning that says '**THIS IS NOT A BEGINNERS MODEL**'. Heed this warning. There is nothing more discouraging than trying to master the basics of flight with a fast and aerobatic aircraft.
- B.** High wing aircraft are more stable, and therefore easier to learn to fly on, than mid or low wing models. Trainer models have a high wing, that is, the fuselage hangs below the wing. This type of aircraft, if built correctly and given enough altitude, will usually self recover from spins and stalls. Mid and low wing aircraft being more aerobatics (less stable) do not have this capability. There are however, several trainers on the market today with low or mid wing construction. These usually have removable attachment to the wings for greater lift and more trainer like flight.
- C.** There are several types of wing shapes; flat bottom, semi and fully symmetrical. Most trainers have a flat bottom wing, this gives the most lift and stability. Semi and fully symmetrical wings are more aerobatics.
- D.** Tricycle landing gear, i.e. having a nose wheel, models are easier for the beginner to handle than a tail wheeled model. Tail wheeled models are easier to fly off a grass field, especially if the grass is high. Three-inch wheels are to be considered a minimum for use on grass.
- E.** When matching an engine to a model, check the recommended engine size range on the model's box. You will find that you will be happier going with the larger recommended engine.
- F.** You need to break in a new glow engine before you fly it. A new engine needs to burn a few tanks of fuel before it will run reliably. Follow the manufactures recommended break-in procedures. A good fuel to start with should 5% or 10% nitro methane. The more 'Nitro' the more expensive the fuel. Once broken in the engine will need to be adjusted for peak power at the beginning of a flying session. This is due to weather conditions such as temperature and humidity. Once adjusted it should be fine for the remainder of the day.

G. A two-tone covering scheme is easier to see in the air. The lighter color should be on the bottom. It is a good practice for the beginners to put a large color panel on the top and bottom on one wing, usually the right wing. This will help in determining right from left while the planes is in flight. It is also a good idea to stay away from colors such as silver, gray and some shades of blue. These colors can become very hard to see in some light conditions.

H. Some companies offer **Select, Complete** or **Combo** packages. These packages include an airplane, all hardware, an engine and radio at a discounted price. Everything you need to get started. Several of these have the electronics installed and advertise getting you into the air in less than an hour. You may want to look into these or ask about them at your hobby shop. Don't be afraid to tell them you're new to the hobby and ask what they recommend.

I. If you're going to build a model from a kit, look for ones that come with full size plans and large illustrated instruction books. **Goldberg** and **Great Planes** kits fall into this category. Both of these companies offer some good entry-level kits for the beginner. If you go to a hobby shop for a kit ask to see the instructions before you buy, most places will be happy to show them to you. **We recommend starting with an ARF and not building a kit.** These **Almost-Ready-to-Fly** models are already pre-assembled to the point of a plastic model. That is you attach the wing halves together, add the rudder and elevator and you're ready to go. No covering, special tools or other assembly is needed. Just be sure to follow ALL the instructions when assembling an ARF.

J. Electric models generally fall into two categories: "Hobby" and "Toy". The way to tell them apart is that models in the "Hobby" category have removable components. The motor, servos and receiver and be removed from the model and used in another. Models in the "Toy" category usually have everything on a single circuit board. There are no components that can be used in another model. When you break a "Toy" model, the entire model needs to be replaced. Be careful some models advertised as "Trainers" fall into the "Toy" category.

Terms

Before we get started a few notes and terms that you might come across.

ARF. Stands for **Almost Ready to Fly**. Model comes in several large pieces that are already covered. Some or all of the hardware maybe included. These models are a great way to get started. You have a flying model quickly with a minimum investment of time and money. A disadvantage to flying an **ARF** is that they all look alike, especially in the air. One **Avistar** looks just like another **Avistar**. One **Easy Sport 40 ARF** looks just like any other **Easy Sport 40 ARF**. This is not a bad thing; it's just a fact you should be aware of.

KIT. By a kit model we mean literally a box of "sticks". A kit consists of balsa, plastic and plywood parts that need to be glued together to form an airframe. This airframe then needs to be covered with some type of 'skin' to complete the model. After that and engine and electronics will need to be added to turn the kit into a flying model.

BUDDY-BOX and BUDDY CORD. Training tool used to connect student and instructor. The instructor controls the transmitter that is flying the model. The student has a separate controller (buddy-box) connected to the instructor transmitter by wire (buddy cord). When the instructor holds down the "trainer" button the student's buddy-box is controlling the aircraft. This is true as long as the "trainer" button is depressed. When released, control reverts back to the instructor.

DIHEDRAL: This is the "V" bend in the wing that makes the wingtips higher than the center of the wing. Most good trainers have some dihedral built into their wings. This adds to the stability of the aircraft and gives it a self-correcting feature (stability).

Aircraft

We recommend that you start with an **ARF (Almost Ready to Fly)** trainer. The advantages of an ARF are you don't need any special tools or equipment to build one and you don't spend a lot of time building the model so you get to the flying part quicker. Also you won't feel as bad if and when the plane crashes. And yes they do crash. One of the differences between new and old pilots is that the old pilots just crash less often. But we still crash. With a few exceptions, stay away from war birds like the P-51 Mustang or Corsair. Also stay away from aerobatic or 3-D models like the Extra 300, Edge 540, Funtana or Magic. None of these will make a good trainer. You also want to stay away from so called Fun-Fly models. Fun-Fly models have short, thick wide wings and a profile fuselage. While the Fun-Fly models will fly very slowly, they are also VERY maneuverable and not for the beginner.

What you're looking for in a trainer is a stable high-wing model, something that is easy to fly. By high-wing I mean that the fuselage hangs below the main wing. Most good trainers have some dihedral built into their wings. These models look like Cessna's or Piper Cubs. Though neither one of these models would make good trainers. Check out some magazines for trainers. Once you have an idea of what you're looking for check out the local hobby shops before you check out the mail order and catalogs. You can get a lot of information from a local hobby shop. Below is a short list of some of the trainer models available. There are really too many to list but this should give you an idea of what's available.

Follow the all directions! If you are assembling an ARF use the type of glues the instructions call for. If it says 30-minute epoxy use 30-minute epoxy. Different types of glues and epoxy have different holding strengths. For example 30-minute epoxy is much stronger than 5-minute epoxy. You will also need to balance the model after construction. Directions on how to balance your model are included in the directions. **Balancing is CRITICAL, don't skip this step.**

First are the "Select, Combo or Complete" setups. These include an aircraft, engine, radio and the other electric components needed to make the model ready for flight. You will probably need other items to actually get airborne but these are a great way to start. Again this list just scratches the surface of what is available on the market.

Trainer Aircraft

ElectriStar and NexStar (Hobbico) Both of these come as either just the aircraft or as COMPLETE setups with radio, engine and electronics along with the model. The ElectriStar is the electric powered version and the NexStar is the glow-powered version of the trainer. The cost for each of these COMPLETE setups run about \$400

P-51 Mustang PTS or F-22 Raptor PTS (Hangar 9). These are models in the Perfect Trainer Series from Hangar-9. These two are the exception to the no war birds' rule. Additions to the wings and landing gear help slow down the model's responsiveness making them acceptable as trainers. Once you have soloed these additions can be removed to give the aircraft more performance. Both of these come as COMPLETE versions and both are glow fuel models. I'm not sure if the aircraft can be purchased separately. The cost for each of these COMPLETE setups run about \$400

In the aircraft only category you have the Lanier Explorer (\$100), Tower Trainer (\$70), Hobbico NexStar (\$100) and Avistar (\$100) and Kyosho Clamato (\$100). In and the ".60 Size" Hobbico

HobbyStar (\$150) and Goldberg Protégé (\$190). Again there are many more trainer aircraft available, so check out your local hobby shop for more information.

Glow Engines

There are basically two types of glow fuel engines, four-stroke engines and the two-stroke engines. Four-stroke engines are on the high end of the glow fuel engine scale. They are generally used by more experienced flyers, usually in scale models. They are more complicated to adjust and produce less power than the same size two-stroke of equal displacement. As a rule of thumb you need a four-stroke engine of 1-1/2 times the displacement of a two-stroke engine to develop the same horsepower. They are also 1-1/2 times the cost of a two-stroke engine.

We recommend starting with a two-stroke engine.

Another distinction between two-stroke engines is whether it's a bushing or ball bearing engine. Ball bearing engines tend to produce more power but are more expensive than a bushing engine of the same displacement. In the .40 to .60 cubic inch displacement range we recommend the following manufacturers.

OS LA Series engines (Bushing ABC Engine) Cost \$55 / 80

These are good bushing engines. They break in easily and are easy to adjust and they run well. While not as powerful as their ball bearing cousins these engines also cost 25% to 50% less. These engines provide good value for the money.

OS FX & ABL Series Engines (Ball Bearing Engine) Cost \$100 / \$120

These are excellent engines. They are easy to break in, to adjust and they run very well. They are an excellent value for the money though they are a little more expensive initially.

Magnum (Ball Bearing ABC Engine) Cost \$80 / \$90

These are good ball bearing engines for the money. They break in easily, are easy to adjust and run well. You get good performance for the money.

Thunder Tiger (Ball Bearing ABC Engine) Cost \$80 / \$90

These engines are good ball bearing engines and a good value for the money. They break in easily, are easy to adjust and run well. Again you get good performance for the money.

The Hangar-9 Evolution (Ball Bearing ABC Engine) Cost \$80 / \$120

This series of engines are new to the market but come already broken-in and adjusted from the factory. Several favorable articles have been written about these engines. The ones I have owned have all worked well, though they take a little practice to adjust.

Electric Motors

There are basically two types of electric motors used for powering model aircraft, brushless and brushed. The difference is as the name implied. Brushed motors have an electro magnet that spins around a solid magnet that is fixed to the motor sides. This electro magnet is powered via brushes that contact the spinning motor shaft. Brushless motors have the solid magnet as part of the spinning motor shaft and the electro magnets are fixed around it in the motor sides. Since the power is supplied to the fixed electro magnets no brushes are needed. The brushless group is further broken down into in-runners and out-runner motors. The in-runner motor is like a normal DC motor in that the motor base is fixed that the shaft spins within the fixed base. In an out-runner motor the motor shaft is fixed and the entire motor spins around the fixed shaft.

Electronic Speed Controllers or ESC's are used to control the speed of the motor and therefore the speed of the propeller, which governs the speed of the aircraft. ESC's come in two flavors, brushed and brushless. Brushless controllers are required for brushless motors. Brushed controllers are required for brushed motors. You can't mix the two.

Battery Eliminator Circuit or BEC's eliminate the need for a separate receiver battery and onboard electronics. With a BEC these are powered by the main battery pack. The BEC has a separate plug for the receiver that supplies the 4 to 6 volts required for its operation and not the peak battery voltage. With a BEC when the battery voltage drops to approximately 4 volts, power is no longer supplied to the motor and the motor stops. Battery power is only supplied only to the onboard electronics, receiver and servos, so you can remain in control of you model.

Radios

There are times you will hear the word channel used in two different ways. One-way refers to the frequency of the radio is transmitting on, i.e. channel 23, or channel 51. Another refers to the number of functions the radio can perform, i.e. a four channel can control four separate functions, a six-channel radio, six functions and so on. We will use the word channel here to mean the number of functions.

We use the term "Electronics" to refer to all of the components needed for controlled flight. These include the servos, receiver battery pack or BEC, switch harness and any servo lead extensions in addition to the transmitter and receiver. The process works like this. When you move one of the control sticks on the transmitter, a radio signal is sent that is picked up by the receiver in the model. The receiver then activates the appropriate servo. The servos are small electric motors that are connected to the control surfaces and throttle of the model. The activated servo moves the control surface or throttle as indicated by the receiver. A rechargeable "receiver battery" within the model powers the servos and receiver or in the case of some electrics a BEC is used. In receiver battery equipped models, generally there is a switch harness containing and on off switch and a charge jack connected to the receiver battery.

We would recommend going with one of the new 2.4GHz radios. While there is nothing wrong with the 72MHz radios but 2.4GHz radios are the future. With the 2.4GHz radios the receiver is bound to the transmitter with a 10 or 12 digit code unique to the transmitter. That way the receiver only listens to the one transmitter. Another feature of 2.4GHz radios is that when you turn on your transmitter it searches the 2.4GHz band for other transmitters and automatically selects channels within the band that are not in use. With 2.4GHz there is no interference from other transmitters. With 72MHz transmitters the frequencies are managed manually at the flying field. You cannot have two 72MHz transmitters using the same channel active at the same time because they will interfere with each other. Hence the reason for a transmitter impound and frequency board.

A 4-channel radio is the minimum radio you should consider. There are two and three channel radios on the market but you will quickly out grow these. Ninety-five percent of the models available will require at least a 4-channel setup. You might want to consider one of the "computer" radios available. They have model memory, mixing functions and many other features that make their additional cost worth it. We're talking about a small difference in cost between buying a standard 4-channel radio outfit and a 6-channel computer radio outfit this is a very good investment especially if you're thinking seriously about entering the hobby.

As far as brands of radios go, I have flown Airtronics, JR, Futaba and Hitec and found them all to be just fine. No one I know of has any complaints about any specific brand. Futaba and JR are the most popular brands in this area, followed by Airtronics and Hitec. All this means is that you

might find it easier to get parts for a Futaba or JR radio than an Airtronics or Hitec brand. In the 72MHz band as far as AM or FM radios go most people I know use FM radios. They seem to be the most available on the market. I have known people who have flown with AM radios and there doesn't seem to be any difference in performance. While the newer servos are interchangeable, you can use one brand of servos with another brand of receiver, receivers are not. It is best to stick to the same manufacturer with respect to transmitters and receivers.

In the 72MHz band, as far as a frequency is concerned, you will want a frequency that is not used by someone else. There are 50 different 72MHz frequencies. They are numbered from 11 to 60. If you belong to a club, they usually have a list of frequencies in use. Remember the fewer folks using your frequency the more you get to fly. This does not apply to the 2.4 GHz transmitters

Learning to Fly

Learning to fly R/C models is not difficult but it is something that is difficult to learn on your own. Our club, like other clubs in the area, has a training program. If you come out to the field on a Saturday or Sunday morning, look for the guys with the red instructor badge on. Explain to them that you're new and want to learn to fly. They will be more than happy to help you out or get you started. We also have "Instructor Nights" on Tuesday and Thursday evening when Day light saving time is in effect. "Instructor Nights" usually start about 5:00 PM and go until dark. There is no requirement that you need to be a club member to take part in our instruction program and the lessons are free.

When you do come out to the field with your model, one of the first things the instructor, or one of our ground checkers, will do is inspect your model for airworthiness. We'll try to make minor repairs or adjustments at the field, but don't be too disappointed if you have to come back another day to fly. After all, we want everyone to be safe and you want to take your model home in one piece.

If your model is airworthy and you're willing, the instructor will hook you up to a "Buddy Box". This is a transmitter that is slaved to your model's transmitter via a "Buddy Cord". The way this works is that the instructor has your model's transmitter, the one that actually flies your model. When he holds the "trainer switch" your "Buddy Box" becomes the controller of the aircraft. If you get into trouble the instructor releases the "trainer switch" and he is again in control of your aircraft. This is how we teach people to fly. You will also receive a student card to keep track of your progress. It also a way for other instructors to see how you progressed when they help you during a training session. Asking for instruction is left up to the individual beginner pilot. You will need to ask an instructor for help. The instructors generally do not ask for students simply because they get busy. Also sometimes the student doesn't feel like flying that evening for whatever reason, too windy, too sunny, too cold, etc. **Remember all you need to do is ask for help.**

Flight Simulators

Finally let me say a few words about R/C Flight Simulators. There are several good flight simulators on the market. First while a simulator will help you to learn to fly they can't take the place of "Stick Time". "Stick Time" is actually flying a real model in real air. On the plus side, flight simulators will give you a good feel for flying, you can use them anytime regardless of the weather and they have a "reset" button when you crash. On the minus side, R/C flight simulators can be a little on the expensive side. They run between \$125 and \$200. This is almost the cost of an airplane, engine and radio. Look for a flight simulator that comes with a controller that looks and feels like an R/C transmitter box with the two control sticks. After all, it won't help you to learn to fly if the controls are keyboard keys or a single joystick. Check out the simulators from

Great Planes, Hangar-9 and Dave Brown. Some hobby shops have the simulators actually set up in the store for you to try.

Finally, there are many choices to make when first getting started in R/C flying, don't be afraid to ask questions. Check out your local hobby shop and magazines. Take your time in picking your equipment. Take your time learning to fly. **Be patient and avoid the mistake of trying to learn on your own.** After all it's a hobby and you supposed to enjoy it. Most of all have FUN. .