New Pilot

Introduction and Training

Guide

First and foremost, you must realize radio controlled model aircraft are not kids' toys. The model is a real aircraft that flies and operates by the same principles as its full-scale counterpart. The only difference is size and weight. Models fly 20-50 mph! These are not slow vehicles, nor can they be flown in a normal backyard. They require plenty of space and, just like their bigger brothers, they require a learned skill to be controlled properly. In fact, most people find the hobby is a bit more complex than they expected. But by the same token, the challenge of learning the new skills required makes the hobby that much more enjoyable and satisfying. You won't get bored!

FLIGHT INSTRUCTION IS FREE TO ALL MEMBERS

As a novice pilot, you will be first instructed using a training "buddy box", giving an instructor the ability to recover your aircraft if you make a mistake. Then you progress to a solo with the instructor standing nearby. Eventually you will fly without an instructor. How long it takes you to learn depends on the time you have available to fly (keeping your new skills fresh), hand-eye coordination, and depth perception. On average, it will take four months of weekend flying to be proficient.

First Steps

Get to know some of the experienced pilots and ask questions! Their experience and help will be invaluable in buying, building and learning to fly your first aircraft. Come to the field and look at the various aircraft, control systems, field boxes, radios, etc. Then, outfit yourself with a good trainer aircraft for your first plane. This is not the time to build and fly that fancy P-51 Mustang you've been fantasizing about. To make your learning easy, there are three key characteristics for your first trainer.

1. High wing with dihedral (the wing is sloped up from fuselage to wingtip)
2. "Tricycle" landing gear (one nose wheel by engine and two under the wing)
3. Flat bottom wing (curved on top, flat underneath).

As you develop your skills, you will move up to aerobatic aircraft with symmetrical wings, mid-wing, a low wing and a tail-dragger. These aircraft are not stable enough to learn with and it will only increase your frustration and chance of failure.

Requirements

Anyone who flies must have a current membership with the Academy of Model Aeronautics (AMA). AMA membership includes an insurance policy for your protection. In addition, you must become a member of LARCC to fly at the field—beginner pilots after 3 flights are required to be a LARCC member.

AMA

http://www.modelaircraft.org

AMA

5151 East Memorial Drive

Muncie, IN 47302

1-800-435-9262

Recommended Items

The plane! If you have basic building skills, your initial costs may be lower since you can buy a kit instead of a pre-built plane—the downside is that you will need to delay your initial flight until the plane is built! There are three levels to consider. The first is a basic kit with just the balsa or foam in pre-cut form. If you want to save time, but would like to pick the color scheme of your first plane, a second option is a pre-built Ready to Cover (RTC). The third and easiest choice for a beginner is an Almost Ready to Fly (ARF), requiring only basic assembly and installation with typical household tools.

Be sure and verify what your aircraft kit does NOT include in the box. You may need to purchase such items as a fuel tank, wheels, rubber bands to hold the wing on, propeller, push (or control) rods, control horns, clevis, spinner, fuel tubing, engine mount, glow-plug and covering material. You can save considerable money if you buy some items packaged together (engine, aircraft, radio). Some typical trainer prices and requirements:

Almost Ready to Fly (ARF)	$90	Basic tools and skills
Ready to Cover (RTC)	$75	Above plus iron, color coordination skills
Basic kit	$60	Above plus glue, building surface, time, patience…
Additional items (if needed)	$60	

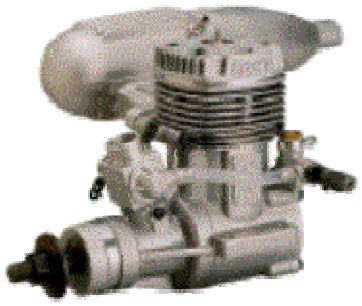
In addition to the aircraft itself, you will need items to get it airborne under radio control. An easy, powerful engine to begin with is a “forty” or .40. to 46. Make sure your plane and engine are compatible; some trainers require .60 size engines. For the safety of others, and the preservation of your aircraft, your first lessons will be on a “buddy box” system—your radio plugged into an instructor’s. Futaba and JR are the most common radio brand used so you have a better chance of teaming with an instructor if you use a Futaba or JR radio. *The buddy box instruction is very important*. While you may be able to teach yourself, the result will be more crashes, higher costs, greater safety risks and a longer training period. Buddy box and trainer cord are provided by LARCC.

As your interest and experience grow, so will your collection of field-box toys. Many of the field box items can be bought packaged together to lower the cost and you can save money by buying used equipment. Some typical retail prices:

.40 engine	$55
4 channel, FM Radio (with servos)	$150
Buddy box “trainer” cord	$15
Starter	$20
12 volt battery for starter	$20
Glo-starter (heats glow plug)	$15
Fuel, fuel pump, etc	$50

Radio

Radios are categorized by frequency type (AM, FM, PCM) and channel count, which affects the number of control surfaces you are able to control. Most new radios are FM, and PCM. Generally, you will want a minimum of four channels to control the throttle, ailerons, rudder (and steering), and elevator. A three-channel system (no ailerons) and aircraft will be gentler to learn on, but won’t perform as well in the wind. If you know you will grow rapidly into other aircraft, you may want to invest initially in a six-channel radio to avoid upgrade costs later. Remember, your radio equipment will have a range far beyond what you can see, and you have to see your aircraft to control it! The radio and aircraft will have rechargeable battery packs inside. If buying a new radio, you will be asked to specify a frequency number. Obviously, to avoid crashes, only one radio can be operating on each frequency at a time. If you select a crowded frequency, you may have to wait in line to fly. Check the LARCC web. page for a frequency that isn’t crowded. At the flying field, each pilot is responsible for getting the correct frequency number pin and putting it on there radio. *NEVER turn on your transmitter at the flying field without possession of the matching frequency control pin!*



(Note: the radio transmitter may have little “cards” that can be removed to change the frequency—this works well for the transmitter; it can easily adjust to a new frequency. However, the receiver radio in the aircraft is physically tuned to a specific frequency (even if it has a removable card) and as a rule of thumb, you should not change its frequency up or down more than one number from the original “store bought” frequency.)

Engine

Your first engine should be powerful enough to pull the aircraft through a slight wind but not so strong that you will have trouble with control. The most common type of engine for model aircraft is the glow fuel, two-cycle engine running on a nitro/alcohol mixture with a caster and/or synthetic oil pre-mixed. Electric motors, four-stroke and gas motors are also used but are not as common in trainer aircraft. Before your first flight, you will want to run the engine through 2-3 tanks of fuel to break it in—follow the manufacturer’s instructions. This step is critical to reduce the chance of engine failure on your first flight. Over time, as the engine “breaks-in”, it will be easier to start and will run smoother. Club members at the field will be glad to show you how to safely start and break in the engine. The glow plug that provides the ignition for the fuel/air mixture in the cylinder is made up of a tiny little coil of platinum wire. To start the engine, an electric current, supplied by a 1.5-volt battery in your glo-starter, must run through the coil to heat it. The engine is then turned over using your starter, to make the engine start running. Once the combustion cycle has started, the coil in the glow plug can retain heat between firings and the electric current from the glo-starter is no longer necessary. The fuel/air mixture is usually adjusted by two needle valves on the carburetor. One needle valve adjusts mixture for idle and low-speed operation while the other is for high-speed mixture adjustment. Throttle control is usually accomplished via a rotating barrel in the carburetor. This barrel controls the amount of fuel/air mixture going to the combustion chamber and is activated by a small arm mounted on the side of the carburetor.

Four-cycle engines produce a lower, more scale-like sound at lower RPMs than two-cycle engines. Because of their valves, they have a higher part count and thus are usually more expensive than two-cycle engines. Engines come with either ball bearing supported crankshafts or with bushings. Ball bearing engines usually have a bit better performance, run smoother and last longer with proper maintenance, but are more expensive than those with bushings.

The pistons and cylinders for model engines are generally constructed in one of two methods; ringed or ABC (Aluminum piston, Brass sleeve, Chrome coated sleeve). Ringed engines have been employed on model engines for years and were the main method of construction until recently. An aluminum or iron piston with a ring moves in an iron sleeve. The ring provides the compression when operating. Ringed engines are easy to flip-start, generate good power. Ringed engines do require a generous break-in period where the motor is run very rich to provide lots of lubrication while the ring fits itself to the cylinder. They are also more easily damaged if the engine is run too lean.

An ABC engine runs with an aluminum piston in a chrome-plated brass sleeve. The piston and cylinder are matched at the factory to give a perfect fit and provide optimum compression. ABC engines start easily by hand, do not require an extended break-in,

give more power than their ringed counterparts, have a good life span, and are less susceptible to damage with a lean run.

Construction / repair

A variety of adhesives exist for building models and you will need some of these for completion of your project. The most commonly used adhesive today is cyanoacrylate ("CA"). Three types of CA are typically used. Thin CA is the fastest curing (usually 3 to 5 seconds!) and is best suited to balsa wood where the joint has a good fit and has a solid contact surface. The parts should be joined first and then the thin CA applied to the joint. The glue will wick into the joint and form a solid bond. Same goes for fingers, by the way. So we've heard.

Thicker or "gap-filling" CA is great for general-purpose building where balsa, spruce or light plywood is involved. Apply the adhesive to the parts and then join. Drying time is on the order of 5 to 10 seconds. The thickest CA, referred to as "slow-setting," can be used like the "gap-filling" CA where slightly longer cure times (30-60 seconds) might be desired. All CA's may be cured more quickly with the aid of an accelerator or "kicker" which is sprayed onto the joint after gluing. *Do not use CA on styrofoam; it dissolves the foam.*

Another family of adhesives is Epoxy. This is a two-part adhesive which is mixed and then applied to the surface to be bonded. Epoxy is especially useful when working with foam parts as it will not attack the styrofoam. Epoxies are very strong and many kits recommend it specifically for certain parts of the construction.

Field Box

As you develop your skills, you will *want* more toys for your toy (field) box. But to start out, you will *need* at least some basic equipment to get the aircraft started. Many companies sell starter kits that include the basics.

Essentials

Field box

Starter

Glo-starter

Battery for starter

Power panel if using a 12-volt battery for starter and glow plug

Glo-plug wrench

Fuel (10% nitro), fuel pump, fuel filter and tubing

Car-wash soap cleaner in a spray bottle to clean oil from aircraft

(Note: avoid degreasers such as Windex or 409; they will degrade the plane's covering)

Options

Voltmeter to check aircraft receiver battery and transmitter

Tachometer

3-in-one oil to protect engine from alcohol post flight

Prop balancer

Quick field charger

Safety starting stick

Rules-of-thumb

- Keep fuel entering the carburetor clean with the use of a fuel filter. Put a filter on the output of your fuel bottle when filling your model and another between the fuel tank and the carburetor in your aircraft.

- When finished operating your engine for the day, run the engine dry of fuel by pulling off the fuel line before shutting it down for the last time. This will ensure that no raw fuel is sitting in the crankcase. Methanol and nitro-methane attract moisture which will rust your engine components, particularly your ball bearings.

- After running your engine dry, use after run oil to give a protective coat to the inside of your engine for further prevention of corrosion.

- When starting an aircraft engine by hand, always use a safety stick to prevent injury to your fingers.

- When setting the high-speed needle valve, always adjust it to the rich side (counter-clockwise) for a smooth run. An engine that runs lean for any length of time is very susceptible to damage.

- Use only the manufacturers recommended fuel mixture and propeller.

- If your propeller is chipped or cracked, replace it. It could be a danger to you and those around you.

Maiden Flight Preflight Check

Internal (Remove wing if attached)

1. Servo mount, servos, servo arms secure (safety clips)
2. Push rods secure
3. Receiver and battery padded and secure
4. Check for loose items that could foul servo or pushrod movement
5. Check for fuel leaks – tank area fuel-proof

Wing

1. Check for breaks, warps, etc
2. Insure center section is adequately reinforced
3. Check aileron pushrods and ailerons clevises (if equipped) before securing wing to aircraft
4. Brief new pilot on adequacy of rubber bands
5. After wing is in place, check for proper incidence and alignment
6. Control surfaces attached securely (aileron, flaps, etc)

Engine Area

1. Firewall area fuel-proof
2. Check engine mount, engine, muffler and prop nut and/or spinner
3. Check prop for nicks, cracks, etc. Brief new pilot on importance of this check
4. Check nose steering mechanism (if equipped)
5. Check cowl secure (if equipped)
6. Check engine for obvious thrust misalignment

Tail Section

1. Check vertical fin, rudder and rudder clevis for security
2. Check tail wheel security (if equipped)
3. Check horizontal stabilizer, elevator and elevator clevis for security

Balance

1. Balance aircraft with fuel tank empty
2. Show new pilot proper balance pint and balance technique
3. Explain danger of tail heavy aircraft
4. Tail heavy situations should be corrected prior to flight

Range Check/Starting Engine

1. Ensure radio batteries have been adequately charged
2. When frequency pin is available, attach to antenna and range check aircraft with antenna collapsed (explain why to new pilot)
3. Check to ensure all flight controls and engine controls move in the proper direction
4. Check flight control surfaces are in proper trim
5. Fuel aircraft
6. Start engine – explain how
7. Tune engine away from pits – explain how and why

Note: Have a clear understanding with beginners prior to flight on how you want to handle the transfer of the transmitter in event of trouble