

# EAST SIDE RADIO CONTROLLED MODEL AIRPLANE CLUB

## **GUIDELINES FOR STUDENT PILOTS**

### **INTRODUCTION**

We belong to the East Side RC Club because we enjoy building and flying RC planes. Our club is open to anyone that shares in this interest. Every trip to the field is an adventure. Sometimes the field is empty and it is fun to practice landings and maneuvers alone. Sometimes there are experienced flyers present and there is always something to learn.



Sometimes there is someone new present so there is an opportunity to share ones own accomplishments. We have club instructors that teach new flyers because they enjoy promoting the hobby. The following guidelines were developed to help this learning period to be more productive for the instructors and more enjoyable for the students. Opinions present herein are a general conscience of the membership. There certainly are other positions on many of these recommendations.

### **AMA & ESRC MEMBERSHIP**

ESRC is chartered under the Academy of Model Aeronautics (AMA)(1-765-287-1256). You must join the AMA before we can issue you an ESRC membership card. Our web site has an AMA application form and a link to the AMA site ([www.modelaircraft.org](http://www.modelaircraft.org)). The current AMA dues are \$48 per calendar year. They also have a student rate. The AMA represents us in Congress and with other government agencies to protect our interests in radio frequency allocations and flying field preservation. AMA also provides the liability insurance that the SIUE campus requires for our use of their field. AMA provides a useful monthly magazine. You can join AMA on the internet with a credit card to get a rapid email receipt of payment with your AMA number on it. Our club will accept this form of assurance from AMA to issue an ESRC membership card. ESRC membership applications are available on our web site and at our field bulletin board. You must also attend a monthly meeting to join. An ESRC card is required to use the field and to obtain the services of our instructors. A parent or guardian must accompany pilots under the age of 16.

### **INSTRUCTORS**

RC flying is a surprisingly involved hobby. It can take more time and effort to build a plane than you might guess. It certainly takes longer to learn to fly than most people expect. Our club provides free flight instruction. No instructor can guarantee the avoidance of a crash during training but he certainly can improve the odds by a huge margin. We post a list of flight skills a student must master to be approved for solo flight. By the time your instructor clears you to solo, you will have recovered the cost of the dues in instruction hours and avoided crashes. Our instructor's and our officer's names & telephone numbers are listed on the bulletin board at our field. Please note that we have a helicopter instructor. You are welcome to call them for assistance. The level of satisfaction that you will enjoy from completing your first solo flight will also exceed expectations.

## AIRCRAFT

A true to scale war bird would not make a good trainer. It is possible to start with a suitable helicopter but almost all of our students begin with fixed wing aircraft called trainers. Several manufacturers produce high quality trainer kits. Our instructors recommend a 40 size or 60 size glow powered trainer. The 60 sized trainers are larger and more stable but they cost more. Most of our students purchase the 40 size ones. Model planes are rated by the size of the engine they use. For Example, a 40-size trainer uses a 0.40 to 0.46 cubic inch 2-cycle engine. These trainers give the student several advantages. A trainer has a “high wing” mounted on top of the fuselage and well above the center of gravity. This improves the flight stability. The wing is large and has a flat bottom to increase the lift and reduce the landing speed. The left and right wing halves both angle upward slightly. This is called the dihedral angle, which also improves the stability. The wing on a trainer is usually attached to the fuselage with rubber bands. This improves the survivability from crash landings. The landing gear has the third wheel under the nose instead of the tail. This “tricycle” arrangement is easier to handle on the ground than a “tail dragger”. There are other types of trainers such as powered gliders but we strongly recommend the type of trainer described and pictured above. If you already own a plane that does not have all of these features, you are welcome to show it to an instructor for evaluation. He might enjoy instructing with something a little different.



Some trainers come as unassembled kits, which require a lot of time to build. Some come as “Almost-Ready-to-Fly” (ARF) kits, which are about 90% pre-assembled. The final costs are surprisingly similar. There are advantages to both types of kits. Most of the trainers at our field are made of balsa and light plywood. They are covered with a modern heat shrinking plastic film such as Monocoat or Ultracoat. These are the easiest to repair and they have good flight characteristics. Some kits use alternate materials such as Styrofoam and aluminum to improve their crash worthiness. These “crash and fly” trainers tend to be heavier than balsa planes and require higher landing speeds. Never the less, some of our students have been very satisfied with these sturdier trainers.

Some airplanes are designed to fly without ailerons or without a rudder. The intent is to make these planes easier to fly. We do not recommend these simplified crafts for students. Better landings are achieved when you have ailerons to hold the wings level and a rudder to hold the intended final course. **Talk to an instructor before you choose a trainer.**

## ENGINE & FUEL

Trainers typically use a single cylinder, 2 cycle engine in the 40 to 46 size range that uses a “glow” plug instead of a spark plug. A glow plug has a small platinum coated nichrome coil that is heated with an external battery for starting and then kept glowing by the burning nitro in the fuel. The fuel should be rated for aircrafts, contain 10% nitro (nitro-methane) and 18 to 20 % lubricant that is 50 / 50 synthetic and castor oil (refer to your engine manual). The other 70% of the fuel is mostly methanol. These glow engines are very powerful. Your first engine is likely to outlast your interest in your trainer so you may wish to consider the purchase of a good quality motor. The ones with ball bearings are noticeably more powerful. Motors with piston rings are not worth the extra cost for new flyers. Several brands are popular at our field. Some pilots prefer 4-cycle glow engines but they cost about twice as much as the 2-cycles. We have not seen any suitable battery powered trainers yet but they do keep on getting better. **Please talk to an instructor before making this purchase. Talk to him again before starting the engine to avoid injury or motor damage.**

## TRANSMITTER

Purchase an FM transmitter that broadcasts in the 72-megahertz range because this frequency range is designated and reserved by the FCC for model aircraft. Licensed amateur radio operators are allowed to use other reserved frequencies to fly RC airplanes. Your retailer will ask you to choose a channel between 11 and 60. These are all frequencies within this 72-megahertz band. Your supplier may not have every channel in stock. Check the bulletin board at our field for a summary of the number of club pilots currently using each channel and record several channels with minimal usage. Purchase a transmitter using a channel from this list to minimize potential conflicts at the field. Two airplanes cannot operate on the same channel at the same time. The club controls this potential interference problem by the use of a “frequency in use” display board. Some of the higher priced transmitters use a digital computer encoding system called PCM. Most of our pilots do not purchase these high priced PCM systems.

A transmitter will only transmit on a single channel but it can be rated from 4 to 9-channels. This is a common and ambiguous use of the term “channel”. It means that the transmitter transmits on a single frequency to control up to 9 different functions on the airplane. A four-channel transmitter is adequate for a typical trainer. The four functions to be controlled are throttle, rudder, elevator and ailerons. Your first transmitter may also be used to fly all of your future planes. More advanced planes add a channel to separate the control of the left and right ailerons. Also additional channels may be used for flaps and retractable landing gear. Transmitters with 4 to 8 channels are common at our field. The more advanced transmitters also have numerous useful computer-controlled abilities that are not found on the basic units. One such feature is a memory that retains your most recent settings for several planes. These are economic decisions.

Purchase a transmitter that has the ability to be connected to an instructor’s transmitter through the use of a patch cord. This gives the instructor the ability to take control of your plane as needed. An alternate approach is to purchase a “buddy box” for your transmitter. A buddy box is an inexpensive dummy transmitter that the student uses to control the airplane while the instructor has the real transmitter. There are several good brands of transmitters. Futaba, Airtronics, JR and HiTec are all popular at our field. **Talk to an instructor before you purchase a transmitter to be sure your unit will be compatible with his.**

## RECEIVER

First time flyers usually purchase a transmitter and a receiver as a packaged system that includes servos, battery packs, chargers and a wiring harness with a switch and charging jack. This is a cost effective approach. Receivers also operate on a single channel (frequency) that must match the transmitter. They too are rated at 4 to 9 channels (functions). The receiver does not have to be rated at as many channels (functions) as the transmitter. The receiver only needs as many channels as the particular airplane will use. One servo is required for each channel (function). A servo is an electric motor and gear drive unit that is controlled by the receiver to move the control surfaces to the position dictated by the transmitter joysticks.

## PROPELLERS

We do not recommend wooden propellers for students because they break too easily upon contact with the runway. We do recommend composite propeller brands like APC and Master Airscrew. Carry an extra propeller and the tools to install it. Be sure to balance them. There are balancers available for this simple task. The hole in the propeller is not always properly sized for the engine shaft. An inexpensive reamer is used to size the hole. Paint the propeller tips white to improve the visibility of the spinning prop for safety. The manual for your motor will recommend a range of propeller sizes. An example is a 10X6. The first number is the diameter in inches and the

second is the pitch, which indicates the distance, in inches, the plane would advance if there were no slip. Propellers with larger diameters and lower pitches tend to be better idle better and provide more thrust for take-off.. Some experimentation is desirable to determine the best prop for a particular plane. Our safety rules require the prop to be secured with a nut and a safety lock nut. These are supplied with the motor. A cone shaped spinner is also required to accommodate the use of an electric starter. Plastic and nylon spinners are common but they break easily and can be a safety problem. It is better to omit the nylon spinner and replace the stock lock nut with an aluminum cone shaped prop nut for about \$6. If your budget is completely unlimited, look at the larger diameter thin walled aluminum spinners. They cost about \$30 and look better until they get all scratched up.

### **SUPPORT EQUIPMENT**

There is always more to purchase in this hobby. Visit the field and checkout several field boxes with their clever control panels. They have provisions to store and pump the fuel. They have a battery for the starter, fuel pump and glow plug. Carry an extra glow plug and a plug wrench. Carry a voltmeter that imposes an operating load on the flight battery while it is indicating the voltage to be sure you have enough electrical power to complete each flight safely. Place a fuel filter between the carburetor and the fueling point. Place a second one on the field box fuel pump. Get a box of #64 rubber bands to attach the wings. The fuel deteriorates rubber bands after one or two flying sessions. We use a lot of paper towels and Windex mixed with rubbing alcohol to clean the castor oil off of the crafts. Some people use a tachometer to set the high-speed carburetor adjustment. We require you to use a positive means of restraining your airplane in the pits. Tom King sells \$5 restrainers for the club. Organize your supplies to avoid the loss of flying time for the lack of a wheel collar or an Allen wrench. Fellow members often help each other out when in need.

### **SAFETY**

Safe flying practice is our most important topic. In the pits or in the air, a 12-inch propeller turning 9,000 revolutions a minute must be taken seriously at all times. Safety begins when you start building your trainer. If you are not sure about a construction step, stop and ask for help. Our safety rules are included in our by-laws and posted on the bulletin board. All students must read and follow them to be cleared for solo. It is necessary to practice these safety provisions to retain your flying privileges. Every member is a deputy to the Safety Officer. We must all work together to maintain our excellent safety record.

### **RESEARCH**

There certainly are some advantages to doing your homework before you purchase and build your first airplane. Our web page, [www.eastside.rcclubes.com](http://www.eastside.rcclubes.com), has links to several sources of information. It has links to magazines that have ads for many good books for beginners. Also go to [www.rcfaq.com](http://www.rcfaq.com) and click on "Beginner FAQ (frequently asked questions) in the left column for some ideas. Tower Hobbies has a very good beginners web page section at [www.easyrc.com/airplanes/index.html](http://www.easyrc.com/airplanes/index.html). Flight simulator programs are available that let you patch your transmitter into your computer and practice at home without crashing a real trainer. Basic training flight videos are available for about \$30. All of these resources are useful but none of them can replace the services of a good flight instructor.

### **PREFLIGHT INSPECTIONS**

You are welcome to bring your plane to the meetings or to the field while it is still under construction to discuss questions and obtain suggestions. It is very important to balance the plane before your first lesson. The plans will show you the position of the plane's balance point. Balance

it without any fuel in it. **A tail-heavy plane will certainly crash.** Some people balance their airplanes on their fingertips. It is better to balance it on fixed supports. Try two wooden pencil erasers. Don't damage the covering. Balancing stands are available for this purpose. One of our master builders epoxies a vertical section of small diameter brass tubing through the wing at the balance point when he joins the two wing halves. This allows him to hang the craft on a string and obtain perfect longitudinal and transverse balance at the same time. Transverse balancing (wing tip to wing tip) is also important. ¼ oz. lead stick-on weights are available for this purpose. Moving the battery is better than flying a lot of lead. Your instructor will make a safety inspection before your first flight. Be sure that all of your linkages and control surfaces move freely and will not vibrate loose. Set the control surfaces to the recommended travel limits. Put your name, telephone number and AMA number inside the plane. If your preparations are less than ideal, this first lesson period may require so much time to correct the little problems and adjust the engine that the first actual flight may be postponed until the second visit. As we noted above, this is an involved hobby that can have disappointing crashes and exhilarating successes. You are invited to come and share this exciting hobby with us.

### SHOPPING LIST

We took a 2002 catalog and made a typical basic shopping list for a beginner. This list is about 95% complete and it presents a good idea of the range of costs to expect for your first flight. Note that Airplane manufactures do not always include all of the required hardware in their kits. Look for a list of required items on the box and talk to the retailer. Sometimes the kits contain metric hardware that can be replaced with English hardware.

Airplane (40 size ARF trainer kit with 60 inch wing span)	\$110 to \$135
Engine (.40 non-ball bearing to .46 Ball bearing)	\$ 60 to \$130
Radio system including 4 servos, batteries and a charger (4 channel Basic to 8 channel computer supported)	\$150 to \$420
Propellers (get at least 2)	\$5
Prop balancer (hand held to bench models)	\$5 to \$30
Prop Reamer (Check engine manual for engine shaft size)	\$7
Field Box	\$50 to \$75
Field Box Battery	\$20
Field Box Power Panel	\$25 to \$50
Electric Starter	\$30 to \$60
Cone shaped Prop Nut for electric starter	\$5
Glow Plug Starter (wired to field box or hand held)	\$6 to \$30
Glow Plugs (Check manual, get 2)	\$6
Glow plug wrench	\$5
Tachometer (optional)	\$40
Volt Meter (good idea)	\$15
After run oil	\$5
Fuel Pump for field box (hand crank or electric)	\$20
Fuel, 1 Gallon	\$13
Box of #64 Rubber bands	\$3
Fuel Filter (get 2)	\$4
Adhesives (check the building instructions for requirements)	\$20

## **DEFINITIONS & TIPS**

**Trim** – Small in-flight adjustments required to achieve straight & level flight at half throttle. A new airplane can be seriously difficult to control until it is in trim. This is one of the valuable services an experienced instructor will provide.

**Hanger Rash** – Non-flight plane damage incurred during storage or transportation. Nonfictional examples include dog attacks, impacts by falling dictionaries, and consumption by trunk lids. Build storage racks out of 3/4inch PVC pipe and cushion the pipe with foam insulation. The relative cost is very low.

**Rekitting** – Reducing a plane into small enough pieces to put it back into the box it came in. This is a bad thing! Check your batteries before each flight.

**Dead Stick** – The engine quits before the plane lands. Use a timer to estimate your remaining fuel.

**Hit** – Receiver jammed by another transmitter or rogue signal. Use the frequency board, display your channel number on your transmitter and know who else uses your channel. Understand and use the range test.

**Tip Stall** – One wing tip loses lift and the unbalanced force rolls the plane into a spin. A common place to experience tip stall is on the final turn for a landing approach. Students experiencing tip stall often think they have suffered a “hit”. This author did. Pay attention when the instructor shows you how to avoid tip stall.

**Washout** – A warp that is deliberately built into the wing to reduce tip stall. Do not skip this important construction step when building the wing.

**Chicken Stick** – A stick used to hand start engines without losing fingers. Just use the electric starter!

**Frequency Paddle** – A common 8 to 10-inch paint stirring stick painted red and labeled with your name and channel number. You are required to provide one and hang it on the frequency board before you turn on your transmitter. Do remember to take it home with you each time. It might be best to paint up a couple of them while you are at it.

## **AFTER BASICS**

Many pilots maintain their trainers long after they are flying more challenging crafts. They use their trainers to warm up with. They use them in the winter with snow skies. They put floats on them for our float flies. They also fall back to them when their aerobatic ships need repairs. For some pilots their second plane is a tail dragger with a wing that has a semi-symmetrical airfoil, reduced surface and mounted below the fuselage. These “low wing sport models” provide higher speeds, cleaner maneuvers; better inverted flight and more fun. Other pilots choose to scale their second planes after actual full size ships and learn to fly them in a more realistic manner. War birds make excellent “true to scale models” that always draw the spectators. Our members welcome you to the hobby and to the ESRC club.

Your assistance is requested to recommend additions and improvements to this article. Comments from new pilots and instructors are particularly useful. Please advise Roger Watson of any proposed changes.