The AMA
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for Newsletter Editors and Club Officers

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PRESIDENT TO PRESIDENT

Is Your Club "Engaged" with the Local Community?

by Dave Brown, AMA President

I'm not referring to being prepared to marry—although in many ways the relationship is similar. What I have in mind is the relationship between your club and the community in which you reside.

When was the last time your club did a community project to raise its positive visibility within the society in which you exist? If your answer is "I can't remember," "I'm not sure we have," or any similar response, then this is a good time to start thinking about what you can do to enhance the stature of your club within your community.

A number of clubs seem to think the secret to survival is to remain "hidden" from public view. I suppose that works for a short time, but in the long run, it will never be the answer. Clubs who try to remain hidden are the ones that are suddenly surprised to find themselves without a flying site and with no options on the table.

Think about it. Many of the organizations which thrive in the community do so not because of what the organization does for its members, but for what it does for the community. It doesn't take much effort to reap a great reward. If your club is willing to give a little to the community, its people will pay you back with increased levels of respect, support, and most importantly, tolerance when you need them to help you through a difficult time.

What can you do? Many things! How about conducting a charity fun-fly? Invite local people and modelers from neighboring clubs over for an event and dedicate the proceeds to a community charity. It doesn't hurt if the charity you select happens to be the mayor's favorite. Surprisingly, it doesn't seem to make much difference how much money you raise! This is *one* area where it really is the thought that counts.

Have you ever thought about sponsoring a scholarship at a local school? I don't think there is any way that your club can get more positive publicity per unit dollar than this.

Think about it! The scholarship gets publicity when it is announced, when it is awarded, when the recipient starts school, and any other time the club draws attention to it. That is a publicist's dream and it's all *positive* publicity. It's also one of the few times that making the front page of the paper is a *good* thing! It doesn't have to be a large dollar amount: $250 or $500 will help a lot.

Does your town have an annual parade on Veterans' Day, Independence Day, Easter, or another holiday? Why not consider putting together a float with many model airplanes on it and get the club *involved!* Believe me, this can be a lot of fun and the public response to your club will be far different than if you try to "hide" your existence.

I'm sure you can put yourself into the shoes of the mayor, sheriff, police chief, or councilman who must deal with a person who constantly complains about the model airplane flying field. It doesn't matter that his or her complaints are unfounded or unreasonable.

Those people have to deal with the constant complainer and unless there is some good reason for them to go to bat *for* you, it's far easier to simply shut you down than it is to deal with chronic complaints.

On the other hand, if your club has become a positive contributor to the community through local projects, it's much more likely neighbors will be more tolerant of your club its activities and that officials will support you and have some ammunition with which to convince anyone who does complain that you should be allowed to continue to fly your model airplanes.

Hmmm … the longer I think about it, this *is* beginning to sound more like a marriage to the community! ♦

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BONUS TIP FOR CLUBS

Bestof Both Worlds

by Carl P. Maroney, Special Services Director

An AMA chartered club inquired: "If we have a donor willing to give us land for a flying field provided he receives a 1099 write-off, could we have them donate to AMA, he then receives the write-off, then AMA could donate the land to our club?"

By donating the land to the AMA, the donor would receive the tax write-off; that is correct. However, AMA cannot redonate the land back to the club. In other words, you can't "wash" the donation through AMA.

With that said we believe that the AMA could accept the donation from your landowner and lease the property back to the club for $1 per year. The primary reason for this is that in the event this club dissolves or terminates for any reason, the land would not be subject to that dissolution. The AMA would continue owning the land in that instance. However, this requires AMA Executive Council action. If this is something you want to pursue, please make an official request through your AMA District VP. ♦

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From the Tucson Radio Control Club, Tucson AZ

"I won't be coming into the office today. I'll be out in the field doing research."

TIPS FOR CLUBS

Mall Shows Part II

by Jay Mealy, Programs Director

In the last *INSIDER* we addressed mall shows and their benefits to clubs. A number of years ago the Academy of Model Aeronautics created this program because, at the time, shopping malls provided the perfect venue for such a presentation. They usually were receptive to the idea and saw the benefit of hosting such activities because it brought in potential shoppers who may have otherwise not visited. Even the retailers would get involved by offering door prizes in exchange for additional exposure, an opportunity that was taken advantage of by many clubs for a long time.

Times have changed and quite often we hear that the floor space previously made available at no charge to community activities, are now being used to generate additional revenue. Space that was at one time given to church groups for bake sales, schools for fundraisers, or model airplane clubs for mall shows is now being "sold" or "rented" for earring kiosks or sunglass huts. Even if space is available, community groups are being asked to pay the same "rent" a business would be charged. This has made it almost impossible for clubs to put on mall shows.

So what do we do?

The mall show concept is still valid and the continuation of such outreach programs by clubs is still just as important. The challenge now is to investigate and identify alternative venues. One such venue available is Wal-Mart stores. This company still makes space available for such community activities; it's just a matter of asking. Other sites for public presentations might be to partner with other functions such as Scouting or school events, community celebrations, or local fairs. With a little effort and legwork, substitute stages for presenting modeling to the uninitiated citizens of your community can be found.

Don't let the fact that you may not have a mall available keep you from having a "mall show." ♦

ON THE SAFE SIDE

Finding the Right Safety Coordinator

by Amy Wilson, Special Services

Now that AMA Chartered clubs are required to have a Safety Coordinator, AMA has created this document to assist clubs in finding the best person for the job. We already have a document of suggested Safety Coordinator duties; however, to offer additional assistance to clubs, we have come up with some suggested skills we believe will be beneficial for the Safety Coordinator to possess.

The Safety Coordinator should be a person who will mentor, serve as a role model and educator and a promoter of safety awareness. He should also have the ability to assist in the development of club activities from a safety aspect and provide support in running such activities. It is important to remember that the Safety Coordinator is not the "Club Field Police," rather the person who displays a positive attitude and willingness to teach others in regards to safety at the club field.

Role Model

An important attribute for a role model to have is leadership skills. A Safety Coordinator should be someone who is very knowledgeable about our hobby, maintains high standards, and displays a positive attitude when dealing with safety issues.

If you lead, they will follow. This statement pretty well sums up how the Safety Coordinator can affect the club. A good leader, with a positive attitude who knows the ins and outs of the club rules and by-laws, will assist in club members gaining trust and respect for the Safety Coordinator. In turn, club members will have an encouraging resource to turn to with any safety issues that may arise.

Educator

Education, education, education! We can't say this enough. Many accidents and injuries could be avoided if only pilots were more educated on the aspects of safety. Start by looking at a person's interpersonal and communication skills. A Safety Coordinator who can work well and communicate effectively with the club board and members will be more effective in teaching safety than a person not as efficient in this area.

Safety Coordinators should work with the club to develop an ongoing educational plan for the club members. Offering quarterly safety meetings, special safety classes for newcomers, and any additional preventative measures the club finds necessary, would be an important step in creating an effective educational program. The Safety Coordinator would play a leading role in the development and implementation of all safety education programs and having skills to educate would be a benefit to the club.

Promoter

Promotion of safety within the club is a must and the club will want to look for a good promoter. An ideal candidate for the Safety Coordinator might be a salesman or marketing major. Salesmen promote the product they are selling, and if they have been in the profession for some time, you would assume he/she has ability in this area. A marketing professional would have a knack for promotion, as this profession would require such skills. This is not to say that someone without a background in sales or promotion couldn't effectively be a good Safety Coordinator. However, we believe someone with this type of background would be a bonus to the coordinator position.

Effective safety promotion will encourage members to become more aware of their surroundings at the club field.

Final Thoughts

When choosing a Safety Coordinator, the club should find a person who will appreciate the importance of creating an atmosphere of safety. Yes, the Safety Coordinator should be responsible for promoting safety first and foremost; however, this person should not be considered the "Club Field Police" and appropriate avenues should be established by the club to handle any safety matters that may surface (i.e. proper steps for the Safety Coordinator to take could be established in the club bylaws).

Good judgment and communication skills are important for your Safety Coordinator to have. The Safety Coordinator will not make the final decision on safety concerns as normally these issues would be voted on and decided by the club board. However, the coordinator should be able to use good judgment, make decisions based on facts, and relay any concerns or observations through the proper channels so the club may make an informative decision and take any needed preventative action.

A Safety Coordinator who has the skills mentioned in this document and does diligent follow-up on safety issues will increase safety throughout the club all the while strengthening our hobby!

As always, we should remember, above and beyond, Safety Comes First! ♦

From the Albuquerque Radio Control Club, Albuquerque NM

The Basics of Electric Flight

by Pat Tritle

I really enjoy getting together with clubs and speaking to the group about the basics of electric power. However, because there is so much information that needs to be passed along, it would be difficult, if not impossible, for those attending to remember much of the pertinent information. For that reason, it's better to write up the basic guidelines so that those who are interested in getting into electrics would have the information available for reference at a later date.

Here goes. I'll keep the numbers as simple as possible to avoid unnecessary confusion.

The numbers in Table 1 are based on models with wing loadings from 8-16 oz/square foot. As with gas models, higher wing loadings require more power since they must fly faster to support the added weight. By the same token, a lightly-loaded model with a wing loading in the 3-5 oz/square foot range will fly very well at 25 - 30 watts/pound.

TABLE 1

Basic power needed to fly an electric model:

Direct Drive Systems	60watts/pound
Gear Drive Systems	50 watts/pound
Mild Aerobatic Performance	70-80 watts/pound
All-out Aerobatics	100-110 watts/pound
3-D Performance	150 watts/pound or more

What's a 'watt'; and where can I get some?

Wattage is the term used in electric flight to relate the level of power that an electric drive system will produce. To relate it to terms we're familiar with, 746 watts = 1 horsepower. To calculate the wattage delivered by a given system looks like this: amps x volts = watts. So where do these numbers come from and how do I know how many volts and amps are needed to fly a given model?

Okay, let's say you want a mildly aerobatic sport model with a 14 oz/square foot wing loading that will weigh in at 2 pounds. We already know that the power requirement for a model like this is about 70 watts/pound, so we're going to need to generate about 140 watts. Let's assume that you are going to use an eight-cell Ni-Cd battery. At 1.2 volts per cell, eight cells will deliver 9.6 volts. To arrive at the necessary current draw to achieve 140 watts, simply divide 140 (watts) by 9.6 (volts) and you arrive at 14.58 amps.

Now, let's assume that you have a three-cell Li-Poly battery for the model, which is rated at 11.1 volts. The formula is the same; 140 (watts) divided by 11.1 (volts) = 12.6 amps. As you can see, as the available voltage increases, the lower the current draw needs to be to deliver the necessary wattage.

Now here's something to consider when selecting your system: the higher the current draw, the shorter the flight duration on any given battery. Therefore, the ideal setup would be to use a higher-voltage battery with lower current draw for maximum duration. On the downside, when using Ni-Cd and NiMH batteries, as the cell count goes up, the weight will increase significantly as well. It works that way with Lithium too, but Lithium batteries are dramatically lighter then the old "round" cells.

Okay, let's say we're going to use an 11.1 volt Li-Poly battery. All we need to do now is select a motor that will swing enough propeller at 12.6 amps to fly the model at a top speed of around 40-45 mph and we're in business. Now that you know the parameters, visit your local hobby shop and select a motor that fits that description.

Gear Drive vs. Direct Drive: Why is one better then the other?

Well, it all depends on the kind of performance you're looking for. If you're looking to go fast, go with direct drive. Going fast requires a high-pitch propeller turning high rpm. The formula to calculate propeller pitch speed is an easy one; it looks like this: rpm x pitch (in inches)/1056 = mph. Let's say that you are turning a 7-6 propeller at 14,000 rpm. 14,000 x 6 = 84,000/1056 = 79.55 mph

Now, let's assume you are setting up a slow, relaxing park flyer with about a 5 oz/square foot wing loading. If we swing a 9-7 propeller at about 3,500 rpm, we'd be looking at a top speed of roughly 23 mph. To swing that much propeller with a small, light drive system, we would use a gear drive unit at a very low current draw and a small, light battery.

Again, to make a known comparison, we can relate all this to riding a 10-speed bicycle. A gear drive swinging a big propeller is like riding your bike in low gear. You pedal like mad with little effort, you don't go very fast, but you can climb steep hills with ease. The direct drive system could be compared to riding the bike in high gear. It'll really go fast, and even though you're pedaling slower, it requires considerably more effort.

What all this boils down to is "propeller disc loading." We all know what wing loading is: it's the amount of the model's weight that each square foot of wing must carry. Prop disc-loading works the same way. A large propeller will be more lightly loaded, thus delivering more torque then a smaller propeller turning high rpm. The tradeoff, of course, will be speed.

One more thing to cover and we'll give you a rest. Batteries are rated in "voltage" and "amperage." Voltage dictates the amount of power the battery will deliver. The amperage rating dictates for how long the battery will deliver that power. To relate that to glow fuel, consider the voltage as nitro content. High voltage (nitro) means more power.

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From the Prop Masters RC Aero Club, Downers Grove IL

Preflight Inspection

by Ivan Cankov

Preflight training teaches the student how to inspect and prepare his model for flight. Like full-scale airplanes, a model airplane flight does not start with takeoff and end with landing. It starts with preflight inspection and ends with inspecting the airplane for any damage because of hard landings or suspicious behavior during flight. As are full-scale airplanes, our model airplanes are complex machines. To ensure a successful flight we must make sure that all components are in proper working order.

We are in this hobby mainly for the fun, but we all crash—we just don't know when. Even trainer models flown with an instructor using a buddy box will crash. The causes can be component failure or pilot error; yes, instructors err too.

To keep it fun we have to follow safety rules—both general safety rules as well as specific rules that apply to our model aircraft field. Students must learn to follow these rules to ensure that all pilots and spectators are safe and property damage, if any, is limited to our model airplanes only. Safety is of concern to everybody—all pilots at the field whether club members or not, flying or not, spectators, and people just passing by. All model-aircraft pilots should enforce the rules and make bystanders aware of potential hazard areas around the field.

Inspection of a new airplane starts with checking the integrity of the main glue joints and all screws. A student's model comes to the field already assembled so it's not possible to thoroughly check whether it is perfectly put together—whether it's scratch-built, built from a kit, ARF, or RTF. Despite this, an instructor is able to check the components that are likely to fail under stress during flight. These likely failures are the wing joint, tail feathers, control surfaces, landing gear, engine mount, and firewall.

Models are not considered airworthy if there are any problems found. Remember, you're a winner when you get your airplane(s) home in one piece even if you haven't flown them. Any problem(s) found need to be fixed and another inspection performed. Some of the problems can be fixed right at the field. Others require more time and the convenience of a workshop.

Test the wings by placing the center flat on your chest and pulling the wingtips with a reasonable force. Performed the test in both directions—top and bottom of the wing. The joint should not crack. Some ARF and RTF manuals state to use tape or small plastic straps and screws to hold the wing halves together. My advice is to glue the wing halves together using 30-minute epoxy unless the wing is specifically designed to use a different method, such as the NexSTAR wing.

Pulling the tail feathers up, down, and sideways should not move them. Again

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The amperage is related to the quantity of fuel, or simply the "size of the tank."

To figure the size of battery needed, let's go back to our 140-watt sport airplane. If we're pulling 14 amps from a 1400 mAh (1.4 amp hour) battery, we will have full power duration of five to six minutes. In the real world, with proper throttle management, you'll see flight times of approximately eight minutes. These are common flight times, even with liquid-fueled models.

To arrive at that number, divide the battery amp rating by the current draw: 1.4 (amp hours)/14 (amps) = 0.1. Then take 60 (minutes per amp hour) x 0.1 = 6 minutes. Now, to double the duration, you must either cut the current draw in half (to 7 amps), or double the battery size (to 2800 mAh or 2.8 amp hours)—again we see trade-offs. To reduce the current draw, we can use a larger, higher-pitch propeller turning slower with very little weight penalty. If we double the size of the battery capacity, the weight penalty is quite high unless we go over to the new Lithium batteries in which we will discover we have benefited from a tremendous weight reduction, but at a higher price then conventional batteries.

Okay, I promise I'll quit before we all end up in "system overload." Once again, there's a tremendous amount of information here for a newcomer to electrics to digest, so let's do this: if you have specific questions about setting up an electric model, please feel free to drop me a line (patscustommodels@aol.com) and I'll do what I can to steer you in the right direction. For now, I'll offer up one last piece of advice. To get started, work with a known good design, and use the recommended equipment that has been proven to work. Talk to the people who are successful and copy what they're doing. The one thing I do know about modelers is that they are always willing to share their knowledge with those interested in what they are doing. ♦

From the Middle Point RC Flyers, Murfreesboro TN

Airplanes for Flying in Windy Weather

by Ivan Cankov

All too often, on an otherwise nice but windy day, folks just don't fly. Obviously, for a beginner, that's common sense—but for someone who has some experience, the wind can be a challenge that adds some spice to flying.

While it's easy to see that experience level has a lot to do with how much wind is too much, it may not be quite as apparent that the type of model you're flying also can have a great effect on your ability to handle winds.

Let's go through some airplane design features to see which ones give us the best flying characteristics to handle winds and the resulting turbulence.

Size: In general, the larger the airplane, the better it will handle winds of all kinds; large models don't "flop around" as much!

Dihedral: The more dihedral in a model's wings, the more they are going to be affected by crosswind gusts; it is hard to keep the wings level, therefore lineup to the runway is difficult in a crosswind situation.

Wing Loading: The higher the wing loading, the less an airplane will be affected when hit with a gust.

Aspect Ratio: Lower aspect ratio (stubby) wings will be less bothered by gusts; there is less leverage for side forces to upset the airplane, and lower aspect ratio wings have a greater tolerance to changes in angle of attack caused by gusts.

Power: Having the power to overcome the force of wind is necessary. The same thing goes when you get into a sticky situation.

Lateral Control: Ailerons are beneficial in a crosswind landing and takeoff phases. The ability to dip a wing into a crosswind without changing heading is essential, as is the ability to rudder the airplane parallel to the runway heading while keeping wings level with aileron while landing.

Landing Gear: Models with tricycle landing gear are easier to land and take off in a crosswind than tail draggers; in addition, the wider the spread on the main gear, the better.

Maneuverability: This one is a bit harder to quantify. You want a model with stability, yet you do need good maneuverability to cope with gusts. Therefore, you want a model that is stable, yet responsive.

Wing Mounting: Generally, a low-wing airplane will handle crosswinds better. This is because the center of gravity of the airplane is nearer, in a vertical sense, to the aerodynamic center of the wing. Therefore, a side gust does not roll the model as easily. Moreover, by mounting the main landing gear on that low-wing model, they can be spread wider.

It's unfortunate that almost every item above is in direct opposition to the characteristics found in many popular trainers. The main exception is the requirement for tricycle landing gear. But even with trainers, there are differences. Compare a Seniorita with the Kadet Mk2. While the Seniorita may be a bit slower and a bit easier to fly, the Kadet, with its ailerons, higher wing loading, lower aspect ratio, and lower dihedral, is a far better airplane when flying in windy conditions. Going a step further with the same kit manufacturer, the Cougar (.40)/Cobra (.60 size) kits embody *all* the right characteristics for windy flying.

In closing, I offer Confucius' only known saying about RC flying: "To learn to fly in wind, one must fly in wind!" ♦

From the Jet Pilot's Organization

Composite Materials: Kevlar and Its Properties

by Art Gajewski

This article will provide some insight into aramids commonly known as Kevlar. As jet modelers, most of us are familiar with the popular fabrics used in the construction of our aircraft. Certainly, we have all built or flown models made of fiberglass and even some with carbon fiber and Kevlar. However, have you ever wondered how these materials are made and what are some of the tricks to use them properly?

Introduced commercially in the 1970s, Kevlar aramid is an aromatic organic compound of carbon, hydrogen, oxygen, and nitrogen. Kevlar fiber is produced by spinning long-chain polyamide polymers using standard textile techniques. The low-density, high-tensile strength, low-cost fiber produces tough, impact-resistant structures. The compressive properties of Kevlar laminates are low (because of poor coupling of resin matrixes to the aramid fibers), so, applications are typically secondary structures or tension-critical applications.

Kevlar fiber, originally developed to replace steel in radial tires, has found increasing use in the belts of radial car and truck tires, where it saves weight and increases strength and durability compared to steel belts.

Two Common Kevlar Alloys

Kevlar 29 is a low-density, high-strength aramid fiber designed for ballistic protection, slash-and-cut resistance, ropes, cables, and coated fabrics for inflatable and architectural fabrics.

Kevlar 49 aramid fiber is characterized by low-density and high-tensile strength and modulus. These properties are the key to its successful use as reinforcement for plastic composites in aircraft, aerospace, marine, automotive, other industrial applications, and in sports equipment. It is available in continuous-filament yarns, chopped fiber, woven and unidirectional fabrics, tissues or veils, and tapes for reinforcement applications.

Kevlar 49 aramid is used in high-performance composite applications where lightweight, high strength and stiffness, vibration damping and resistance to damage, fatigue, and stress rupture are key properties. Reinforced composites can save up to 40% of the weight of glass-fiber composites at equivalent stiffness. The aramid composites resist shattering upon impact, and the presence of the fiber inhibits propagation of cracks. Depending upon the selection of resin systems, aramid composites have a useful temperature range from -320° to

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400° F (-196° to 204° C).

Kevlar 49 is not a carbonized or graphitized material. Unlike other organic materials, its stress-strain behavior is linear to ultimate failure in tension at 340 kips/square inch (2344 MPa) and 1.8% elongation. Toughness of the fiber composites is significantly higher than carbon graphite composites. Furthermore, the very low density of the fibers provides a higher specific strength than glass or carbon reinforcing fibers. The specific modulus is between four and five times higher than that of glass fiber. The usable strength of Kevlar 49 reinforced epoxy is about four times that of 7075T6 aluminum at less than half the density.

Kevlar—Getting the Most Out of Yours

Kevlar is lighter than fiberglass (for a given strength) and tougher than carbon fiber. Therefore, it sounds like the ideal composite, right? Well, yes and no. Let's see how to best use this aramid material.

First, cutting it can be a real pain. Special shears are required to cut Kevlar fabrics and tapes. These shears are designed to hold the fabric securely as the cutting blade does its job. If you look at these shear blades closely, you'll notice that there are serrations on the "holding" edge and a sharp edge on the cutter. These shears are a specialty item and are therefore somewhat expensive, but they are well worth the price in reduced aggravation and improved results. Don't try to cut Kevlar without them.

Second, use a compatible resin. Kevlar does not bond well with polyester resins. Keep it simple and use epoxy resins for the best results.

Last, use Kevlar for specific applications including reinforcements as opposed to entire structures, predominantly tensile loads, vibration damping, or scuff resistance. Kevlar works well as reinforcement in fiberglass structures. Cost may become prohibitive when used as the only fabric in a composite structure and its compressive strength isn't as good as some other materials. I have seen Kevlar canoes, but I don't know how well they perform. Kevlar works really well as localized reinforcement in vibration-prone applications (e.g. engine-mount boxes in Giant Scale airplanes with gasoline engines). Scuff resistance is another good application—wing tips, fuselage bottoms, etc.

Always use high-quality, engineered resin. Some hobby resins may not have all of the strength properties we desire in our applications. I personally use and recommend WEST Systems 105 resin with fast or slow hardener. WEST Systems is competitive on a cost-per-ounce basis. This resin dries hard, is easy to sand, it's tough and not easily damaged compared to some other hobby resins intended for the same application.

Once again, a quick word about hybrid fabrics (carbon fiber and Kevlar)—these hybrid fabrics are popular because they look attractive and can provide the lightweight, high strength, and stiffness of carbon fibers with the lightweight, toughness, and abrasion-resistance of aramids. ♦

Note: Information in the article is adapted from Composite Materials Handbook, M.M. Schwartz, McGraw-Hill Book Company, 1984.

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some ARFs and RTFs use studs glued in the fin and nuts (with plastic inserts to prevent them from unscrewing) to bolt the tail feathers to the fuselage. It's somewhat handy for transportation and storage but they are also more likely to fail, so my advice here is to glue them in place while still using the nuts.

Pulling the control surfaces—ailerons, elevator, and rudder (and flaps on some airplanes)—is the easiest way to check them. They should stay in place. Inspect the hinge gap; is it too big? If so, seal it. The easiest method I've found is to use regular Scotch tape. I always carry a roll in my flight box for repairs at the field (including repairing holes in the covering caused by landing in the weeds).

Check all linkages: there should be no play or slop. Play or slop in the linkages as well as big hinge gaps can cause flutter that can in turn destroy the wing, stabilizer, or fin to which it is attached. Although trainers have smaller control surfaces, moderate speeds of operation, and are not very prone to flutter, it can still happen—usually after the beginner pilot has soloed and starts performing aerobatic maneuvers with the trainer model at higher speeds. It happened to me; I lost my trainer due to aileron flutter.

Check all screws. I put Loctite on all metal-to-metal screws—from landing gear to fuselage. Don't tighten any engine screws if you are not familiar with the particular engine and its carburetor. Some of these should not be tight at all while others are torque-and-sequence sensitive.

All wood screws should be tight, too. Use thin cyanoacrylate glue to harden the holes. First, run the screw in the hole so it taps it, then remove the screw and put a drop of thin cyanoacrylate glue in the hole. Wait for the cyanoacrylate glue to fully cure and reassemble the part. These include, but are not limited to, servo screws—the ones that hold the servos to the servo tray—hatches, tail landing gear (most high-wing trainers are not tail-draggers but use tricycle landing gear and don't have a tail wheel), main landing gear, etc.

Most RTFs come with already assembled engines and landing gear. Usually they are not properly tightened and sometimes they become unscrewed and fall in the box. The result is a model that arrives at the field with screws missing or not tightened. Beginners are not knowledgeable enough to notice or even know how many screws should be used, and are mislead by the Ready-To-Fly advertisement of the product they just acquired.

Check the propeller. Is it the proper size for that particular airplane/engine combo? Is it suitable for training? Small diameter high-pitch propellers provide a lot of speed that is not needed for a trainer model. A typical propeller for a .40-.46 size engine on a trainer plane is 11 x 5.

Next check to see if the propeller is properly attached to the engine crankshaft. The propeller nut should be tight—very tight. The modern engines have hardened crankshafts and use hardened propeller nuts, so don't be afraid to tighten it. With an electric starter, from a safety and ease point of view, a spinner or spinner nut should be used. It should be tight, too. If the screws holding the spinner cone to the backplate are not tight, the cone will start to vibrate when applying the electric starter and shatter if it is a plastic one.

Check the center of gravity (CG) of the airplane with an empty tank. An improperly balanced airplane is hard to impossible to control. If done at the field and it's windy, try to find a place where the wind will not affect the airplane's attitude. Using your fingers is not the most precise method but it works. For most trainers the CG is located at the main spar. Check the CG with the fuel tank empty. When it's full, the CG is slightly forward. It's easier to fly a slightly nose-heavy airplane than a tail-heavy one. Most of the fuel is gone by the end of the flight, so the CG goes back to where it was set up with an empty tank.

Check the direction and the amount of control surface deflection. Do not exceed the manufacturer recommended values—they make the model more sensitive to the controls. That, combined with the inherent tendency of beginners to over control the airplane, will lead to aggravation from the student. He or she will be constantly fighting the airplane.

Do a thorough range check with the transmitter antenna fully collapsed and the engine running at idle, half, and full throttle. You can do it while breaking the engine in (if the engine is new). The servos should not twitch when you walk up to 30 paces (60 feet) away from the airplane. Twitching servos might be caused by low battery voltage for the receiver and/or transmitter pack. (Were they charged overnight?)

Break in the engine. ABC/ABN engines normally take one to two tanks before they can run reliably. Ringed engines take longer. Run the engines on the rich side of the needle valve, especially ringed engines. The airplane is ready to fly when the engine can idle and transition reliably.

Some engines (Evolution) are advertised as factory broken in. My advice is to take the time to run at least one tank of fuel through it. After that, if its performance satisfies an experienced pilot, the engine can take an airplane in the air. Keep in mind that the engine will continue to break in until it burns a gallon or two of fuel. How much depends on engine design. During that period, the engine will require some readjustment of its needles.

Leave the maiden flight to an experienced pilot. He will fly the airplane and trim it out. He will also readjust the linkages if necessary when the airplane is back on the ground so the trims can be recentered (if the transmitter is not a computer one). ♦

Getting Started in Model Aviation

Glenn Bontly, editor

This past summer, I was asked if I would be interested becoming a flight instructor. Having been an instructor pilot for the Air Force many years ago, I jumped at the chance to share my knowledge and skill with new student pilots. In preparation, I did a lot of research in various books and on the Internet, and compiled a training manual in order to help me provide a comprehensive and methodical approach to training students from Ground School through Solo and beyond. I would like to share some of the things I learned during this process for the benefit of those who are currently learning to fly.

In my opinion, model aviation is one of the most exciting hobbies available. You are introduced to many new interests, disciplines, and skills including: aerodynamics, electronics, mechanics, engines, model building, and of course flying. As you know, radio-controlled airplanes are not toys; they are true airplanes that fly and operate under the same principles as full-size aircraft, the primary differences are size and weight. The average .40-size model will weigh roughly 6 pounds and can fly at speeds from 25 mph to 50 mph. The force of the model hitting an object can be devastating, especially if it hits a person. As such, a model must be controlled properly for both enjoyment and safety. An experienced RC flight instructor can provide you with the knowledge and teach you the necessary skills to safely and successfully achieve your goal of becoming an RC Pilot!

The first step in your journey will be to purchase an airplane, engine, radio, and field equipment. Expect to pay approximately $400-$500 to get started, with the understanding that your radio, engine, and field equipment will usually all carry over to future airplanes. Often a prospective RC pilot will visit a flying field, see a sleek-looking warbird, and decide to run out and buy one as a first airplane. Hangar 9 recently came out with its P-51 Mustang PTS (Progressive Training System). I'm sure it's a fine model, but the fact remains that it's a low-wing tail dragger—not the best choice for your first airplane in my opinion. I believe you will be much more successful if you start with a standard basic trainer.

A trainer is a specific type of model airplane that is designed to be stable. Absent of control input, it has an inherent ability to correct itself and return to straight and level flight (assuming sufficient altitude is available to do so). Most trainers are designed to remain stable in slow flight as well, so they are easier to land than more advanced airplanes. A typical basic trainer is moderately sized (.40-.60 engine), with tricycle landing gear, structurally sound construction, and a high, flat-bottom wing.

There are several good trainer airplanes on the market. These range from the most basic kit (that you must build from individual pieces using plans, cover or paint, and install all of the hardware, including the engine and radio system), to Almost-Ready-to-Fly (ARF) models (requiring only assembly of the major components and installation of the engine and radio system), to Ready-To-Fly (RTF) models (complete with pre-installed engine and radio system). The two primary considerations when choosing a trainer are time and money.

For many aeromodelers, building provides a significant portion of the fun. Purchasing a kit gives you the pleasure of building your own model, the option of selecting your own color and trim scheme, and the knowledge of the structure of the airframe (making it easier to perform repairs if required). The biggest disadvantage of building a kit is the time required to construct the model—time you may rather spend learning to fly. Another disadvantage, in some cases, is the emotional attachment you may develop, having spent many hours on your creation (it "hurts" more when you crash!). As far as cost goes, although the kit itself will be much less than an ARF model, once you include tools, covering, and hardware, the difference in cost is negligible. Often, the final cost of an airplane built from a kit is higher than an ARF.

The big advantage of ARF models is that they can usually be assembled over the course of just a few days, and you will be ready much sooner to start your flight training. On the down side, you typically don't have a choice of color schemes, so your model looks like everyone else's. With the covering already complete, you usually can't inspect the quality of the structure, so it would be wise for the beginner to get an experienced modeler to check it out before you start assembly. They will be able to point out areas that may need to be re-glued or reinforced. On the other hand, the quality of ARF models is getting better and better. Most are built and perform as well as any of the kit models on the market today.

Finally, today's RTF models can literally be assembled faster than the time it takes to charge your radio batteries! They cost a bit more, but if you absolutely must get into the air in the shortest amount of time, this is definitely the way to go. ♦

This diagram shows the various components of a typical trainer airplane.

Aileron: one on each wing; the moveable control surfaces on the trailing edge of the wing that cause a change about the roll axis

Cowling: the part of the fuselage that covers the engine

Engine: an internal combustion machine that provides motivational power

Elevator: the moveable control surface on the trailing edge of the horizontal stabilizer that causes a change about the pitch axis

Fin: also know as the vertical stabilizer, the fin provides stability about the yaw axis

Fuselage: the main body of the aircraft

Landing Gear: the supporting structure of an aircraft consisting of landing gear struts and wheels

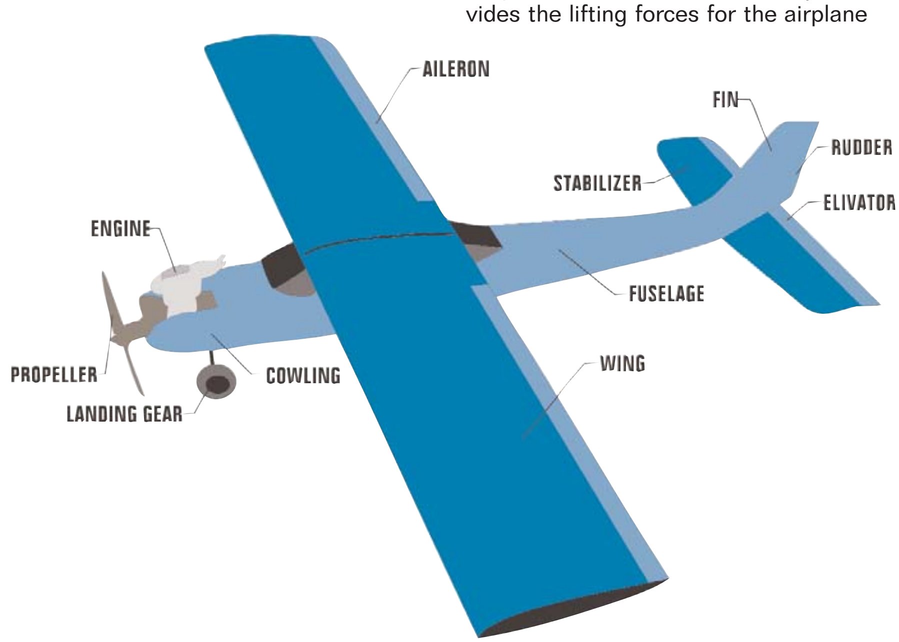
Propeller: the device that converts the power created by the engine into forward thrust for the airplane

Rudder: the moveable control surface attached to the trailing edge of the fin that causes change about the yaw axis

Spinner: an aerodynamic covering over the center hub of the propeller

Stabilizer: also known as the horizontal stabilizer, the stabilizer provides stability about the pitch axis

Wing: the horizontal surface that provides the lifting forces for the airplane



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