



**PRESIDENT TO PRESIDENT**

# AMA/NASA Program

by Dave Mathewson, AMA President

AMA recently signed a memorandum of understanding with NASA to collaborate on a program to incorporate NASA Remote Sensing resources as an aid in the classroom to teach Earth Science. This Space Act Agreement signed between NASA's Remote Sensing Earth Science Teacher Program (RSESTeP) and the Academy of Model Aeronautics (AMA) will allow certified Earth Science teachers nationwide to continue to take part in the program.

NASA has a history of developing programs to encourage young people to become more involved in aviation and

aerospace as a career choice. As an important participant in the RSESTeP program, AMA members can play a significant role in helping to build our country's future workforce.

The agreement calls for AMA members and clubs to work side-by-side with teachers and students in local school systems using NASA research equipment. While NASA provides the necessary tools, AMA members will provide the modeling experience and piloting skills to make the program successful. RSESTeP is administered by the Goddard Space Flight Center and is available to teachers

instructing in fourth through 12<sup>th</sup> grade levels.

To take part in the program teachers are required to submit a conceptual outline of how they will incorporate the program into their classroom. Teachers selected to take part then spend a week during the summer at Goddard Space Flight Center developing their "missions."

The program, which began in 2005, has

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**CLUB CORNER**

## The Club Corner

by Jim Wallen, *Insider* Club Column Editor

Club leadership is one of the more important facets of our AMA clubs. If we have dynamic and proactive leadership, the club tends to prosper. If a club officer is an officer in name only, the club will not do as well. Stagnation and declining membership are symptoms of clubs having uninspired leadership.

There are multitudes of activities that clubs may undertake that are only limited by the time available from the club officers. Let's try to recruit club officers that have new ideas and want to give them a try.

All too often it is a problem filling even the most important officer positions in a club. Try to think of some ways to make volunteerism more appealing to club members. Maybe you can have an Officer Recognition Day at one of your club meetings. Make it a point to invite all officers, past and present, to the meeting to be recognized. Invite the spouses and bring a cake to celebrate. Some clubs incentivize members to become club officers by giving them discounts on the club membership! Patches and/or pins are a possibility as well. Get their names out in front of the membership with an article in the club newsletter.

Remember, nothing happens unless you go out and make it happen. Bring up this idea at your next officers' meeting and get their opinion. You might be surprised at the new ideas that pop up!➔

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# It Wasn't the First Time

Don Nix, *Insider Safety Column Editor*

And it certainly won't be the last time my occasionally warped sense of humor gets me in trouble. In a previous column I offended someone by making a remark that seemed callous and unfeeling to one reader.

I wrote about one club losing its flying field because a non-member's model crashed into a prison yard. I followed with this comment: "I was just wondering ... if the model had taken out a hardened criminal, d'ya' suppose the officials might have withheld their complaints?"

Apparently that touched a sensitive spot with this reader, even though (I thought) it was clearly intended as dark humor. Dang ... foot in mouth again. I have already apologized to this individual, but just in case it missed the mark with anyone else, I would never seriously advocate killing anyone with a model.

Now, with that taken care of, let's get back to the subject of safety, which for the past several months has dealt with the safety of people. Considering the cost of

our equipment, perhaps we should devote a few paragraphs to its well-being.

As I have mentioned in the past, for a dozen years I was the owner of one of the leading model fuel manufacturers. During that time—and even now another dozen years later—one of the most frequently asked questions was about rust and corrosion in engines. In retrospect, it seems there have been almost as many different theories about the cause as the number of questions.

Assuming the fuel was made properly in the first place (key word: assuming), there is only one thing that causes rust: water. Experienced modelers know the trick of disconnecting the fuel line and running their engines completely dry after the last flight of the day. Methanol, the primary ingredient of glow fuel is extremely hygroscopic—meaning it absorbs moisture from the air very rapidly. Residual fuel left in engines, even small amounts, can easily cause rust on steel parts in a very short time.

Smart (and careful) modelers will follow this with a few drops of an after-run oil in the intake, followed by a quick hit with the electric starter to disperse the oil throughout the engine. Incidentally, Marvel Mystery Oil works just fine as an after-run.

Oh, did I mention that methanol is hygroscopic? I have no data to support it, but my guess is more "bad fuel" is caused by leaving the cap off the fuel container than by all other reasons combined, and it can happen in an astonishingly short time. Anyone who has spilled fuel on top of the can has noticed it very shortly assumes a milky appearance. That dear reader is a graphic demonstration of the hygroscopic nature of methanol, so keep the cap on the fuel container at all times.

Frequent e-mails ask something like, "I bought (found, whatever) several gallons of fuel that I'm sure are several years old. Is it any good, or will it damage my engine if I run it?"

The only way to know if it is still good is to run it. If it runs fine (particularly at idle), then it's good. If it runs roughly (particularly at idle) or won't run at all, you have the obvious answer. If the latter happens, drain the tank thoroughly,

replace with new fuel and go fly. And use after-run oil.

A few paragraphs above, I said that properly made fuel would not cause rust. I am aware of one incident where a particular blend of a popular and normally highly respected fuel suddenly began causing extreme cases of rust in certain brands of engines. The owner of the company nearly drove himself and those near him crazy checking everything in that particular batch; same methanol as in other blends and batches, same oils, same additives.

No clue whatever, until the owner asked his plant foreman if there was anything—even the slightest little thing—that could have been different about that one batch. "Well," the manager replied, "nothing except a different dye. We ran out of our usual industrial dye, so I went down to Wal-Mart, got lucky and found the exact same color "Rit" dye. I used it until we got the new supply the next day. That certainly couldn't have caused any problem, could it?" Oh, no; except that one of the ingredients of "Rit" dye is salt.

**Jumping subjects** abruptly, I remember a time some twenty-odd years ago when an out-of-control model hit one of the other fliers at our field, injuring him rather seriously. Although this was before every kid and his cat had a cell phone, fortunately one in the group had one, and EMTs were called. We couldn't understand what took them so long to get there until the boss told us no one really knew where the field was. Always be sure the local EMT and fire department have the precise coordinates of your local field.

Oh, in case you're curious about the dye story, wondering if it really happened, I can assure you it did, since I know the original owner of that fuel maker quite well. I see him every time I brush my teeth.

As always, suggestions, stories, and any sort of input is welcome. →

Visit the AMA *Insider* archives online at  
[www.modelaircraft.org/insider/archives.html](http://www.modelaircraft.org/insider/archives.html)

## President to President

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involved teachers in 21 states and we hope to increase that number through this effort. By participating in the program AMA members have an opportunity to help young people learn new skills and to apply those skills in a real-world experience. Working together, experienced modelers, pilots, and students will conduct real-time research projects.

This is another opportunity for our clubs to become involved in—and an asset to—their local communities. At the same time participation opens the door to introducing students and teachers to model aviation. This is an excellent example of a "win-win" situation for everyone involved.

Details of our new partnership will be finalized soon with an anticipated launch date of early 2011. More information will be published in *Model Aviation* magazine and be available on the AMA Web site.

See you next time ... →

# The Internet: Friend or Foe?

Contact Frank at [murocflyer5@gmail.com](mailto:murocflyer5@gmail.com)

Frank Geisler, Chairman Leader Member Program Development Committee

Many new people have joined the information revolution by purchasing personal computers for a variety of reasons. Whatever the reason, they soon realized there is a great big world out there called the World Wide Web (WWW). To them I say welcome to the WWW and I'm glad to see you here.

Of course there is another group of folks that have been "surfing" the Internet for many years now and are professionals at finding things that even Google has a tough time tracking down. From the brand new guy to the "old hat," we all know one thing about the Internet: there is a ton of information available to us just by clicking the mouse or by typing a few letters in a search block. There is more information out there than any of us will ever have time to read or see in our lifetime. As most of us know, not all that you see or read on the internet is true or accurate. Some will laugh at that, but the fact is that many believe what they read on the internet is true. One look at some of the sites that debunk urban legends will tell us that there is a plethora of misinformation floating out there in the WWW.

Which brings me to the point of this article; is the Internet our friend or foe when it comes to model aviation and the Academy? I would like to submit to you that it can be both at times, but overall, the Internet can definitely be our friend when we come to realize what we can do with it to help promote model aviation and the Academy on a daily basis. Never before have we been able to touch so many people in such a short amount of time. All it takes is a little effort on our part to submit ideas and/or concerns to your club webmaster, your district webmaster, or even send an e-mail to the other LMs in your district or DVP. You have the ability to let many people know what you think very quickly. Communication is very important and the Internet is a quick and easy way to share with others.

An excellent way to share your thoughts and ideas as well as to help others in our sport is through the use of RC forums. RC forums have become very popular these days since they allow users to share thoughts, photos, videos, tips, and advice with thousands of people across the US and the world in a matter of seconds. Some of the popular RC forums have many thousands of members with millions of posts in them. Just think of all the positive influence you could have when using those forums to help promote the Academy and the sport of model aviation. I mentioned the AMA forum in my first Leader to Leader article which is another forum that is growing more and more each day. As of last count they have topped more than 1,800 members and the number keeps growing. I encourage you to have a look and sign up when you can. We certainly welcome you to share your knowledge and experience, and who knows, you might even learn a thing or two also.

Unfortunately this deluge of information and the ability to buy product online is reducing the positive impact of the local hobby shop (LHS) that we have all enjoyed over the years. At one time, your source for information and modeling equipment, tools, and aircraft parts all came from your LHS where you would meet up with friends and talk aeromodeling and learn all about the latest gadgets and kits on the market today. There you would find the store's owner or employees guiding modelers in the right

direction on what to buy, how to fly, and anything else in between.

They would let you know where to fly, which usually meant your local AMA chartered club where newcomers would learn about the AMA and how to safely fly their new airplane without the crashes involved with teaching yourself how to fly. Many times, hooking up with a club and meeting new people turned into lifelong friendships. These opportunities are slowly fading as stores are closing or switching their emphasis to something other than model aviation. What a loss to modelers of all experience levels and interests! You could encourage new modelers to balance their input between the Internet and the LHS so that they get the best of both worlds by broadening the input to the new modeler and perhaps saving the LHS from extinction.

Beyond encouraging your club members to shop at your LHS, I also suggest that you as LMs get involved with your favorite modeling forum and help with new folks coming into this sport. Provide them with guidance to get them off on the right foot and, when questions about the AMA come up, you will be there to give them accurate information rather than them trying to sort through the tons of posts that have inaccurate or distorted views of the AMA. Those newcomers need help and who better to help than LMs with their experience and background?

Let's use the WWW to our advantage to inspire and teach newcomers to our sport and promote the Academy and model aviation. I look forward to seeing you on the WWW whether on the forums or via e-mail; I appreciate any time you may give sharing your knowledge and wisdom. →

From Wings R/C Club, Les Mars, Iowa

## Cheap Model Airplanes From Builders' Cast-offs

Once you have mastered the basics of building a model airplane and have a few spare bits lying around your workshop it becomes very easy to produce your very own design of plastic model airplane. Simple Plastic Airplane Design (SPAD) is a really cheap and fun alternative to constructing expensive remote-controlled model airplanes kits.

The concept of SPAD started in the late 1990's and has evolved into a highly detailed and solid method for building RC model airplanes. While using traditional building materials and techniques can take weeks or months to put an airplane together, applying the SPAD concept can reduce the build time down to days, or even hours. SPAD materials are widely available and are less expensive than those used in standard model airplane kits. Plans and help for building a SPAD can be found online

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**Model Airplanes ... on page 7**

# Protecting Yourself From Hazardous Materials

By Chris Myers

If we caught our kids out in the garage sniffing paint or glue, we would send them to counseling. Yet, as adults we do this and call it modeling.

Last year I read an article about a man who was working with acetone in his house. After using it, he almost collapsed. Getting out of the room and lying down, he returned to normal.

When I look at the shelves in my work room, the chemicals stored there range from Balsarite to various spray cans, paint, lacquer, pesticides, etc., to CA to acetone, along with a couple cases of fuel. In addition to this, I use balsa and do a lot of sanding, creating particles to clog my lungs.

In the process of repairing and maintaining our aircraft, our hands come in contact with several hazardous materials. Our body absorbs these chemicals, and consistent exposure to them can be a danger to your health.

If you dissect our hobby, it quickly becomes apparent that we often spill fuel and CA on our hands. We sniff the paint and glue fumes and use grease and oil in our maintenance. It all gets on our hands. If you are an active modeler, you have a lot of

exposure to hazardous materials.

Below is a list of a few items you may want to keep around the workshop. They should help minimize the risk of exposure to hazardous materials.

1. Get a fire extinguisher.
2. Go to an auto paint and body shop and pick up a good face mask.
3. Buy a small fan for ventilation. [**Tech editor's note:** A large fan is recommended. In order to move more air, a small fan must be run at a higher speed and that causes some of its own problems. A large fan running slow moves sufficient air without making other problems.]
4. Work in a room that is properly ventilated.
5. Buy a box of rubber gloves.

Our hobby is great fun, but more than the propeller deserves some serious attention to keep you from being in harm's way. Fly safe and have fun. →

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From *The Beacon*, Miramar Radio Control Flyers, San Diego, California

# Two-cycle Engine Field Emergency—Dirt in Carburetor

Every now and then, when you can't get an engine to run right, the culprit is dirt in the carburetor. The engine was running fine last time out, and you haven't changed the engine settings. Now it quits at full power and won't idle.

What's wrong?

If you haven't been to the field in six months, make sure you're using fresh fuel! Fuel that's been sitting around for months, especially if it's left in the fuel tank, could be your problem. If it's not the fuel, put in a new glow plug.

Check the clunk hung up in the fuel tank for clogged fuel lines. If your aircraft comes to a sudden stop, the fuel tank clunk can slide forward, getting stuck in that position. Having eliminated these possibilities, you may have a fuel draw problem caused by dirt in the carburetor, most likely at the narrowest part where fuel is drawn through the needle valve. If backing out the needle valve doesn't allow the engine to run rich like it should, it's time to flush the carburetor.

At home, you can disassemble the carburetor for complete cleaning. At the field, a quick fix is to back flush the carburetor with fuel. This doesn't require carburetor removal and can be done in just a few minutes.

## Cleaning the carburetor:

1. Check to see where the main needle valve is set. Then remove it and set it aside. Remove the fuel inlet tubing. Adapt these procedures to engines with remote needle valves.
2. Connect the fuel tubing from your fuel pump to the fuel inlet nipple. Pump fuel. It's a bit messy but only takes a second or so. Almost invariably, the culprit is a particle of dirt lodged at the point where the tip of the needle valve throttles engine fuel. The back flush blows that particle out.
3. You've probably got excess fuel in the engine. To avoid hydraulic lock damage to your engine, remove the glow plug and washer and blow the excess fuel out of the engine with your electric starter. [**Tech Editor's Note:** Before you apply the starter, make sure the plug/washer are out of the head, then point the cylinder head so that when you run the starter it doesn't spew fuel all over someone else or something else that the raw fuel shouldn't be spattered on, friends, relatives, or pets. Usually, pointing the cylinder

straight down does a great job and then it will be just your legs and feet that get the benefit of fresh fuel.]

4. Replace the glow plug, washer, needle valve, and reconnect the fuel tank line. Adjust the needle valve to its previous setting.
5. Check your engine and fly.

## Avoid getting dirt in the carburetor

In three words—use fuel filters! Somehow, dirt, or minute solid particles get into our fuel. In order to keep these particles out of my engines, I started using multiple fuel filters. Use one at the bottom of the fuel bottle or can. You'll soon find that once in a while, this first filter gets a bit clogged. Back flush it, and you start drawing fuel again. Use another fuel filter between the fuel pump and the aircraft fuel tank. Finally, always use a fuel filter between the aircraft fuel tank and the engine. When fueling the aircraft, disconnect the fuel line at the tank side of the engine fuel filter. This system works and eliminates the old problem of having to periodically back flush the engine to get rid of dirt. When flushing fuel filters, make sure you flush them both ways before inserting them back into the fuel lines. →

# Covering Material

by Ellie Pflager

I was asked to research airplane covering materials and their weight ratio. I have learned a great deal in doing this article. I guess you could say that I have had several “ah-ha” moments and now a lot of things that were discussed during show-and-tells make a lot more sense to me. For my research I looked at both manufacturers’ Web sites as well as many forum group sites and tried to find multiple “agreeable opinions.” Bob LaBrash was a great help when it came to the product weights; he gave me a great head start. Hope you find this information helpful.

## Tissue

[**Tech. Editor’s Note:** There is some misinformation here. There are several types of “tissue,” but the lightest and best is known as Japanese tissue. The “grain” has to be determined, usually by tearing, it is not that noticeable. The grain is then laid down span-wise on a wing, and this instruction is very important. Good tissing is an art.]

This is not Kleenex, but more like gift-wrap tissue. It really is paper that comes in different weights. Tissue works best on the lightest models; usually balsa models designed for Free Flight (not RC). It has a noticeable grain to it, and this grain should be applied in the direction needing most strength.

It is traditionally applied to the wood frame with dope, although thinned glue works fine. Once the tissue is applied to the structure, it is shrunk tight with a light mist of water, then sealed with dope or Krylon spray enamel.

## Silk

This covering is actually woven silk fabric that is applied with dope. From what I could tell this covering is not used very often these days. I couldn’t find any other information on this type.

## Silkspan

This is like tissue but contains other fibers, and is generally stronger but heavier. It can be applied in the same manner as tissue. It is a good covering for foam. The weight per square yard of this material is 6.17 ounces.

## Fabric

Fabric covering can produce a very realistic finish and can be painted or purchased painted. Some are manufactured from real woven cloth and feature a simulated, hand-rubbed lacquer finish like full-size airplane finishes. It goes on like a film; roll out and apply, then iron on at low heat to properly activate the adhesive. Because of the low-heat iron it can be used on sheeted foam. The weight per square yard of this material ranges from 2.9 to 3.3 ounces based on brand.

## Fiberglass

This woven material is great on solid structures, but not good over open areas. It can be used to seal balsa wood or foam and comes in a great variety of weights, the lightest (.5 ounces per square yard) being very light but flexible. This is a great substitute for silkspan when covering foam. It may be applied with epoxy (wood) or water-based polycrylic (foam). It adds great surface strength for very little weight. It can be applied in (or over) a form to produce a “shell” for a nose cone or heli body.

## Plastic Coverings

Plastic Coverings are also known as polyester films, or heat-shrink coverings. These are all applied to the wood frame with heat that activates an adhesive layer on the underside of the film. Once the film is attached to the finished airplane kit frame, it is then shrunk tight with heat. Film types of covering produce the lightest model. The weight per square yard of this material ranges from 1.685 ounces to 2.700 ounces based on brand and color. Below are some brand comparisons that I did based on forum opinions:

1. Ultracote by Hangar 9: polyester type with a lower-gloss finish.
2. MonoKote by Top Flite: supposedly preferred due to a high-gloss, smooth finish and is long lasting and durable.
3. 21<sup>st</sup> Century Film by Coverite: handles extreme temperature and humidity changes.

4. Litespan by Solarfilm Company: much lighter than MonoKote or Ultracote and has no adhesive on the underside, said not to shrink quite as drum tight as the other films. A 20 x 36-inch sheet weighs 31.8 grams.
5. Solite (Litefilm) by Nelson: super-light film but has adhesive on the underside, some of the “opaque” colors are somewhat translucent.

## Painting

Painting is another option for finishing an airplane. Wood or foam structures must be sealed before painting to help produce a smooth paint surface. Surfaces that are sealed should not need as much paint and that will help keep the weight down. A primer coat is often applied after sealing. Its function is to create a surface that will bond well (chemically) with the paint layer.

I found there are several types of paint, each with their own benefits. Some examples are: dope, enamel, acrylic, and latex. Dope is a cellulose lacquer. Enamel gives a great finish but is tricky to clean up and dries slowly. Water-based acrylic dries quickly, easy to cleanup, and supposedly does not attack foam or wood. Acrylics tend to dry flat, so glass finishes need a separate clear coat. If your model plane kit (or heli) will use glow or gasoline fuel, the paint finish will need to be fuel proof. Many common paints are not fuel proof so make sure your topcoat is fuel proof, possibly a clear.

In my research I found the following Web site tutorials that seemed good to me. Thought I would pass them on.

Tips for covering RC airplanes with heat shrink film:

[www.rchobbies.org/planes\\_covering-tips.htm](http://www.rchobbies.org/planes_covering-tips.htm)

[www.rc-airplane-advisor.com/heat-shrink-covering.html](http://www.rc-airplane-advisor.com/heat-shrink-covering.html)

Tips for covering RC airplanes with fiberglass:

[Home.fuse.net/ryan/glassing.html](http://Home.fuse.net/ryan/glassing.html) →

# More on Soldering

By David McCormick, club president

I'd like to expand a bit on the excellent tips offered by Phil Laperriere in the July 2010 edition of the *AMA Insider*, "Understanding Deans Connectors."

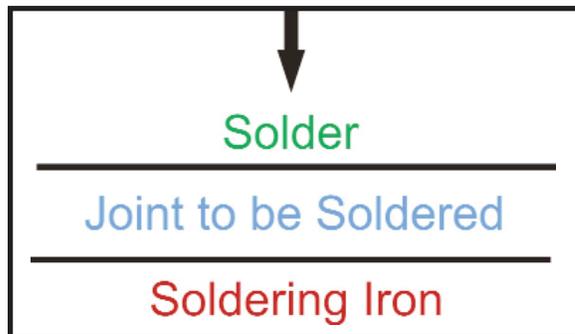
As someone who has been involved in electronics since I was a teenager, I get a lot of requests from the members of my own RC club to help them with the same kinds of soldering issues Phil discussed in his article. The recent boom in the popularity of all-electric airplanes and helicopters, and the ever-increasing size and capacity of the batteries, motors, and speed controllers they use has made what used to be fairly simple tasks very difficult for a lot of modelers. So here are a couple of my own soldering tips.

**1. Use a smaller gauge solder.** Solder comes in different sizes, just like wire does, and a small gauge solder will melt more quickly and flow much better than a thicker one. I use .032 gauge solder (available at Radio Shack) for all my electronic soldering tasks. It takes much less heat to melt it, which helps reduce the damage excess heat can cause to terminals, connectors, and insulation. And the smaller gauge solder has a greater percentage of flux, compared to a larger diameter solder, which helps it stick better to the joints. You'll be amazed at how much easier it is to use.

**2. Get yourself a flux pen,** also available at Radio Shack, or from any good electronics retailer. They're made like a magic marker, but contain the same rosin flux that's in the center of the solder. Coat the wire and terminal to be soldered with flux before you "tin" them, and your solder will adhere and flow much better, making a stronger, more reliable connection. Use only rosin core flux on electronic wires, never acid core!

**3. Use the soldering iron to heat the joint, not to melt the solder!** This is a big one, and very important. The job of the iron or gun is to heat the wire and/or joint to a temperature hot enough so that it, the joint, can melt the solder. Don't place the

solder against the tip of the iron and try to drip it onto the joint. Place the iron against the joint, let it heat the joint, then let the joint melt your solder. Once you get the joint hot enough, the solder will flow over the wires and connectors, coating everything evenly. This is the only way to prevent a cold solder joint, which can rob you of performance and may even break loose completely. Remember, use the iron to heat the joint and not melt the solder. Let the joint do the melting. It takes practice, but it works.



**4. Wear a glove.** How many times have you had to turn a hot wire loose before the solder had cooled enough to hold it well? How many times has the heat from the joint traveled up the wire and shrunk your tubing before you were ready? Use a pot-holder type glove, or whatever you have, to protect your hands while soldering. You'll be able to hold the wires longer and steadier while soldering, and they will help cool the wire more quickly once you're done, which will save your heat-shrink.

I'd also suggest you invest in one of the small devices that have two or three alligator clips to hold your wires and terminals, sometimes called a "Helping Hands." (They often also include a soldering iron holder.) Cover the alligator clips with a piece of fuel tubing to pad them and prevent them from marring your wires. They're great for holding things steady while you apply the heat and solder. Good luck! →



## TODAY'S THE DAY TO SIGN UP FOR AMA TODAY!

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[www.modelaircraft.org/publications/AMA\\_Today.aspx](http://www.modelaircraft.org/publications/AMA_Today.aspx)

## Tips & Tricks

### All Screwed Up

I recently discovered a great way to mount canopies, cowlings, hatches, virtually anything that requires a mounting screw, to attach it to an airplane. I'd like to share it with the rest of my modeling friends.

As anyone who's ever tried to mount a fiberglass cowling or a plastic canopy on a balsa wood model knows, one of the most difficult things to do is to get the wood hard enough to reliably hold the mounting screws so they won't vibrate out in flight and allow the part to crack or fall off. In the past, the best method has seemed to be to use hardwood or plywood blocks, pre-drill the holes, and then harden them with CA. While that may work for a while, if you have to remove the screws a few times they eventually get loose again and you're right back at square one. Often, the next step is a bigger screw, which adds weight and looks crummy! So here's my solution ...

Cut a small piece of plastic antenna tubing slightly longer than the length of the screw. You can use any hard plastic tubing you have (not fuel tubing), just make sure the inside diameter is slightly smaller than the body of the screw. Antenna tubing is a perfect fit for the small allen-head servo mounting screws I like to use.

First, drill a small hole through the part and into the block (or balsa) as you normally would. Next, enlarge the hole to the outside diameter of the tubing. Make sure you're accurate with this hole, as it's important that the tubing fit snugly into the wood before gluing. You should have to tap the tubing into the hole with a small block or tool. If it's loose, drop down a size on your drill bit. You may want to practice on a scrap of wood at first to find the right bit sizes. Now just use thin CA to secure the tubing into the wood, and give it several minutes to dry.

Your screws will bite into the plastic tubing much better than they do into wood, and you can remove and replace them as many times as you need to. The friction of the tubing on the screws' threads will act like "lock-tite," and they won't vibrate out or loosen in flight. I keep several sizes of plastic tubing handy to match the various sizes of screws I use on my airplanes. You can use pan head, socket head, or flat head screws, whatever you prefer, they all work equally well with this method. And it's easy to modify an existing mount to use this method, too.

Good Luck!

—David McCormick, President, Falling Water Radio Control Flying Club, Soddy-Daisy, Tennessee

## Cheap Model Airplanes

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and are completely free. The best part about flying a SPAD is its survivability when it comes to the inevitable crashes as your enthusiasm gets away from you!

The basic RC model airplane SPAD concept revolves around using inexpensive building materials that can be found at local hardware stores and sign shops—or even picked up for nothing from builders' cast-offs. While the materials required for constructing a SPAD vary from one design to another, the basic materials used include PCV downspout pipe for the fuselage, Coro-Plast (corrugated plastic) sign material for the wings and controls surfaces, HDPE cutting boards for firewalls and landing gear blocks, and CA (superglue) to hold everything together.

Because of the simplicity involved in putting a SPAD RC model airplane together, even an inexperienced modeler can complete the job in a single weekend. A basic fuselage made from PVC downspout can be made in a matter of minutes, CoroPlast wings and control surfaces in just a few hours, and all the miscellaneous parts to complete the project in just a few hours more. Acquiring the materials needed for a RC model airplane SPAD project may require no more than a trip to the local hardware store and a few phone calls to local sign shops.

Aside from these readily available materials, there are a few other items that you will need: self-tapping sheet metal screws, zip ties, a utility knife, and a few wood sticks (4mm x 27mm x 1m pine lathing/lattice). Other items needed to complete your RC model airplane, such as wheels, landing gear, and control arms, will need to be fabricated or purchased from your favorite hobby store.

Plans for building a SPAD RC model airplane are available online, free of charge, from many different sources. SpadToTheBone.com, the original home for the RC model airplane SPAD concept, has plans to suit just about anyone. From the ever popular trainer called the Debonair, to the more sophisticated Coro Edge 540 sport/fun-fly model. A community has been built around the RC model airplane SPAD concept at [www.SpadWorld.net](http://www.SpadWorld.net) where model builders from all over the globe help each other learn better and more exciting ways to make SPADs.

One of the greatest benefits to building with the RC model airplane SPAD materials is just how tough they are. Whether you're trying a new aerobatic maneuver and just can't seem to pull out of it, or just learning to take off for the first time and cartwheel your airplane down the runway, the chances that your airplane will survive are good. Compared to easily breakable balsa, plastic is a forgiving material that can survive higher impact speeds without damage—and is easily fixed when broken.

Ease of construction, low cost, and survivability all add up to a package that encourages modelers to experiment with design concepts and methods that extend the envelope of their experience and knowledge. Why not give it a go yourself? →

## AMA Vision

We, the members of the Academy of Model Aeronautics, are the pathway to the future of aeromodeling and are committed to making modeling the foremost sport/hobby in the world.

This vision is accomplished through:

- Affiliation with its valued associates, the modeling industry and governments.
- A process of continuous improvement.
- A commitment to leadership, quality, education and scientific/technical development.
- A safe, secure, enjoyable modeling environment.

## AMA Mission

The Academy of Model Aeronautics is a world-class association of modelers organized for the purpose of promotion, development, education, advancement, and safeguarding of modeling activities. The Academy provides leadership, organization, competition, communication, protection, representation, recognition, education and scientific/technical development to modelers.

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