The AMA INSIDER
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for Newsletter Editors and Club Officers

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PRESIDENT TO PRESIDENT

Leading a Club is More Than Doing the Job Yourself

by Dave Mathewson, AMA President

The year 2008 is winding down and this is the time when many of our clubs elect new, or reelect current, officers for the coming year. I'm going to begin this column by shamelessly plagiarizing an article I recently read about being an association officer: "Filling an officer role does not mean that you are required to do the job alone. Being an officer simply means that you are responsible for ensuring that the job gets done. As an officer, you are allowed to ask other members of the club to help you fulfill your duties."

How true is that? I've been a member of a number of different organizations, and far too often I've seen cases of burnout because club officers feel a need to carry the load of running a club or association entirely on their own shoulders.

Sure, there's a responsibility that goes along with being a club officer, but that responsibility doesn't include doing all of the work yourself. In fact, over time, many clubs eventually fail because the club officers allow themselves to be put in a position where they had to do all of the work and simply accepted this as the way things were done. In other words, it was easier to do the job yourself than to solicit the help of others. At least that sounded good at the time.

As club members we should accept the fact that we all need to play some part—even if only a small part—to ensure the well-being of our club. That's what being part of a club is supposed to be all about. At the same, time we recognize that those who have volunteered their time to be club leaders have accepted a greater level of responsibility; however, that responsibility should lean more toward creating an atmosphere of teamwork and cooperation within your club.

As a club officer you also have an opportunity to influence the direction of, and culture within, your club. Your members depend on you, as well as the other elected officers, to help set and meet goals and objectives for your club during your term. How you do that can mean the difference between success and failure, not only for you, but for your club.

In some cases, if things go extremely wrong, it can result in

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TIPS FOR CLUBS

Flying Site Grant Development/ Improvement Program

Does your club need a new shelter, runway fixes, fencing, or a frequency board? If so, AMA might be able to help. This year alone, the Academy gave away more than $33,000 to make such improvements to various club fields.

How did the recipients get this money? Through the Flying Site Development/ Improvement Grant Program, which began in 2003 to assist clubs in need.

If approved, a grant will provide as much as 10% of the total cost of a project. The maximum amount is $5,000. This money that is to be awarded will be announced on (or near) May 1 each calendar year.

Applications for the next set of grants are due to your district vice president on or before March 1, 2009. He or she will review and approve the application and forward it to AMA Headquarters so it arrives on or before March 15, 2009. Applications received after March 15 will not be processed.

Applying is easy! Go to www.modelaricraft.org/PDF-files/712.pdf or call the Programs Department at AMA HQ—(765) 287-1256, extension 272—for more information. The original grant application must be signed by the club president and

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Cabbages and Kings

Don Nlx, *Insider* Safety Column Editor

"The time has come," the walrus said, 'To talk of many things: of shoes and ships and sealing wax, of cabbages and kings ..."
—Through the Looking Glass (Alice in Wonderland) by Lewis Carroll

Or … let's talk about safety, which can sometimes be about as interesting as talking about buying insurance or clipping toenails. However, we all know we need to do both from time to time, so let's start with a few thoughts and facts about safety when handling model engine fuel.

I owned a model fuel manufacturing business ("blender" would be a more accurate term) for a dozen years. For 20 years before that, I was involved in blending, packaging, and marketing a wide variety of flammable solvents used in the printing industry. Throughout those three-plus decades, I began to develop a healthy respect for the inherent dangers of flammable liquids—and a concern about the general lack of knowledge among even experienced users.

Flammable Liquids 101 (considerably oversimplified in the interest of brevity):

Flash point. Terrible sounding term, conjuring up all sorts of mental images. All liquids classified as either flammable or combustible by the U.S. Department of Transportation (and industry standards) have a listed flash point. Most often, the casual user assumes—incorrectly—that when the temperature of a particular liquid reaches that listed temperature, the liquid is going to explode or at least burst into flames.

Not so. That event would be the auto-ignition point, and in most cases is several hundred degrees F.

Briefly stated, flash point is the temperature to which a liquid must be raised before the vapors can be ignited by a source of ignition (spark, flame, etc.). Vapors—in engines, or in the open—are what actually ignite, not the liquid itself. To put things in perspective, here are the approximate flash points of some common liquids:

Gasoline: 45° F *below zero!*
Acetone: 0° F
Methanol: 50° F
Nitromethane: 95° F
Model engine lubricants: vary in the range of 350° F to 445° F.

Surprised? I knew you would be. So, as you can see, nitro methane, the baaaad-sounding ingredient in model glow fuel, is actually only about half as flammable as the methanol. The Department of Transportation classifies liquids with a flash point of 100° F or lower as "flammable;" higher than that as "combustible." So, if the flash point of nitro were just 6° higher, it wouldn't even have to carry the familiar diamond-shaped red label, because it would then be classified as combustible rather than flammable. Further, our hot glow fuel is actually far less flammable and dangerous than gasoline. Gas users, please take note! Flash point of typical sport glow fuels is around 60° F vs. the minus 45° F of gasoline.

Typically, people interpret stated flash points backwards … a high flash point must be the most dangerous, right? Wrong. Here's a simple memory device you will never forget: flash points are like paychecks—high is good; low is bad.

Modelers typically fly in relatively warm weather, so if the ambient temperature is 60° F or above, glow fuel can be ignited by the presence of a spark or flame. The greater the difference between the flash point and the temperature of the liquid, the greater the danger; because, as the differential increases, the rate of vaporization increases dramatically.

Example: Suppose the temperature of your fuel reaches 90° from sitting in the sun, the back of your car, etc. That would be a 30° differential for glow fuel, but an astounding (and dangerous!) 135° for gasoline. Please, never forget that.

I've read reports where modelers had their fuel cans in the back of their vehicles, the starter battery contact points came in contact with the metal, shorted out and caused a dangerous fire. My personal opinion is that model fuel is safer in plastic jugs than in metal. Contrary to conventional wisdom, if the fuel blender has used the proper-type plastic jug, the fuel will remain just as moisture-free as in metal or better!

Toxicity 101

I hesitate to make a broad statement for fear someone will take it as license to do something stupid, but for practical purposes, the most toxic ingredient of glow fuel is the methanol. One of the big reasons is that—unlike many liquids —methanol can be absorbed through the skin, and stated simply, it just ain't good for you. Ditto inhaling the fumes. No, it's not going to kill you on the spot, that day, or that month, but try to minimize your exposure. Finally, ingesting it could make you sick, possibly blind or kill you, depending on the quantity swallowed.

Dating back to about the time the earth cooled, methanol (methyl alcohol, referred to as wood alcohol in the dark ages) was always considered poisonous, and my recommendation would be to continue to treat it as such. Having said that, I'll add that about 15 years ago, the U.S. Department of Transportation decided it wasn't toxic, and not only rescinded the requirement to put the usual skull-and-crossbones symbol and written warnings on the outer shipping container, but threatened to fine anyone who shipped it that way. Trust me on that; it happened to a friend, and I had some shipments blocked until we removed the warning on the cartons.

I've been away from the glow fuel business for some years now, but the last time I looked, all the model engine fuel I saw still carried the same warnings on the fuel containers (plastic or metal, inside the box) to encourage users to be prudent. Please heed them.

When it comes to gasoline, I'll do what I wish our politicians would do more often: Admit it when you're not too knowledgeable about a subject. Nearly all my personal experience was with glow fuel, but I don't think I would go very far out on a limb by saying that when it comes to toxicity, gasoline is considerably less of a health threat than glow fuel.

Here's what one source says: "No acute toxic health effects would occur ***during the normal course*** of using automotive fuels." Please note the bold, underlined, italicized emphasis. Water is the most essential substance on the planet to sustain life, but if one insists on diving into it and swallowing it, that person will die. Contrary to popular belief, gasoline is *not* just a single ingredient refined from crude oil. All of it contains varying amounts of many other chemicals, none of which would do your health any favors. Some states require gasoline pumps to carry a warning saying something like, "Gasoline contains ingredients known to cause cancer in certain …"

That's enough for one session. Anyone who might care for more details, argue with me, or suggest subjects for future columns is free to do so at FLYERDON@aol.com. ✈

From the St. Paul Model Radio Controllers, Inc., St. Paul, Minnesota

Winter Airplane Storage

Since the snow will be falling very soon, many AMA members may not be flying for quite some time. For those who don't intend to fly on skis, the following suggestions may help to preserve your model over the winter months and allow you to get back in operation quickly when the snow disappears next season.

Airplane

Be sure to give the entire airplane a thorough cleaning to remove all traces of exhaust residue. Check the covering to be sure that fuel is not creeping under the seams around the firewall and areas around the exhaust outlet, soaking the balsa. If so, make the repairs during the off season while you have some extra time. Check the fuselage and flying surfaces closely for cracks or other damage. Check the servo arms, control horns, clevises, pushrods, and/or control cables for excessive wear or damage.

The airplane can be stored indoors or outdoors in the garage; the constant cold temperatures can be tough on batteries, but otherwise don't seem to cause any problems. The only problem that could occur would be if you stored it in, for example, a workshop that is heated occasionally and then allowed to cool down after use. This could result in damage to the engine because of condensation and probably to the balsa or covering material from temperature changes.

If you store the airplane on a wall, it should not be supported on the nose because this could damage the engine bearings. Support it by the tail structure or similar means. If the wing is removed, do not stand it on end. Support it similar to the way it is normally mounted on the fuselage. Do not leave the weight of the airplane resting on the tires if you don't store it vertically.

Engine

The concern for engine storage is to remove all the glow fuel from the inside of the crankcase and cylinder to prevent rust formation on the bearings, crankshaft, etc. The best advice is to remove the engine from the airplane, remove the glow plug and backplate, and flush the inside out with a solvent such as kerosene.

While the backplate is off, check it over for signs of rust, bearing failure, etc. After cleaning, generously oil the bearings and the cylinder with lubricant such as one of the after-run oils or Marvel Mystery Oil. After it is well oiled, reinstall the backplate and plug and place it in a sealed plastic bag along with the mounting hardware until next season.

If you decide not to remove the engine, at least remove the glow plug, pour some oil into the carburetor, and spin the engine over clockwise to distribute the oil through the bearings. Add some oil through the glow plug hole, turn the engine over slowly a few more times and reinstall the glow plug. Remove the propeller if it is made of wood. Put a plastic bag over the engine to keep dust and dirt out.

Batteries

Ideally you should cycle the transmitter and receiver batteries and record their capacity for reference next season. It is best to leave them on a trickle charger to maintain a charge during the off season. If this is not practical, try to charge them at least every one to two months. When ready to fly again next spring, cycle the batteries first to be sure they have adequate capacity.

Transmitter/Receiver/Servos

Don't forget to check over the servo wiring and connectors. If there is any sign of corrosion on the connectors, then get them replaced. Also check the output shaft for looseness.

Check the receiver antenna for damage. If there are any doubts, get it fixed or replaced. Extend the transmitter antenna and clean it with alcohol. Collapse the antenna and repeat the cleaning several times. (There are contact fingers inside each antenna section that may become coated with oil, preventing the proper contact between sections, greatly reducing the transmitting range.)

Fuel

If you have fuel left, be sure it is capped tightly and store it in a cool place out of sunlight. Some recommend against storing fuel in very cold temperatures, but I have not had any problems doing this in the past.

Starter Battery

If you have an electric starter hookup, remove the 12-volt lead acid battery, clean the terminals and check the electrolyte level. Add water if necessary. This battery must be charged if stored outdoors during the winter. A monthly charging will keep the battery from freezing and also extend its life.

Miscellaneous

If you have a handful of used rubber bands as I do, throw them out and plan to buy a new box next season. This would be a good time to check your supply of spare glow plugs, propellers, etc., and make up a parts list to replace those used during the summer. If, during your inspection, you run into problems or there is something you are not sure about, call another club member for some advice or suggestions. Make the repairs during the winter and save the warm weather for flying! ✈

President to President

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an officer eventually leaving not only the club, but modeling all together, because the pressures of holding a club office have taken the fun out of what was supposed to be an enjoyable activity.

Please keep all of this in mind as we move into the new year. Being a club officer doesn't mean tackling every project or activity yourself. It doesn't have to feel like a job. Most often, it can be an enjoyable experience if approached the right way. Enlist your members to do their part in support of your club. Most want to be a part. They just need to be asked.

Since this is the last issue of the *AMA Insider* for 2008 I want to close this month by wishing everyone a happy holiday season and the best of luck in the coming year.

See you next time. ✈

From the Sacramento Valley Soaring Society, Novato, California

Soldering: It's All About Heat and Clean

by Tom Ball

When I was teaching school back in the 1950s, I got a summer job with the company that installed the first dial telephone system in Elk Grove. Eventually I moved on to other jobs as the work progressed, but initially what I did was solder each wire from a 200-pair cable to terminal blocks eight hours a day. By the end of the summer I had a pretty good idea how to attach two items together with molten metal while avoiding the dreaded "cold joint."

I just finished doing all the wiring for a new 1/5-size Cub that I am converting to electric power. While I had all the gear out, I also changed the terminals on three batteries that I bought at the last swap meet. This seemed like a good time to write an article I had suggested some time ago.

Before I get to the preparation of the actual materials to be soldered, let me talk for a minute about irons, solder itself, and tools. My standby is an older model Weller 8200 rated at 100 watts. I love this gun because it is ready to go as soon as the trigger is pulled and I can lay it back down on the bench without wondering an hour later if I turned it off. For really heavy work, like joining 1/8-inch piano wire for landing gear, I have a conventional 100-watt iron made by a company called Drake. My third iron is a small Ungar, which does not show wattage, but it has a very fine tip and is good for jobs like re-attaching a broken wire to a speed controller.

For solder I used a good quality resin core 60/40. The last numbers refer to the proportions of lead in the mixture to tin. The flux I happen to have on hand at the moment is Otaey No. 5 solder paste. On hand means it has probably been around five or six years. With paste, a little goes a long way.

Many of the tools I use, like needle-nose pliers and small files, are just normal bench tools. A more specialized tool I almost always use is called a "third hand." It consists of a base supporting frame with two opposing alligator clips, which can be twisted and moved to almost any position.

By gripping the two parts to be soldered and holding them firmly together through the entire process, it helps eliminate burnt fingers and failed joints because of movement before the solder has completely cooled. The last two tools that always come out when I set up a job are a simple wire stripper and a small bronze brush which I use to clean off the tips of the irons when they start looking a little dull.

For a perfect solder joint, both surfaces must be clean enough and hot enough that the solder will melt and flow evenly on both items. Any dirt, rust, corrosion, or other foreign matter on either surface will prevent the solder from sticking to the dirty area and will cause a weak or imperfect joint.

This is less of a problem when dealing with new components and fresh wire than when doing repairs or reusing old components. Sandpaper, files, a Dremel tool, and the wire brush I mentioned earlier can all be used to get a bright and shiny surface. When doing repairs, I cut back enough fresh wire if the wire is long enough to allow it.

One way to guarantee that you are dealing with two clean surfaces is to apply a light coating of paste and solder to each surface before you make the actual joint. This is sometimes called tinning and will show up any places that are not willing to take solder.

Once both surfaces are tinned, they must be held together in some immovable way through the entire process, from the application of heat to the final cooling when the solder itself turns from bright to dull. If you are going to do this without some type of jig, be sure to use pliers. There is no way you can hold something with your fingers close enough to the joint to be effective without burning yourself. For larger jobs, I use everything from small vises to C clamps.

The actual soldering is generally over within seconds. The trick is to position the iron so that both surfaces are heated to the point where solder melts and flows.

For small jobs such as soldering wires onto plugs or terminals, you can generally get enough solder on the tip of the iron before applying it to the area. If more solder is needed, for example when building a heavy-duty landing gear, push the end of the solder right into the heated area but don't overdo it. Excessive solder buildup does not make for a stronger joint. Also, keeping an iron in an area until wire insulation and other components are melted does not make for a better job.

One last point to watch out for is the so-called cold joint. A true bond will be made only when both surfaces become hot enough to solder. Be sure that the tip of the iron comes in contact with both surfaces long enough for this to occur. Cold joints will often look fine and may even hold for while, but they have a nasty habit of failing on final approach. ✈

From the San Diego Orbiteers Free Flight Club, San Diego, California

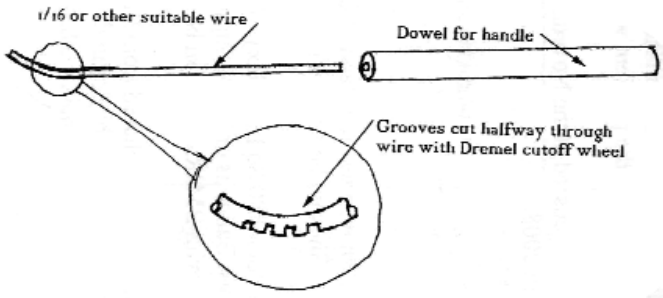
Balsa Grooving Tool

by Jerry Sullivan

I recently wanted to cover the plain old landing gear on my Power Scale S.E.5a with balsa to gain a few more scale points. In the past I have used four pieces of balsa to make a little box around the wire. For this try I figured that two pieces of balsa with a groove in each would do the job.

I did have a miniature round wood rasp that did the trick. However, to assist other modelers who might not have such a tool, I wanted to give them a way to do it.

I took a 1/16-inch diameter wire and bent one end into a gentle curve. I drilled a hole in the end of a dowel as a handle, and CAed the wire into the handle. Using a straight edge on my work piece, a few quick strokes make a dandy groove. You will have to clean out the grooves occasionally. Repeating on the other work piece gave me a pair that could be glued around the wire. Use of CA will hold the balsa leggings to the wire. ✈

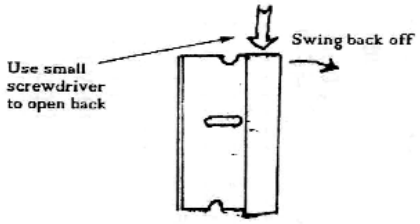


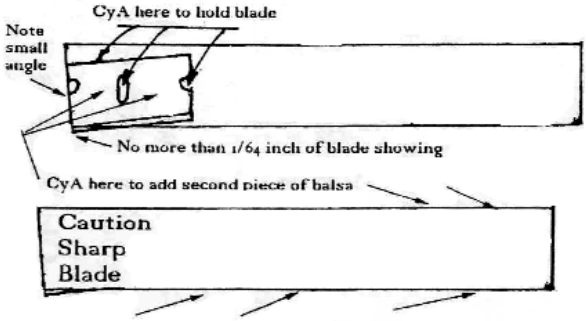
From the San Diego Orbiteers Free Flight Club, San Diego, California

Inexpensive Tissue Trimmer

by Jerry Sullivan

I sometimes (no, all the time) have trouble trimming the wing or fuselage tissue to get a nice straight fold over to lock the tissue to the model. I have tried to use the commercial trimmers, but they were made for big models generally covered with MonoKote. I have tried to cut the tissue using a razor blade space from the model with a stick of balsa. This kind of works, but needs more hands than the two with which it was issued. The following is an easy way to make a tool that I dreamed up which works quite well.





1. Remove the back from a single-edge razor blade. Use a small flat blade screwdriver to open one end and then just swing it off. REMEMBER the blade is very sharp, so do this carefully using appropriate tools to hold the blade while removing the back.
2. Use CA to glue the blade to one end of a piece of 1 x 6-inch balsa as shown. The thickness should match the size of the longeron/stringers. Use 1/16 for small models, 3/32 or 1/8 for larger. Just a couple of drops of CA will hold it. Do use a fan to blow the air and CA fumes away from yourself or anyone else. CA fumes carry the risk of serious illness to all who breathe them.
3. Put a couple of drops of CA on the blade and drop another piece of 1 x 6-inch balsa of the same thickness on the assembly. Put CA along the joint, keeping it away from the exposed blade. Harden the very tip of the tool with CA.
4. Mark the tool with a warning label that the blade is sharp.
5. Trim the tissue with the edge to be cut on a trimming pad. Rock the fuselage as you go along so that the actual cutting area is supported. You can tip up the trailing edge of a wing while cutting the leading edge. ✈

From the Spirit of St. Louis R/C Flying Club, St. Charles, Missouri

How to Adjust a Two-Needle Carburetor

Typically, carburetors come from the factory close to being preset. If you have torn down your carburetor for a thorough cleaning and examination, or you just want it to run right, here's a good starting point.

With the throttle barrel in the full open position, close the high-speed needles until it stops. Then, back it out three turns. Now, with the throttle barrel almost closed, do the same thing with the idle mixture screw. This is your baseline.

Some carburetors have a throttle-stop screw. Usually we set these so the air hole in the carburetor barrel completely closes off at full low throttle trim. When adjusting some idle mixture screws, the carburetor barrel wants to rotate and get pushed inward, making it a little difficult to get a good setting. All you have to do is lock the throttle arm so it cannot rotate or go in while you are adjusting the idle mixture screw.

Here are 10 steps for setting up almost any two-needle carburetor:

1. Start the engine and go to full power.
2. Set the high-speed needle to maximum power and back off about ¼ to ½ turn.
3. Go back to as low an idle as you can achieve.
4. Turn the idle mixture screw until the engine stops. While the engine is off, back the idle screw out ½ to ¾ turn.
5. Restart the engine at idle.
6. The engine should be idling pretty well.
7. Reset the high-speed needle to maximum rpm and back off 200-300 rpm.
8. Return to idle and let the engine idle for about 15 seconds.
9. Quickly move the throttle to full power and listen to the transition from idle to full power. If it instantly goes to full power, you are finished.
10. If it hesitates or sags a little, it is still too lean. Back out just ¼ turn. Repeat step 9.

When you are finished, at about ½-trim setting, you should be getting a good fast idle at high-throttle trim. You should be able to shut the engine off at full low-idle trim. That's all there is to it! ✈

From the River Valley Fliers RC Club, Plover-Wausau, Wisconsin

Paint Compatability

by Wayne Dempze

Finishing materials, and especially some of the solvents they contain, react with one another. A lacquer applied over an old coat of the same material will partially dissolve the dry paint, so lacquers rarely peel. Sometimes, when one kind of paint is put over another, the whole finish may dissolve and wrinkle up. We call this a compatibility problem.

The table on the right shows what material can be applied over others. We think you'll find it easy to use. For example, a builder might wish to use Aero Gloss dope over a butyrate dope. Find Aero Gloss dope in the top row which is labeled Over. Find the butyrate dope in the left column labeled Under. The "N" in the table shows the combination not to be compatible.

Maybe a model was originally sealed with dope over the alkyd as the table shows. Perhaps a builder wished to paint a model with one kind of paint and trim it with another. The compatibility table shows if the trim will react with the base color; however, I don't recommend this practice.

C = Compatible
N = Not Compatible

UNDER \ OVER	Vinyl Spackle	Polyester Resin	DuPont 305	Aero Gloss Dope	Nitrate Dope	Butyrate Dope	Acrylic Lacquer	Alkyd Enamel	Epoxy Enamel	Acrylic Enamel	Polyurthane E.
Vinyl Spackle	C	N	C	C	C	C	C	C	C	C	C
Polyester Resin	C	C	C	C	C	C	C	C	C	C	C
DuPont 305	C	N	C	N	C	C	C	C	C	C	C
Aero Gloss Dope	C	C	C	C	N	C	C	C	C	C	C
Nitrate Dope	C	C	C	C	C	C	C	C	C	C	C
Butyrate Dope	C	N	C	N	N	C	C	C	C	C	C
Acrylic Lacquer	C	N	C	N	C	N	C	C	C	C	C
Alkyd Enamel	C	N	C	N	C	N	N	C	N	N	N
Epoxy Enamel	C	N	C	N	C	N	C	C	C	C	C
Acrylic Enamel	C	N	C	N	C	N	N	C	N	C	N
Polyurthane Enamel	C	N	C	N	C	N	C	C	C	C	C

Here's another example on how to use the chart. Vinyl spackle is compatible over polyester resin. Find vinyl spackle in the Over section and read down to polyester resin. Now let's reverse the two materials. Vinyl spackle is not compatible when put Under polyester resin.

Incidentally, always sand any color paint with 320 or 400 grit between coats. Sometimes paints need the rough texture to bite into; not all finishes partially dissolve earlier coats like lacquers do.

No doubt, some very skilled wood finishers may have been able to use materials in a way we say is incompatible. The table favors a conservative, safe approach. Compatibility characteristics change considerably with brands, weather, method of application, and the reducers used. A finisher using materials other than those listed had better plan to test for compatibility on a scrap of wood prepared in the same fashion as the model. ✈

Tips for Clubs continued from page 1

approved by the district vice president and submitted to Flying Site Grant Application, Academy of Model Aeronautics, Attention: Erin Dobbs, 5161 E. Memorial Dr., Muncie IN 47302.

Status reports on the projects must be submitted to AMA Headquarters every six months, with the final report describing their completion. Any AMA funds exceeding 10% of the final total cost of the project must be returned to the Academy.

An application will be returned if it contains more than five pages, the amount of the requested grant is more than 10% the total cost of the project, or if the amount of the requested grant is more than $5,000.

The 2008 grant recipients are:

- Plattsburgh Radio Aeromodelers: $527.25
- Wright State Renegades: $1,000
- Brandon Radio Control Aero Modelers: $500
- Orchard Farm RC Flying Club: $450
- Marshalltown Radio Control Flyers: $2,825
- River District RC Eagles: $100
- West Michigan Smoke Rings: $2,600
- Golden Triangle Radio Control Club: $313.80
- Jetero RC Club, Inc.: $1,108.35
- Angelo RC Club: $5,000
- Tejas Radio Control Association: $5,000
- Chisholm Trail RC Club: $1,130
- Airpark Elite: $1,300
- MARKS: $5,000
- Yankee Air Pirates Aeronautical Institute: $5,000

Congratulations to all clubs that received grant money. To those that did not, we extend our best wishes for a successful flying season and we hope you apply again next year. ✈

From the Canandaigua Chiefs R/C Flying Club, Canandaigue, New York

The Lost Bugatti

In the late 1930s, automotive genius Ettore Bugatti built a radical race plane to capture the world speed record from the Germans. Decades later, it was found in a barn in France and is now being restored in Connecticut.

The Model 100 is a remarkable airplane. It was hidden from the Germans when they invaded France in June 1940 and wasn't to be discovered again until 1973. Even after 30 years, it astounded the aeronautical world.

The airplane is an engineering tour de force, a showcase of innovation and ingenuity. U.S. and foreign patents were taken out for almost every significant part of the structure. Bugatti build almost every part of the airplane in his shop except the main landing-gear legs. The instruments were remarkably similar to those found in Bugatti automobiles.

Photo from bugattiaircraft.com

Bugatti Specs

Gross Weight: 3,086 pounds
Wingspan: 27 feet
Length: 25 feet 5 inches
Wing Area: 22.7 square feet
Wing Loading: 13.9 pounds per square feet
Power Loading: 3.44 lb/hp
Design Max Speed: 500-550 mph
Engine: Two Bugatti Type 50B, 450 hp at 4500 rpm

The power train is perhaps the airplane's most unorthodox feature. The front engine was canted to the right, joined to its drive shaft by a universal joint at the firewall behind the pilot. The drive shaft passed by the pilot's right elbow. The rear engine was canted to the left, driving its drive shaft through a universal joint along the pilot's left elbow. The two drive shafts entered a reduction gearbox at the pilot's feet. The two-input gearbox allowed the propellers to be contra-rotating, a major advance for such a small, high-powered aircraft. The engines and power train were built in Bugatti's Molsheim auto factory, tested in a mock-up, and then shipped to the Paris furniture factory where the airframe was constructed. A patent still protects this revolutionary power system.

The aerodynamics of the Model 100 are almost as mind boggling as its power train. The basic problem of aircraft design is a trade-off between high-speed and low-speed efficiency. Bugatti attacked this problem with a unique and complex system of self-adjusting flaps. The Model 100 used split trailing-edge flaps. Both flap surfaces could be moved up and down to suit the speed and power situation.

The flaps would automatically set themselves to any of the six positions for take-off, cruise, high speed, dash, descent, landing, and rollout. The flap control was linked to a complicated system that sensed manifold pressure and airspeed. At low airspeed and low power, not only would the flaps drop into landing position, the landing gear would automatically extend. Not bad for May 1939.

You'd hardly expect such an airplane to have a normal structure, and it doesn't. In contour, the streamlining was remarkable for the day. It presented drag coefficients not attained until the mid-1970s. The fuselage is built up of a wood "sandwich," buttressed by rectangular box sections. On this polyhedral frame, layers of balsa wood, that's right—balsa wood, were glued then carved to obtain the subtle aerodynamic shape.

After shaping, hardwood rails and supports were set into the balsa wood around engine mounts, canopy, and inspection panels. The structure was then covered with thin strips of tulip wood to form the skin. After sanding and filing, it was covered with linen and dope.

The Model 100 was not quite complete by the time of the unfortunate visit by the German Wehrmacht. And by the time it resurfaced decades later, it wasn't the best of shape to take on the rigors of 500 mph flight. However, with a lot of TLC from the restoration team, it will be brought back to its original beauty. ✈

Tips & Tricks

A Couple of Building Hints

How many times have you used the household iron and been jumped on for leaving sticky stuff on it? Have you used iron-on film and had the color pigment stick to the iron and bleed to another section leaving streaks and marks on the second color (red on white, for instance)?

Solution: Heat the iron, put some salt on any sheet of paper and rub the iron over the salt. PRESTO! Iron face back in pristine condition.

—From the Tingalpa Transmitter in Australia

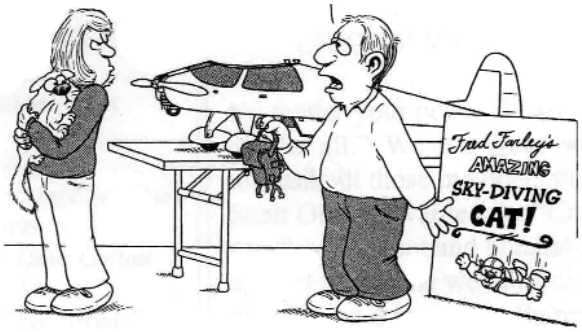
When drilling a hole in balsa, the wood has a tendency to splinter out and make a nasty mess where the drill bit exits. Drip a few drops of thin Hot Stuff around the exit area of the drill bit and let it cure. You can now drill a hole and the wood will hold together much better. It may still splinter out some, but not nearly as much. This method also works great when drilling wing hold-down holes on built-up wings.

—From the Windy Flyer newsletter, Downers Grove, Illinois

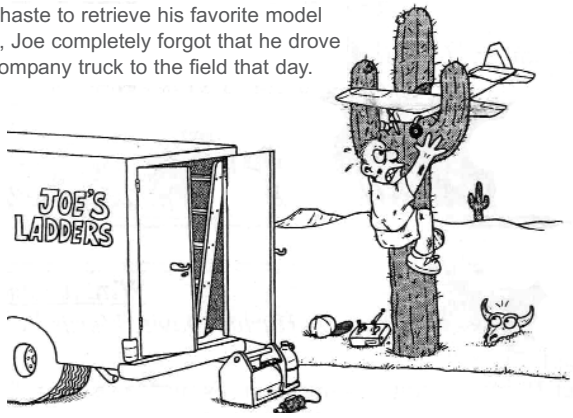
From the 1995 Warped Wings Calendar by Bob Zimmerman

Cartoons

"But honey, I already made the parachute and the sign and everything!"



In his haste to retrieve his favorite model airplane, Joe completely forgot that he drove the company truck to the field that day.



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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.

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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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