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5161 East Memorial Drive Muncie IN 47302
Tel.: (765) 287-1256 Fax: (765) 289-4248
www.modelaircraft.org

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NATIONAL NEWSLETTER

MAY 2003

Teaching Radio Control flying: Do you have what it takes?

By MIKE LYNCH

This is the first in a series on teaching Radio Control (RC) flying. Watch for additional information in future newsletters.

Just because you're good at something doesn't necessarily mean you can teach it. Some of the best fliers at our field admit they do not have the patience to teach beginners. Teaching requires an ability to see things through the eyes of the beginner and to modify your discussion accordingly. Not everyone is cut out for this.

It is my intention to teach experienced fliers how to teach RC flying. While the information will be most useful to beginning instructors, fliers who have been teaching for some time also will find many of my points helpful.

As you were learning to fly, surely you noticed that instructors at your field were very busy, especially during evening and weekend flying. There probably never seemed to be an abundance of instructors, even during designated instruction times. For this reason, many newly proficient fliers should consider becoming instructors.

I will show you how you can become a flight instructor. While there are many ways you can give back to your club, flight instruction is one of the most rewarding.

Before we begin, let me say I admit there are many ways to teach RC flying, and no two instructors will agree on how every concept should be related. The methods I show are rather simplistic, yet they have been proven during 10 years of instruction. You will improve on what I show as you develop your own teaching style.

The goal of this instruction program is to get students to the point where they can fly by themselves. When using my teaching methods, there are four steps (or progression levels) students must achieve to get to the point where they begin flying alone. This makes it very easy to teach since you can organize every technique needed into four basic steps. It also helps you limit the number of things beginners must master as they learn to fly. While you can eventually mix and match techniques for your own teaching preferences, I recommend that you understand the entire process before you make changes.

Let me point out that this text will stress the teaching of flying skills. I assume you can relate the basics of aerodynamics and flight, control surfaces, and in general, what makes an airplane fly. While I do offer some assistance for helping the beginner pick their first airplane, understanding flying safety, and starting and maintaining engines, there are things you need to relate before training can begin.

Here are some special notes for beginning instructors:

1) Demand trainer systems. While experienced instructors may be able to teach without a trainer system, as you begin instructing, you will be amazed at how many precarious attitudes beginners will get their airplanes into. Depending on your flying skills, some of these attitudes won't be comfortable to you. It's difficult enough to right a wandering airplane with the trainer system. Doing so after a transmitter is

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Teaching RC flying, *continued from page 1*

passed can be more difficult, especially when the airplane is close to the ground, as it is when taking off and landing.

For myself, if students do not have the trainer system capability, I can easily help them with the early stages of learning how to fly (steps one and two). As long as we keep the airplane high enough, it will never be in danger. Though I have to be much more attentive, I am confident in my flying.

However, as students begin taking off and landing, I make it very clear that there will be little I can do to save the airplane as it gets close to the ground. More than likely, the airplane will be dumped and damaged several times before takeoffs and landings are mastered. As long as my students understand this, I'll work with them. However, if the students show any sign that they may blame me for the airplane's damage, I won't help them learn how to take off and land!

One more point about passing the transmitter as opposed to the trainer system—with the trainer system, you are able to easily retake control. When you pass transmitters, students must give you the transmitter before you can retake control. As beginners progress, they may protest when you ask to retake control. The students may feel they are still in total control even though you know better. By the time they acknowledge they are in trouble, it may be too late for you to save the airplane. I make it very clear at the start that if the student protests when I ask to retake control, I will stop helping.

2) You control the pace. Beginners tend to get a little anxious. You will eventually develop a feel for when students have progressed enough to move on to each new step. Until then, take it slow. If in doubt, stay on the current step until you are sure.

3) Be assertive with your control of the master transmitter. Especially at first, be ready to take control of the airplane at the first sign of mistakes. While this frustrates beginners to some extent, you must be comfortable with the control of the airplane. There may be times, for example, when students come close to the flightline. They may be flying fine, but you will have to take control of the airplane to avoid the flightline boundary.

4) Patience is key. Beginners will have difficulty with things you find easy. This can be frustrating. If you show your frustration, beginners will lose confidence. You must constantly encourage beginners, stressing positive accomplishments to build on.

5) Be on the lookout for new ways to do things. Believe it or not, the best way to thoroughly learn something is to teach it! You will be amazed at how many things you learn from your students' questions. They really force you to think through things you now take for granted. In order to explain anything, you have to understand it. For questions you can't answer, look for an another experienced instructor in your club to help.

There are many ways to teach RC flying, and no two instructors will agree on how every concept should be related.

6) Be sure you can fly out-of-trim airplanes. If you have never taken a new airplane off by yourself, you shouldn't take a beginner's airplane up for the first time. To get ready to fly an airplane for the first time, practice this. Get your model in the air and have an instructor intentionally throw off one or more of your airplane's trims. Practice getting them back to normal.

7) Be sure beginners have an AMA membership card. Beginners must understand that flying can be dangerous and accidents happen. They need insurance when flying model airplanes every bit as much as when driving a car. AMA provides insurance to their members. AMA will allow you to register up to three instructors as those designated to help non-AMA members for a period of up to 30 days. These designated instructors and their students will be insured as long as they follow AMA rules.

8) Keep the left hand on the stick. Through the first two steps, beginners will predominantly use their right hands. You will notice that they will tend to let their left hands stray away from the left stick. Urge them to keep both hands on the sticks. As they begin taking off (in step three), they will need their left hands, and it will be easier if they are comfortable using them.

9) Be flexible. As you begin teaching any subject, you will be amazed at the number of ideas your students come up with. Most beginners tend to be a little naive. They simply do not understand enough of the big picture to draw correct conclusions. However, sometimes excellent ideas come from naivete. Do not be too quick to judge a student's idea as being bad. They may surprise you!

10) Watch for the student's saturation point. We all have a limit to how much new information we can absorb in a given period of time. RC flying is no exception. Keep in mind your students will be concentrating very hard during practice sessions, especially during their first few flights. There will come a point when they cannot take any more without a break.

One common symptom of this will be that the student has been doing just fine for about eight to 10 minutes of flying, but all of the sudden, the student starts making mistakes. Students may not understand why they are doing so poorly and may get frustrated. As the instructor, you must recognize when your students have had enough. Suggest a break and land the airplane.

11) Two steps forward, one step back. You must remember that your students will have problems along the way. At times, things you thought they understood will seem to be difficult again (especially after long non-flying periods). This can be frustrating for instructors so you'll have to show your patience when faced with this problem.

One way to minimize the problem is to do a review of what the students already know at the beginning of each flying session. You can review on the ground, reinforcing their knowledge as well as begin the practice flying by having them do seemingly simple maneuvers they already know. This also helps you begin a more complicated and new topic on a positive note. However, even with reviews, you must be on the lookout for times when students need to take one step back before they can move forward.

BEGINNER'S PERSPECTIVE: Learning how to fly

By MARK SCHAFFER

Learning to fly is a very exhilarating, challenging, rewarding, and fun activity! I highly recommend it to anybody who is interested.

During my first couple of inaugural flights, I was both nervous and excited, kind of like riding a giant roller coaster at an amusement park for the first time. As you prepare to embark on the ride, you are filled with excitement for what is yet to come, but a part of you is nervous and can't help but wonder what you are getting into. After the ride is over, you realize it was better than you thought it would be! That is what those first couple of flights were like.

During my training sessions, my flight box was wired to my instructor's flight box via a standard interface cable provided by the club. This allows the instructor to take immediate control of the airplane without me having to do or say anything. Flying tandem like this (the buddy box system) is like a dual cockpit in a real airplane with the instructor sitting right next to you at all times. The instructor performs the takeoff for you using his flight box. After the airplane has climbed to a safe operating altitude, the instructor levels it out and turns the electronic control over to you. My instructor always tells me that altitude is your best friend when learning to fly. The reason being if you do make a mistake, you or the instructor has enough altitude (thus time) to correct the problem.

Next, the trainer provides verbal commands of what flying actions to execute and how to physically perform them on your flight box. If the instructor senses your airplane is in trouble, he or she electronically takes control of the airplane. The trainer also lands the airplane for you at the end of the lesson. Each lesson usually lasts 15 to 20 minutes, and you usually get two to four flights in per session.

During the first few flights, I would estimate I had control of the airplane three to four minutes. The remainder of the time, my instructor had control while bailing me out of whatever mess I had gotten into. I worked with two different instructors, and both were extremely patient, knowledgeable, and friendly. You can tell their love of the sport by their willingness to help others learn, and it was obvious that they enjoyed these training sessions as well. Instructors are a real asset to the club, and I can't say enough good things about them.

It may seem hard to believe, but I was absolutely mentally and physically exhausted from the adrenaline rush after those first flights. It is a lot to keep up with. You are listening very intently to every word your instructor says while moving two unfamiliar control sticks in different directions. And you aren't able to look at the controls because your eyes are glued to your airplane at all times so you know where it is and how it is responding to your control actions. I asked my new training friends about this, and they all said they felt the same way.

Learning to fly is a very exhilarating, challenging, rewarding, and fun activity!

For those first couple of flights, even though I was connected to my trainer's buddy box, I was still afraid I was going to crash the airplane in front of a bunch of people I didn't know. We (the trainer and I) never did. After the first flights, I realized that no matter how badly I managed to screw up, my instructor would save the airplane. At that point in time, I became more relaxed.

For most of us, fear is a training inhibitor. With my fear diminishing, my learning curve and enjoyment started to accelerate. After a handful of additional flights, I progressed to the point where I could get the airplane to stagger through the air in the general direction I wanted it to go without the instructor taking over. I was flying! With more practice, my turns got smoother, and I flew straight and level without a problem, but the instructor was still taking off and landing for me.

I was starting to reach a reasonable level of comfort with the ability to fly pattern laps around the field when the instructor said it was time to start practicing landings. The nervous/excitement ratio took a big jump with this announcement! It was time to give up my good friend altitude.

Landing the airplane requires giving up both your altitude and your speed so you can bring the airplane to ground level. As your altitude and speed decrease so does your margin of error.

During normal flight speeds at higher altitudes, the airplane is responsive to minor changes in the radio controls. All your flying experience to date has been in this mode of operation. Flying at low landing speeds is a different ball game, and for all practical purposes, it's like having to learn to fly all over again but in a different way. One example I can think of would be driving a car. When a car travels at highway speeds, it requires very slight, almost unnoticeable movements of the wheel to keep it moving in a straight line. Move it slightly, and the car is quick to change lanes. Now slow the car down to about 5 mph. At lower speeds, it takes more movement in the steering wheel to cause a change in direction. The more drastic the change in direction, the more you must move the wheel.

Flying an airplane at low landing speeds is similar to this. As you begin to lose forward speed, your radio controls become sluggish. The slower you fly, the more unresponsive they become and the more you need to move the controls to make even the smallest correction to the airplane's flight path.

My instructor did not throw me to the wolves though when I started training for landings. At first the instructor had me reduce throttle while I was still at or near normal flight altitudes. This gave me the experience of how my airplane and controls react at slow speed and how to make proper corrections. I still had my altitude for a margin of error. As I became more comfortable with flying at low speeds the instructor asked me to practice at lower altitudes. I was still hooked up to

continued on page 4

Learning how to fly, *continued from page 3*

my instructor's buddy box, and he gave me constant feedback and encouragement as well as saving my airplane from time to time. At that point in time I was regularly doing low speed fly-bys down the length of the runway at about five to eight feet off the ground.

My instructor told me it was time to try a landing. He was very candid with me and told me that when the airplane was only a few feet off the ground on the landing approach, there would be little he could do to save it. Even though I had trained very hard at the low fly-bys, I was still nervous about crashing the airplane. The first time I attempted a landing, my instructor kept telling me to simply take my time. It actually worked! I was really proud of myself.

Have I ever crashed? While I have not had any fatal crashes to date, I have had two hard landings. I dropped the nose of the airplane just moments before landing, hitting the runway. The impact twisted the engine from the mount slightly. The instructor showed me how to fix it at the field and about 30 minutes later the airplane was in good flying condition and back up in the air.

When landing you normally pull the nose of the airplane up a little bit prior to actual touch down. During the second mishap, I pulled up on the nose a little too hard, and the tail section of the airplane hit the runway causing a slight crack in the elevator surface. More instructions on field repair, and I was flying again. When comparing notes with my training friends, it seems all of us have had at least one hard landing resulting in a crack or scratch here and there, but no one has had a crash where the airplane could not be easily repaired. I have done between 12 to 15 landings without incident.

The point I want to make here is that you should have some realistic expectations that your first airplane will receive a few bumps and bruises. I will not go so far as to say that you will never have a fatal crash, but if you work hard with your instructor, odds are you won't have one.

from *High Flier*
North Dallas RC Club
Dan Henderson, editor
Dallas TX

Aviation word search

The following aviation terms may be listed forward, backward, vertically, or diagonally. How fast can you find all 34 words? (Good = 14 minutes, Great = 12 minutes, and Ace = 9 minutes)

Aft
Ailerons
Airspeed
Altitude
Ascent
Bank
Bulkhead
Cabin
Ceiling
Cockpit
Cruise
Deplane
Descent
Drag
Empennage
Eta
Flaps
Headwinds
Jet stream
Landing
Latitude
Longitude
Pitch
Pressure
Pylon
Radome
Roll
Schedule
Slide
Stabilizer
Struts
Takeoff
Thrust
Traffic

H	C	T	I	P	H	C	B	R	N	Y	T	U	B	L
W	F	R	U	E	Q	E	D	U	T	I	T	L	A	A
A	E	L	U	D	E	H	C	S	L	Y	B	T	S	S
L	O	N	G	I	T	U	D	E	E	K	I	A	T	P
G	L	F	J	L	S	N	D	Q	R	T	H	U	C	C
J	N	O	J	S	I	E	D	F	U	T	R	E	I	L
T	E	I	R	W	Z	M	E	D	S	T	T	F	A	O
S	M	T	D	S	T	N	E	C	S	A	F	D	D	D
U	P	A	S	N	N	G	P	C	E	A	E	E	N	C
R	E	A	E	T	A	O	S	B	R	L	P	S	O	E
H	N	S	L	R	R	L	R	T	P	L	Q	C	L	I
T	N	T	D	F	F	E	I	E	A	E	K	E	Y	L
T	A	K	E	O	F	F	A	N	L	P	J	N	P	I
X	G	R	A	D	O	M	E	M	I	I	H	T	S	N
R	E	Z	I	L	I	B	A	T	S	B	A	N	K	G

from Sod Busters R/C Flyers newsletter
Mark Glammeier, editor
Sioux Falls SD

Care and feeding of sealed lead acid batteries

By RED SCHOLEFIELD

Lead acid gel cells should be charged with a constant potential charger specifically designed for these batteries. These chargers can be referred to as Constant Voltage Chargers (CVC). You can charge them with a constant current charger, but you must terminate the charge when the voltage reaches 14.7 volts. You should not exceed the C/10 charge rate. If you have a 7 Ah battery in your field box, the maximum constant current charge rate should not exceed 700 mA. It takes about 14 hours to charge from a fully discharged state (voltage less than 12 volts.).

A CVC is exactly what the name implies. It is clamped at a certain voltage and puts out all the current it can until the battery reaches the clamp voltage, usually around 14.5 volts. Then, the current drops off to maintain this voltage. A CVC is characterized as one having a current capable of supplying a fixed voltage to whatever load is applied. A constant current charge on the other hand will provide whatever voltage is necessary to force a fixed value of current through a load. Constant current charges have a much higher internal resistance than the load so that any variation on the load will not change the current being supplied. Constant voltage charges have a very low resistance as compared to the load and will supply whatever current necessary to maintain a given voltage at the load.

Many inexpensive chargers used for sealed lead batteries are what are called taper chargers; these are set up so the voltage tapers off as the full-charge voltage is reached. True constant potential chargers can be quite expensive so a compromise is made in the design to control costs.

We have used the term sealed lead battery in this discussion. These batteries are not truly sealed as cylindrical Nickel Cadmium (Ni-Cd) batteries are. They have a gelled electrolyte system where there is a modest recombination of the oxygen in overcharge in some designs. All require venting of the oxygen and hydrogen byproducts of charging and discharging. You should never totally seal these in a field box where these gasses can accumulate. Mixtures of oxygen and hydrogen can cause a spectacular "event" if a spark is provided (from an electric fuel pump motor).

How much charge is there in the battery? Unlike Ni-Cds, you can read the remaining capacity quite easily with a voltmeter. After the battery has been on rest for a few hours, read the voltage (no load). A reading of 12 volts is essentially fully discharged while 13 is fully charged. This is a fairly linear relationship so a reading of 12.4 volts means you have 40% of the capacity remaining.

Never leave a lead acid battery in the discharged condition or sulfation will result. The sulfuric acid in the electrolyte reacts with the sponge lead active material and forms lead sulfate. It is a poor conductor. This, coupled with the H_20 left after you take all the S out of H_2S0_4, is also a poor conductor, so trying to charge requires a lot of voltage to push the current through to convert the active material back to the charged state. Sometimes they just cannot be brought back from the sulfated state.

The good news is that sealed lead batteries retain their charge much longer than Ni-Cd; at room temperature, it's well over a year. All you have to do is make an occasional open voltage check to see if you need to charge it.

from *Hear Ye!*
Valley Forge Signal Seekers
Marilyn Ayres, editor
Glen Mills PA

TIP: Links removable tail wheel assembly

A lot of kits out these days either have you mounting the tail wheel right on the rudder or having the tiller sunk into the rudder. There are some problems here. If the tail wheel is mounted on the rudder, all the shocks from that wheel are taken up by the rudder hinges. This is not recommended for long life.

The better system to use is a tail wheel bracket to take all the loads. However, if the tiller is embedded in the rudder, there are still potential problems.

1) There is little turning shock absorption. Most of those shocks will be transmitted back to your servo.

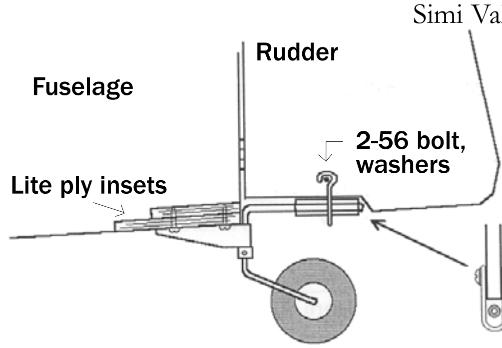
2) After several landings, the tiller tends to turn the inside of the rudder to mush.

3) If the tiller breaks through the rudder, or if the wire strut breaks, there is no way to remove and replace it without ripping up half the rudder.

A removable assembly, as shown in the diagram below, circumvents these problems.

Use a wheel collar on the bottom to transmit the loads to the bracket. On the tiller, put on a piece of inner nyrod, then some fuel tube. This will help dampen turning shock loads, easing the loads on the rudder servo. The yoke that goes around the tiller and is bolted to the rudder easily can be bent from clevis to rod wire. The bracket does not have to be lined up with the rudder hinge line.

from the newsletter of the
Simi Valley Fliers
Simi Valley CA



Tuning the carburetor on a glow fuel engine

By LLOYD SULLIVAN

Let's talk about how to tune the carburetor on a glow fuel engine. This technique will work on 2- and 4-cycle engines. Proper tuning for peak power is not hard if you follow the steps correctly.

Note: Never position yourself in line with the prop blade arc while tuning or running the engine at a high speed.

Before we discuss tuning the carburetor, let's list things that could get in the way.

- It is important to have a clean carburetor. Small particles of dirt or trash in the needle valve or the low speed jet will greatly affect or even prevent proper tuning.
- Air leaks will affect the carburetor's performance and its ability to set properly.
- Check the spray bar position. Most spray bars are fixed so this is not an issue, but for Super Tiger drivers, the spray bar is adjustable, and if the screws holding its position loosen, it can be a source of an air leak.
- Check for leaks in the fuel line from the tank to the carburetor. This affects the engine's ability to draw fuel from the tank and a lean run will result.
- Tank position is critical to proper fuel draw and engine performance. The tank's center line should be no lower than a half inch below the needle valve.
- Fuel foaming due to vibration causes lean runs and engine failures. Foaming is usually caused from a tank being poorly isolated from the fuselage structure. Proper propeller balancing is another factor in fuel foaming.

Let's assume we have a clean carburetor with no air leaks and fuel filtered from a properly positioned tank, which is isolated in foam rubber from the airframe.

First, close the high speed needle (the one by the fuel line) completely and open it two turns. Next, either close the low speed needle and open it two turns, or if you have a carburetor like an O.S. where the low needle is inside the throttle arm, put the end of the needle flush with the outside edge of the throttle arm. This should get the engine to a rich setting on both needles while still allowing it to start. Fill the tank with fuel and start the engine. If the engine doesn't start, open the low needle a half turn and try again. Allow a minute or two for warm up and slowly advance the throttle to full. The engine should run very rich. Close the high speed needle slowly until the engine runs smoothly, but do not try to peak it out yet. We have to make the first adjustment to the low speed needle. Reduce throttle to idle and let it run for about 15 or 20 seconds. Test throttle response by popping the throttle quickly to about half or better. If the engine stumbles and slowly picks up speed, the low needle is too rich. Close it clockwise about $^{1}/_{8}$ turn and repeat the throttle response test again. You are looking for an almost instantaneous smooth response without quitting. If the engine dies abruptly in the above test, the low needle is too lean. Open the needle $^{1}/_{8}$ turn at a time until the engine starts to stumble a little with quick throttle application, then close it until you have a smooth response to any throttle application.

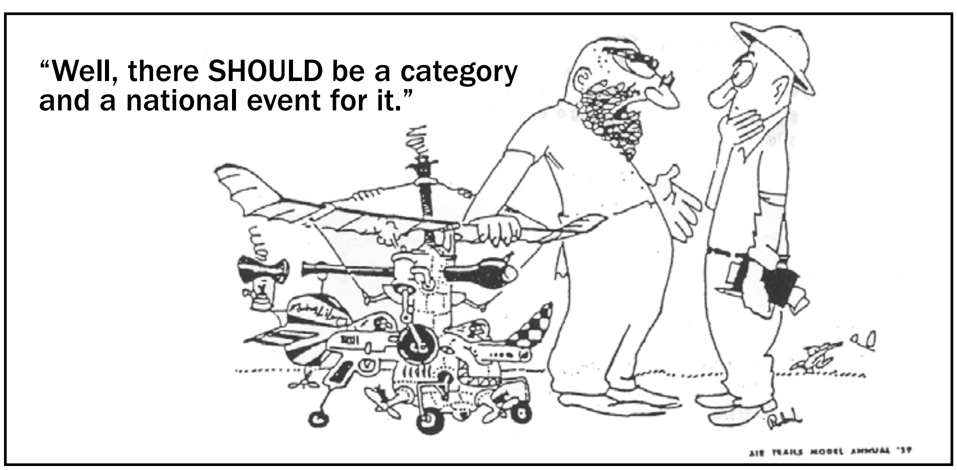
Now let's peak the high speed needle. Advance the throttle to wide open and slowly close the high speed needle until a very slight drop in rpm is heard. Open it to peak, then a couple of clicks more. You want your engine running slightly rich at full throttle so it will not be too lean when you point the nose up in flight. (I usually use the pinch test if I can get to the fuel line to confirm proper setting. The pinch test is performed by pinching the fuel line shut for an instant and letting go while at full throttle. The engine rpm should increase slightly without dying. If you can safely hold the airplane nose up to do the pinch test, more accurate settings result. If you can't hold the nose up safely, don't worry about it.)

Go back and check the throttle response again. Make any fine tuning adjustments as necessary, then check the high setting if you had to make any further low speed adjustments. Any time you adjust the low speed needle, you have to recheck the high speed needle. Low speed needle adjustments affect the high needle, but the high needle has little effect on low speed adjustments. Remember, only adjust the high speed needle at full throttle, and only adjust the low speed needle at an idle.

If you have a carburetor with a high needle and an air bleed adjustment, open the air bleed screw wide enough to adjust the high speed needle. It is about all you can do on these carburetors. Sometimes, though, you may need to close up to half of the air bleed hole for optimum idle.

If the tank position is good, you will have an engine that will idle until it runs out of fuel without loading up, has good throttle response, and runs slightly rich at full throttle without overheating. Loading up at idle indicates that the low needle is still too rich and overheating is an indication that the high needle is too lean.

from *Propwash*
Propnuts Radio Control Model
Airplane Club
Paul Shaffer, editor
Highlands TX



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. After 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 Balsa Wright to 10 cans of aerosol to CyA 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 CyA 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.

Here 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.

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.

from *Notam*
Bayou City Flyers
Joe Chauffe, editor
Katy TX

Soaring with the "sports cars" of aeromodeling

By LENNY KEER

Hotliners! Even the name sounds exciting. These are probably the most versatile and fun to fly Electric Sailplanes made. They could be called the "sports cars" of Electric Soaring. This type of airplane is generally sleek, strong, and aggressively powered. Brushless motors offer the best power to weight ratio, but a good brushed motor can provide good power too. With an appropriate motor system, vertical climbs are easily accomplished.

Like a slope ship that requires no slope, they excel at carving smooth high speed turns and performing whatever aerobatic moves you can do. They thermal fairly well too, especially when using a 7- to 10-cell power system.

A typical flight may include multiple climbs to altitude, a variety of pleasing maneuvers and high speed dives, followed by thermalling back up to altitude for more fun. Flight times are 15-30 minutes and can go much longer with a little thermal help.

Most hotliners have aileron and elevator controls. Some have flaps too, and a few have a rudder. Wingspans are usually around 50 to 80 inches, and construction ranges from balsa over foam to hollow molded glass and carbon wings. Fuselage construction is almost exclusively fiberglass.

For some good examples of hotliners, check out the Bandit from Aeromodel, the Nike, Filip E, or Flash E from Northeast Sailplanes, or the Mini-Ellipse from Skip Miller. If you're looking for something to spice up your stable of TD sailplanes, a good hotliner may be just the ticket!

F5B is an international, multitask, Electric Soaring class requiring high power for fast climbs, and the lowest drag and highest efficiency possible to maximize the glide. Each flight consists of a distance task, a thermal task, and a landing task. The flight starts with a 200-second distance task on a 150-meter course. The object is to achieve as many laps as possible in the allotted time. The motor can only be run when outside the course. When the distance task ends, the thermal task immediately starts. This is a 10-minute thermal duration task, ending with a spot landing. In the thermal portion of the flight, the motor can be run as much as needed, but each second of motor used counts against your score. The best pilots in the world are doing 40 to 43 laps in distance, and making the 10-minute duration with only 5 to 10 seconds of power used.

**Hotliners!
Even the name
sounds exciting.**

If hotliners can be considered the "sports cars" of Electric Sailplanes, then F5B models would be the Ferraris or Maseratis. These models are at the top of the hotliner food chain. Their design is dictated by the international rules for this competition class. They are usually all molded glass and carbon construction with very thin airfoils. They have to be very strong to accommodate the high-G turns used in the distance task, and very clean and efficient to maximize the thermal performance. Wingspans normally range from about 65 to 80 inches. Controls are ailerons and elevator, and sometimes flaps. Rudder control is not used. ShredAir carries several F5B models, including the Surprise series.

While these airplanes certainly fit into the high performance category, they're not really difficult to fly. They are designed to handle well despite their higher wing loading. With spoilerons (and sometimes flaps) deployed they still slow down to a reasonable speed for landing.

from *The Feedback*
Fort Bend R/C Club
Charlie Caulkins, editor
Sugar Land TX

Are you older than dirt?

Count all the ones that you remember, *not* the ones you were told about! And *no* fudging!

❑ Blackjack chewing gum
❑ Wax Coke-shaped bottles with colored sugar water
❑ Candy cigarettes
❑ Soda pop machines that dispensed bottles
❑ Coffee shops with tableside jukeboxes
❑ Home milk delivery in glass bottles with cardboard stoppers
❑ Party lines
❑ Newsreels before the movie
❑ P.F. Flyers
❑ Butch wax
❑ Telephone numbers with word prefixes (Capital 4-4374)
❑ Peashooters
❑ Howdy Doody
❑ 45 RPM records
❑ S&H Green Stamps
❑ Hi-fi's
❑ Metal ice trays with levers
❑ Mimeograph paper
❑ Blue flashbulb
❑ Packards
❑ Roller skate keys
❑ Cork popguns
❑ Drive-ins
❑ Studebakers
❑ Wash tub wringers

Ratings:
0-5 = You're still young
6-10 = Getting older
11-15 = Don't tell your age
16-25 = You're older than dirt

How many of these do you remember?

- Head light dimmer switches on the floor
- Ignition switches on the dashboard
- Heaters mounted on the inside of the firewall
- Real ice boxes
- Pant leg clips for bicycles without chain guards
- Soldering irons you heated on a gas burner
- Using hand signals for cars without turn signals

from *The Pilot's Log*
Fort Worth Thunderbirds R/C Club
Charles Osborn, editor
Fort Worth TX

What's the oil content?

By DON NIX

Fact: It's likely no other single facet of modeling generates as many myths, misconceptions, misunderstandings, or errors (and more than a few lies), as model fuel, one of our absolutely necessary, non-optional items for powered flight.

Fact: Of all the above, the one fact that rouses the most questions—and without doubt, the most wrong answers—is the ongoing nonsense about the amount of oil required in model fuel.

Myth: Model Glow Fuel must contain XX% oil to operate properly, perform well and protect the engine.

Fact: There is no such fixed number, at least not a valid one. Why not? Think about it. In order for this to be true, all oils used in model fuel would have to be identical in every characteristic. Does anyone honestly believe they are? I doubt it.

While lubricants compounded for full-size engines—automotive, recreational vehicle, or aircraft—are rarely, if ever, suitable for use in model engines, there are a number of base lubricants that are available for our highly specialized use. However, most of these must be changed by the use of a variety of additives and modifiers.

While Klotz model oils are perhaps the most well-known and are quite good, they are by no means the only lubricants available to model fuel blenders. Each type of fuel has its own "personality"—its own set of technical specifications and characteristics.

At this point, I should indicate that I'm speaking of the so-called "synthetic oils" popularly used in modern model fuels. Castor oil, the oil of choice, and indeed, the only suitable model engine oil for many years, is more of a common and known factor. Assuming a good grade, if a fuel uses only castor as its lubricant, then we could give you a fixed percentage, at least for the various engine groups.

However, few model fuels intended for radio control use today contain only castor oil as the lubricant. For the purposes of this discussion, we will only deal with fuels containing either straight synthetics or a blend of castor and synthetics.

So what does all that mean? Let's draw a picture here: Suppose at some point in your life, you become concerned about living a long and healthy life, and you decide to consult a doctor for advice as to how to accomplish this. When you come to the subject of food, you say, "Tell me, Doctor, if I wanna still be healthy and virile at 90, how do I eat?" The good doctor replies, "M'boy, if you will eat two pounds of food a day, you'll be fine!"

My guess is your response would be something along the lines of, "What kind of food., Doc? After all, no two are exactly alike. Is that two pounds of lettuce or two pounds of pork chops?" If he replied, "It doesn't matter. Just as long as you eat that two pounds every day, you'll probably outlive your kids." You'd probably run, not walk, out of that quack's office!

Why then do we blindly follow someone's word when they say, "Thou shalt use no fuel that does not contain XX% oil." It makes no sense to me, nor do I think it will to you, if you stop to think about it. All foods are different, so are oils.

If that's true, why do the instructions with my engine specify a fixed percentage of oil? Simple: to protect themselves. All engine manufacturers have been burned in recent years by "bargain-priced" fuels containing either inferior oils or insufficient amounts of oils.

Everyone that I've talked to will admit off the record they know fuels containing good oils won't need as much as their instructions say. But they also say they have no control over that, so they are going to print a high number, in hopes the amount of even a cheap oil will be sufficient. Frequently, it isn't.

So why not just put a lot of oil—at least 20% or more—in fuel and not worry about it? There are several reasons. For example:

- Any more oil than is necessary makes the engine run really badly.

continued on page 9

Oil content, *continued from page 8*

Think about it. Methanol burns, oil doesn't, or at least it shouldn't. Common sense tells us the less oil (non-burnable) we can safely use (to an irreducible minimum point, of course), the more methanol (burnable) we will have in our combustion chamber. More burnable ingredients equals more power. One well-known magazine writer, with more than 50 years engine experience, tells me that for every 1% oil removed from model fuel, the effect is about the same as adding 1% nitromethane. And it costs a lot less!

By the same logic, the less oil we use (to the predetermined minimum, of course), the less the oil is going to be dousing the glow plug element, and we should be able to achieve a lower, smoother idle.

Next to nitromethane, oil is the most expensive ingredient in model fuel. By not using an unnecessary amount of oil, the manufacturer can keep the cost of the fuel down, putting a smile on modelers' faces. Remember, even another 25 cents in manufacturing cost translates to an additional dollar or more at the retail level.

So, what is the right amount? It depends on what kind of oils, in what combinations, with what additives, etc. For what use (sport airplanes, racing, helicopters, boats, cars, ducted fans)? What size engines? (As engine size increases, they need progressively less oil. Why? Simple mathematics. Surface area of the combustion chamber increases at about half the rate as the displacement increases.) Most people know that the big Tournament of Champions and Unlimited racing engines use oil in the 4% to 5% range.

Ducted fan and helicopter engines typically need more oil, 4-strokers or less. It surprises most airplane fliers to know that top competition model car engines use fuel with oil contents in the single digits, even though they are turning in the 40,000-50,000 rpm range, and have no fan in front to cool them! As matter of fact, they will hardly run on regular airplane fuel.

from the newsletter of the
Itasca R/C Club
Gail Lane, editor
Grand Rapids MN

Don Nix is the president of GBG Industries, Inc. The article was reprinted in the Itasca R/C Club newsletter with permission from PowerMaster Fuels.

Radio Control equipment check list

AIRFRAME
❑ Check wing for warps and use a heat gun to correct if necessary
❑ Check wing attachment mechanism (dowels or bolt on)
❑ Check for loose covering and seal down and remove wrinkles if needed
❑ Check physical attachment of fin and stabilizer
❑ Verify that name, address, and AMA number are in or on aircraft and are legible

CONTROL SURFACES
❑ Check linkage for flexing/bowing—should be able to move servo with control surface (Note that some servos do not like to be reverse-driven, so be gentle)
❑ Check control horns and clevises for tightness/wear/keepers and replace if necessary
❑ Check thread-on metal clevises and tighten jam nuts and check keepers
❑ Check brass threaded couplers—use only on throttle (use stainless on control surfaces)
❑ Check for broken or worn hinges and replace if necessary

RADIO INSTALLATION
❑ Check servos, servo tray, and servo rails for secure mounting
❑ Check servo output arm screws and linkage attachments (clevis, EZ connector, Z-bend)
❑ Check receiver on/off switch for proper actuation and mounting
❑ Check all servo connections to extensions and the receiver itself
❑ Check receiver and battery foam padding—replace if worn or fuel soaked
❑ Check antenna integrity and routing
❑ Check battery capacity with cycler or ESV—replace if less than 80% of rated capacity

LANDING GEAR
❑ Check landing gear for bends and replace as necessary
❑ Check that landing gear mounting screws are tight
❑ Check nose gear/tail wheel linkages—verify travel and no binding
❑ Check that wheels spin freely and tighten wheel collars if necessary (use fuel tubing outside of collars)

ENGINE/PROPELLER
❑ Check engine mounting—engine to mount, mount to firewall, firewall to airframe
❑ Check engine cylinder head bolts and muffler attachment
❑ Check valve clearances on four-cycle engines
❑ Inspect propeller for nicks/cracks
❑ Check needle friction for both high-speed and low-speed needles (if applicable)

FUEL SYSTEM
❑ Remove fuel tank and check for debris and/or leaks (vacuum test)
❑ Replace fuel tubing between fuel tank and engine if it looks worn/old
❑ Use filter between muffler and fuel tank to eliminate debris
❑ Hold airframe nose up and shake to verify that fuel tank clunk is free

SUPPORT EQUIPMENT
❑ Empty out your flight box and clean it
❑ Review tools carried and remove any you don't use
❑ Stock up on glow plugs and props that you will need
❑ Charge/check 12-volt starter battery
❑ Charge/cycle glow plug battery and replace if necessary
❑ Test electric fuel pump/lines/filter to verify everything works properly

List courtesy of Chuck Baker and Doug Gifford

SUPERIOR PILOT SKILLS: Watching the flightline

By GARY THOMPSON

Superior Pilot: *Def.* "A pilot who uses superior judgment to keep his butt out of situations that might cause him to have to use his superior flying skills."

THE FLIGHTLINE

The flightline is the closest point to our flying models and therefore a dangerous location at the flying field. By controlling our models beyond the flightline, we separate the danger of a flying model from the pilots and spectators. Pilots and spectators normally remain on the people side of the flightline while flying models must fly only beyond the flightline. Each time you cross the flightline, the danger risk increases.

Just where is the flightline? A superior pilot knows exactly where the flightline is located at all times. Do you know?

At our fields (and at most AMA sites), we have established that our models must fly beyond the far edge of the runway and when aircraft are flying, people must stay behind the pilots' stations and fence. So, we have a flightline or area that is normally not occupied by flying models or people. By design, the flightline designates a buffer zone that provides a margin of safety.

Some of your activities will involve the use of this buffer zone and therefore require extreme care and the possible use of your superior flying skills. They are:

- Takeoff
- Landing
- Aircraft retrieval

Using the buffer zone at any other time shows carelessness on your part and a lack of superior judgment.

Become a superior pilot. Don't be challenged by having to resort to using your superior flying skills to get yourself out of trouble.

How can you protect the flightline?

1) If you have to enter the buffer zone to retrieve your airplane, announce (loudly) your intentions to all other pilots and make sure that you have their attention. While you are in the buffer zone, make sure all other pilots are aware of your location and announce when you are clear of the zone. This applies to yourself and your model.

2) Fly your model well beyond the flightline so that if you make a mistake the model does not enter the buffer zone.

3) When you have to enter the buffer zone (takeoff and landing), announce your intentions (loudly) and make sure the other pilots are aware of your intentions.

4) On takeoff, make sure that you have complete control of your model. Start your takeoff roll past the pilot area and make sure your first turn will be away from the pit area and out of the buffer zone.

5) On landing, target a touchdown directly in front of you, taxi back to the pits on the runway, and stop your engine using your transmitter.

Don't cross the flightline any more than necessary. Using the preflight check list will help you minimize the number of times you have to enter the danger zone. Don't fly a model that has problems.

from *Transmitter*
Palomar RC Flyers
San Marcos CA

Event suggestion

The Bean Counter event comes from the Prop Masters R/C Aero Club, Warrenville IL.

CONTEST RULES

Each pilot is given a paper cup and 20 beans. The beans are placed in the cup. The cup is secured to the airplane with rubber bands and a wooden dowel (if desired). The pilot must fly specified maneuvers without losing the beans. The pilot who completes the maneuvers with the most beans remaining in his cup is the winner. The cup can be placed anywhere on the model as long as the beans are not artificially prevented from falling out.

Beginners fly one circuit around the field. Novices fly one loop. Advanced fliers fly two loops. Experts fly three loops.

Building floats for your model

By CHUCK CUNNINGHAM

I'm going to hit some of the high spots so those of you who have become infected with float fever this past year will have a few tips.

First, when selecting floats for your aircraft, make sure they are large enough for the model they will be used on. Many of the commercial floats are on the small side for a .60 or larger size aircraft, and you may need to build your own floats. The length of the floats should be at least 75% of the length of the aircraft fuselage, measured from the back of the prop to the elevator hinge line.

Next, place the floats so the step on the float is just a bit aft of the center of gravity. Since you are installing floats on a previously flown model, check and mark the balance point on the side of the fuselage. Balance without fuel, but with all the landing gear and wheels in their normal positions. Chances are that after the floats are installed, the aircraft will be tail heavy, so bring it back to its former balance point by adding weights to the floats.

Installing the floats at the normal landing gear spread is okay. If the spread is right for wheels, it is fine for the floats. The aircraft should be positioned on the floats in such a manner that the wing is sitting about two degrees to the top of the float line. This will allow the lift of the wing to aid in breaking the suction of the water when making a takeoff run. It is very important to make sure the wings are not negative to the top of

continued on page 11

Floats, *continued from page 10*

the floats as this results in gluing the aircraft to the water's surface. This is great for high speed taxiing but not for making a nice takeoff from the water.

The next tip is to use a plastic or nylon prop rather than a wood prop on the engine. If the water surface is choppy and the wind is kicking up, just a little water spray can quickly make toothpicks out of most wood props. If you always fly from calm water, then a wood prop is fine.

If you cannot locate commercial floats that are large enough for your aircraft, it is very simple to make them from styrofoam. You don't need to use a hot wire; you can cut them out with a band saw. If you don't have access to a band saw, you can cut them from styrofoam using a hand saw.

The method of attaching the floats to your aircraft is very simple. A stiff back made from 1/4-inch plywood around 5/8- to 3/4-inch wide, running the full length of the float, is glued to it with epoxy cement. Next, drill five 1/4-inch holes in the stiff back and into the styrofoam float, two each close to the landing gear attachment points and one near the nose. Stuff the holes full of epoxy, then drive a 1/4-inch dowel into the hole and the foam, making a system that locks the stiff back to the float. If you don't follow this step, it's almost a sure bet that one or more floats will rip off in a less than perfect landing.

Attach the landing gear to the floats using plastic landing gear clamps and retain the landing gear to the clamps with wheel collars.

You may cover your floats using several methods. First, if you really like to make beautiful floats, cover the foam with 1/16-inch balsa, then cover that with silk and dope or plastic film. If you want to make an easier float, simply cover the floats with plastic packaging tape. We have been covering floats this way for about five years now and have several pairs that have survived hundreds of takeoffs and landings, with only slight wear and tear. If you want to be a little more jazzy than packaging tape, cover the floats with EconoKote. This material will stick well to foam and will give you a better looking finished product than the packaging tape, but will not be any more durable.

There are two methods of making a water rudder. The first is to attach a rudder to the aft end of each float and connect these via pushrods to the aircraft rudder. The other is to extend a wire down from the rudder into the water. On the end, solder a small metal rudder, about 1 1/2 x 2 inches, which should be large enough. This rudder should be located so that it is in the water when the aircraft is being taxied (taxiing should be done holding up elevator to keep the prop out of the spray) but clear of the water when the model is up and running on the step for takeoff. When the aircraft is moving out on the step, you want the air rudder to be the functioning rudder, not something dragging in the spray.

With floats placed so the wing is positive to the top of the float, you will need to hold up elevator while taxiing into the wind. Once in the takeoff position, you need to hold just a bit of up elevator as you bring the engine up to full throttle. This keeps the tips of the float up. As the speed builds, relax the up elevator. You may need to feed in just a little down to bring the floats up on the step. Let it run until flying speed has been reached, then gently lift off with up elevator.

Some aircraft, such as Slater's Balsa US Cub, will simply lift off the water in about five feet, as soon as power is applied, while other, more heavily loaded aircraft need a longer takeoff run to attain flying speed. Know your model and how it reacts on takeoff.

Landing with floats is easy, but you should practice making landings with the aircraft held in nose-high attitude. This allows the aircraft to settle down on the surface of the water gently and easily. If you make a nose-low bash at the water, the chances are pretty great that a float tip will dig in, causing a water loop and a dunking.

Give flying from water a try this season. If done carefully and with proper preparation, you will enjoy it. Proper preparation includes making sure your model doesn't have any holes in the covering where water might get into the structure. Make sure the engine has a good idle. If it always dies at idle, either correct it or put another engine in the nose. It is imperative that the engine idle well.

If you dunk your aircraft while float flying, then as soon as you get it to shore, dump all of the fuel from the tank as it may be contaminated with water. Remove the plug from the engine and drain all of the water from the engine and muffler. Using an electric starter, turn the engine over rapidly with the plug still removed. Refill the fuel tank, hook up the engine to the starting battery, and run it for five minutes to drive all the moisture from the bearings.

If the servos were submerged, they also need removed and their cases taken apart. The servos should be thoroughly dried out. The receiver and battery pack should be packed in foam, then overwrapped with plastic wrap to protect them from immersion.

Go out to the lake or pond and have fun. It's just another facet of radio control flying you will enjoy.

from the newsletter of the
Itasca R/C Club
Gail Lane, editor
Grand Rapids MN

Inner strength

If you can start the day without caffeine ...
If you can be cheerful, ignoring aches and pains ...
If you can resist complaining and boring people with your troubles ...
If you can eat the same food everyday and be grateful for it ...
If you can understand when loved ones are too busy to give you time ...
If you can overlook it when people take things out on you ...
If you can take criticism and blame without resentment ...
If you can face the world without lies and deceit ...
If you can conquer tension without medical help ...
If you can relax without liquor ...
If you can sleep soundly every night ...
Then you are probably the family dog.

from *Hangar Talk*
Orange Coast RC Club
Betty Bliss, editor
Whittier CA

Engine break-in procedures improve performance

By LARRY DUDKOWSKI

Breaking in an engine ensures smooth and reliable performance. Nothing is more frustrating than having your engine quit, whether it's in flight or on takeoff. Breaking in an engine reduces this problem.

The break-in process involves impregnating the metal surfaces with lubricant as they wear together. I picked up this method from a model magazine a few years ago and have used it ever since. The procedure repeatedly brings the engine up to operating temperature, which opens the pores in the metal, allowing the lubricant to penetrate during the cool down cycle.

The following steps are performed with the throttle wide open. The engine speed is adjusted via the needle value. Generally an engine is broken-in when it will idle reliably and will throttle up smoothly. The instructions here are for 2-cycle engines; 4-cycle engines require a different break in. When in doubt, follow the manufacturer's instructions.

Engine Break-in Procedure:

1. Warm up the engine. Start it. Once it's running, set the throttle wide open and adjust the needle valve mixture *very* rich. The engine exhaust should be wet with unburned fuel and oil. The engine should be four-cycling (that is firing only every other cycle). Run this way for two minutes.
2. Lean out the mixture until you're near peak rpm. Run for 30 seconds.
3. Enrich the mixture again until the engine is four-cycling. Run for 30 seconds.
4. Lean out the mixture until you're near peak rpm. Run for 60 seconds.
5. Enrich the mixture until the engine is four-cycling again. Run for 30 seconds.
6. Keep alternating the high-speed runs with the cool down periods, increasing the amount of time you're running near peak rpm in 30-second increments. Remember the 30 seconds of running rich cool down time in between each high-speed run.

For the next tank of fuel, let's begin with step one, "the warm-up," but pick up the high-speed run time where you left off. If you ran out of fuel after two minutes, the next high-speed run would be two minutes, 30 seconds. After the second tank of fuel is used, check for smooth idle and throttle response.

If the engine quits at idle or hesitates at throttle up, continue the process. Once completed, you should have a reliable power plant for your model. I find that about 20 ounces of fuel is the minimum required for proper break-in.

For the first few flights, you should run the engine slightly on the rich side, gradually leaning it out for peak power in successive flights. The fuel is also an engine coolant and lubricant. Engines, especially the ABC types, are manufactured to very close tolerances. When the model is in motion, less load is on the engine, and the propeller moves easier. This allows the engine to run faster. If the fuel mixture is too lean, the engine overheats because of the high combustion temperature, and less unburned fuel is available for cooling and lubrication. This causes the internal parts to expand. Expansion can cause the engine to seize and quit running during flight.

Remember, it's running too lean if:

1. At full throttle, you quickly pinch and release the fuel line and the engine hesitates or slows.
2. At full throttle, you hold the aircraft vertical and the engine slows or hesitates. Wait 15 seconds.
3. Brown or black residue is on the cylinder head. This is burned oil.
4. Your engine slows or quits on take off or during vertical maneuvers.

from *Plane Talk*
Prop Masters R/C Aero Club
Dave Masters, editor
Warrenville IL

TIP TIME

Drilling wing bolt holes in belly pan sheeting

Many airplanes, particularly warbirds, have a belly pan under the wing that makes getting to the wing bolts a bit tricky. Most kits have you drill a hole in the belly pan sheeting and use the supplied paper tube to create a conduit for inserting and removing the wing bolts. The problem is the paper tube is barely large enough to go over the head of the bolt. If you change to a different type of bolt later or don't get the tube aligned just right, you have a problem.

You can usually take care of this by using a 3 x 5" index card. Drill a hole in the belly pan sheeting directly over the wing bolt holes. Make this hole as large as necessary to accommodate the type of bolt you wish to use. You can use a coin of the appropriate size to mark the outline of the hole. Then, use your hobby knife or a Dremel tool to remove the material. Wrap the index card around a wooden dowel that is smaller than the hole. Insert the card and dowel into the hole and remove the dowel. Be sure the card is touching the wing bolt plate. The rolled up card will expand nicely and should conform to the hole you drilled. Glue the tube in with CyA and sand it flush with the sheeting. If the holes are anywhere near the exhaust, it is a good idea to fuelproof them with resin or fuelproof paint.

from *Mission Briefing*
Magic Valley Air Force
Gary Nelson, editor
Jackson TN

Emil's trivia question

What were "Maia" and "Mercury"?

Answer on page 13

Sheeting a compound curve fuselage

By AVEY SHAW

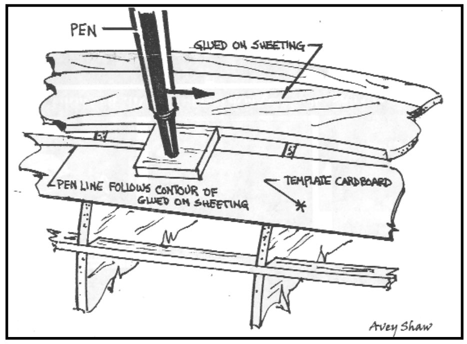
Sheeting a compound curved fuselage is difficult no matter what method is used, but I have come to the conclusion the best method is as follows.

Select a firm but flexible balsa. If using 1/8-inch sheeting, be aware that in areas that have considerable contours you shouldn't try to use more than 1 1/4-inch in width.

Soak the balsa in hot water until it is flexible. Some people prefer ammonia. Dry the back side with your heat gun, and glue it to your frame work. That's your first piece.

So far it has been easy. If your second strip will contour to the shape of the first without much fight, you can continue gluing it into position. At this point, a considerable bow or bend will have developed, and a third strip, cut with parallel sides, won't work out.

Cut from stiff paper or cardboard a strip two inches wide and butt the edge of the cardboard to your mounted strip. Note the gap. Do not force the cardboard to close the gap. Measure



the gap's widest opening and cut a scrap of balsa larger than that and about 1/2-inch long. Drill or punch a hole for a pen halfway, 1/4-inch from each end. Now let the pen protrude through, leaving enough material so it's larger than the gap. You can bank off the glued strip and run a line on the cardboard (see diagram). Cut along that line and match it to the curve on the strip. Adjust if necessary.

Spray 3M Super 77 adhesive on the back of the cardboard. Set it on the balsa you are going to use for your next strip. Run your X-acto knife along the edge of the cardboard, transferring the shape to the balsa. It is a good idea to flip over the cardboard and repeat that curve on the topside of the same strip you apply. Wet the strip down, and you're in business. Keep in mind to work opposite sides to keep the fuselage straight.

from *The Altitude*
Long Island Radio Control Society
Lionel Berstein, editor
Bohemia NY

EMIL'S TRIVIA QUESTION: "Maia" and "Mercury"

By EMIL CASSANELLO

The Short Brothers Aircraft Co. was a major aircraft manufacturer in England. It built seaplanes during World War I, and in the 1930s, it built four engine flying boats. The Short Brothers built more flying boats than the American Boeing, Martin, or Sikorski companies. However, its large flying boats did not have the range to fly the Atlantic Ocean. The Maia and Mercury combination was the company's solution to give an airplane the range needed for an ocean crossing.

The Short Brothers eventually designed and built a large flying boat and an upper releasable twin float seaplane. It worked.

The S.20 Mercury had a wing span of 73 feet and was powered by four Napier Rapier V engines with 340 horsepower. It was a clean design with a slim, beautifully designed metal monocoupe fuselage and a calculated still air range of 3,800 miles.

With all eight engines running, the composite lifted off, and at the proper time, separated. The Maia returned to land, and the Mercury was on its way.

The same principle was used by the Russians. They carried as many as four fighter airplanes on their bombers (called the Zveno-1 Combination).

In World War II, Germany used a similar method. Twin engine bombers packed with high explosives and a fighter airplane flew together, with a pilot flying the top airplane. At the proper time, the bomber would be released and guided to a target. The pilot in the fighter would then return to base.

from *The Altitude*
Long Island Radio Control Society
Lionel Berstein, editor
Bohemia NY

Conversions

- 1 millionth of a mouthwash = 1 microscope
- Time between slipping on a peel and smacking the pavement = 1 bananosecond
- Weight an evangelist carries with God = 1 billigram
- Time it takes to sail 220 yards at 1 nautical mile per hour = 1 Knotfurlong
- Half of a large intestine = 1 semicolon
- 1,000,000 aches = 1 megahurtz
- Basic unit of laryngitis = 1 hoarsepower
- Ratio of an igloo's circumference to its diameter = Eskimo Pi
- 2,000 pounds of Chinese soup = Won ton
- Shortest distance between two jokes = A straight line
- 453.6 graham crackers = a pound cake

from the newsletter of the
Indy Sportliners Control Line
Model Airplane Club
Indianapolis IN

Hints & Tips

Information you can use

Construction tip

Next time you build a stick and tissue box fuselage, try this. As an example, using the Gollywock, lay out the top and bottom $^{1}/_{8}$-inch square longerons. Lightly glue two $^{1}/_{8}$-inch square sticks together with 3M Super 77 adhesive. Now, you can cut two uprights at the same time, one for the right side and one for the left. Pry them apart. I like to number them (station #1, station #2, etc.). Put the second batch aside. After you have glued all uprights in place on the right side, remove the pins and fold the plan protector on top of the first side. Now, pin the longerons for the left side over the right side. Put in the other upright you previously cut, and *bam!* You have two sides that match in about the time it takes to build one. You can do the same with the cross pieces too. I do my cutting with a 4-inch Dremel table saw, but if you don't have a saw, you can use a small miter box to make the square cuts.

from *Brainbuster Newsletter*
Brainbuster Free Flight Club
Abram Van Dover, editor
Newport News VA

Starting engines

Having trouble getting a balky engine to start on a cold day? Here's a trick we used in Korea. Remove the glow plug. Put in a couple of drops of fuel on top on the cylinder head. *Note:* I said a couple of drops. Those of you with electric fuel pumps will need an eye dropper or a manual fuel pump.

Once you have a couple drops of fuel in the cylinder head, replace the glow plug. Attach the glow plug starter. Turn the engine by hand, and you should feel it kick. Don't use an electric starter at this point to avoid hydraulic lock. Use a chicken stick to start the engine. If the engine runs backward, no problem. The important thing is you are warming the engine. You can stop and restart with your electric starter after 15 minutes.

Emergency patching

Sometimes a taxi mistake or a soft landing results in minor damage, such as a hole poked in the wing covering material. Your aircraft is flyable except for that hole. To handle this problem, carry some denatured alcohol in a small, plastic container and a roll of scotch tape. Using a paper towel, clean the patch area with the alcohol to get rid of all oil. The oil film will keep the tape from sticking. Clean the area twice. Wait a couple minutes and apply the scotch tape to seal the hole. I have an old Ugly Stik that I use to break in 2-cycle engines, and it has several scotch tape patches that have held up for years. *Caution:* Don't use regular rubbing alcohol as it has some oil in it that will leave enough film to prevent the tape from sticking properly.

from *The Beacon*
Miramar Radio Control Flyers of MCAS Miramar
Dick Doucet, editor
San Diego CA

Separating iron-on covering

If you have trouble separating the iron-on covering from its plastic backing, try this. Stick a small piece of tape to each side of the covering, near the edge, and pull them apart. This should separate the covering from the backing. Another method is to stick a No. 11 X-Acto blade into the backing at a sharp angle. The blade will puncture the plastic backing but not the covering. Then, just lift up on the blade, and the backing will come off.

Loose rubber deflectors

If you are worried about your rubber deflector coming loose from your muffler, put a bead of J-B Weld around the outlet pipe to form a lip at the tip. Now, when you push the deflector onto the nipple and tie wrap it around the ridge of J-B Weld, it will not come off. This would probably be a good method for keeping tuned pipes in place also.

Gluing on canopies

Before gluing on your airplane's canopy, put a small hole in some obscure place to allow air circulation under the canopy. This will keep your canopy from popping off in the summer when the air inside expands or from collapsing in the winter when the air shrinks.

Soldering wires

Unless you have nerves of steel, it's difficult to hold two wires still while you solder them together, even if one is clamped to your workbench. An easy solution to this problem is to glue two wooden clothespins to a wooden base, about an inch apart. Now, slip the wires to be soldered into the clamping part of the clothespins, and they will be held together without jiggling. You can put the clothespins side by side rather than nose to nose. This keeps them from interfering with longer wires. You will probably have to sand the gripping part to create a larger grip area.

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Hints and tips, *continued from page 14*

Keep screws in place

If you are having trouble with screws backing out of servos, cowlings, or anything else, try this. Put a little carpenter's glue on the threads before installation. The glue will hold the screws but will allow them to be removed if needed.

Shortening antennas

Sometimes your antenna is just too long. The antenna may be doubled over or dangling out the rear of the airplane. You all know that you should not cut an antenna to make it shorter. Also, you should not double the antenna wire back. A half-wave antenna will become a quarter-wave antenna if it is doubled in half. So what can you do?

It's easy. Cut a small piece of a coffee can lid (or similar plastic) into a 2 x 1 inch rectangle. Put a small cut in the middle of each end of the plastic so it can hold an antenna wire when it is slipped into the cut. At a convenient place along the antenna, slip the wire into the slit. Wind the wire around the plastic, keeping the wire side by side and not overlapping. When you have enough turns to shorten the antenna sufficiently, slip the wire into the slot on the other end and let the rest of the antenna go wherever you had intended. The coils will only decrease the efficiency of the antenna minutely. If you cut your plastic in the shape of a dog bone, it will make winding the coils a lot easier.

from *West Jersey Wind*
West Jersey Radio Control Club
Tom Voorhis, editor
Haddonfield NJ

Removing glue

After you put that beautiful covering on your model, you accidentally spill some CyA glue on it and think it's a mess. Get a bottle of "debonder," put a little on a paper towel, and rub the glue right off. Wipe it clean, and your model looks brand new again. If there is glue on your fingers, and it won't wash off, don't wait for it to wear off. Get a pumice stone from your hobby shop or the hardware store. You can rub the glue off with soap and water in seconds.

from *The Wine Country Flier*
Wine Country Flyers
Phil Leech, Stevo Smith, editors
Santa Rosa CA

Flying wires

Do you want real scale looking flying wires on a 1/5-size aircraft. Remove the metal from your used windshield wiper blades. They are 1/8 inches wide, flat, and around 24 inches long. They are also stainless steel for long-lasting good looks.

from *Transmitter*
Northern California Radio Control Unlimited Flyers
Mike and Sandie Brown, editors
Bella Vista CA

Rubber band clean-up

After a day of flying, take the oil- or fuel-covered rubber bands and place them in a container of corn starch. Shake them up so they are well covered. The corn starch soaks up the oil, and you'll have almost new rubber bands for your next flying session. Snap them before securing that wing, and you'll find that most of the corn starch falls off, leaving a fresh rubber band.

from *TaleSpins*
Fredericksburg Aeromasters
James Bingham, editor
Fredericksburg VA

Center of gravity

Place a small sticker at the center of gravity (CG) on your model. That way you have a reference point for tuning. A neat way to identify the CG is to punch a symbol out of the checkerboard MonoKote trim sheets. This makes a small 1/4-inch sticker that even looks like a CG symbol.

from *El Torbellino*
San Diego Orbitters Free Flight Club
Howard Haupt, editor
San Diego CA

Fighting rust monsters

By RICK GIANNINI

Yes, it's true. Late at night when you are asleep, they come. Creeping into your engine bearings, the rust monsters arrive, in eager anticipation of the yummy flavor of metal. Laughing and sharpening their teeth to razor points, they begin their dastardly deed. In short order—as little as a month—they have reduced those smooth, round ball bearings to pitted, moonlike orbs, guaranteed to cause an increase in friction-generated heat, lean runs, and a general loss of performance. All of a sudden, your nice, expensive engine runs like crud.

"Oh,my!" you exclaim. "How can I keep this from happening to me?" Ah, my fellow modelers, the answer is very simple. At the end of each day's flying session, run your engine completely dry of fuel. Disconnect your fuel line, attach your glow driver, and spin that engine until it doesn't even pop. Then get out a little after-run oil, or Marvel oil, and drip a dozen or so drops down the carburetor and hand prop it for about a minute. This is a must for good engine maintenance. The current cost of replacing a set of bearings in a .60 engine is $30 to $35. Ouch!

For the YS engines, use a compatible lubricant. Don't use Marvel oil in them, as it will damage the regulator diaphragm.

Happy flying!

from *News-O-Flyin'*
The Desert Hawks
Rick Giannini, editor
Lake Havasu City AZ

"Flying a plane is no different from riding a bicycle. It's just a lot harder to put baseball cards in the spokes."

Captain Rex Kramer (in the movie Airplane)

Academy of Model Aeronautics
5161 East Memorial Drive
Muncie, Indiana 47302

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