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RCM radio control MODELER

THE WORLDS LEADING PUBLICATION FOR THE RADIO CONTROL ENTHUSIAST

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For The New Outboard Class

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Designed For The Novice And Sport Flyer

RC FORK LIFT TRUCK
Looking For Something Different? This Is It . . .

VOLUME 14 1977 NUMBER 8

R/C MODELER

FEATURES

AUGUST

THIS MONTH'S COVER

Donna Moline with original design twin engine "Pattern Commander" powered by two K & B .40 "pumpers". Built by husband, Gary Moline of La Verne, California. This plane won "Best R/C Sport Pattern Class" at MAC Show in Anaheim. Ektachrome transparency by Randy Kidd.

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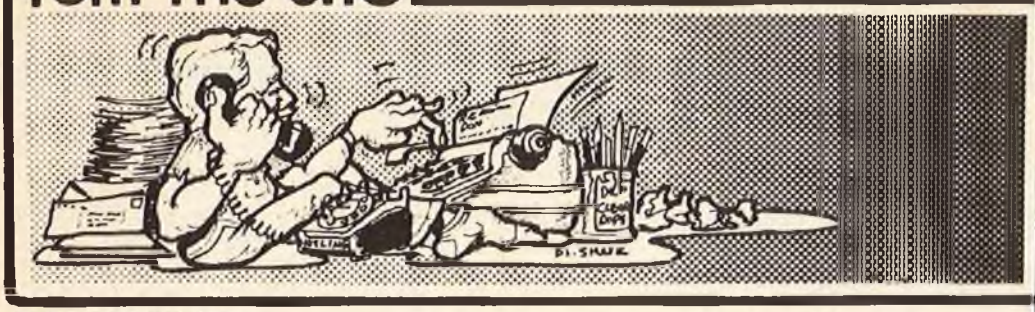

DON DEWEY

Bob Seigelkoff of Hayward, California, submitted the following rules for a new racing event. These rules have been discussed for the last two years by a large segment of the modeling fraternity on the West Coast. The original idea was from Jerry Nelson. This event, called Formula One 10CC, incorporates the same basic rules as the .40 powered Formula One event with some controls built-in to insure that a full blown speed event does not occur, as has happened in Formula One over the past years. These airplanes will fly at approximately the same speeds as a pattern aircraft. A fast lap time will be approximately two minutes. Here are the proposed rules as suggested by Bob Seigelkoff:

Proposed Rules For Formula One 10cc / .61 cu. in. Racing

Engines — Front Rotor, 10cc / .61 cu. in. max displacement. Any make or home-made.

Fuel — Supplied by Contest Sponsor. Can be low or high nitro.

Carburetor — Any.

Aircraft — One quarter scale Formula One aircraft only.

Pressures — Any.

Spinner — 3.500" minimum.

Weight — 7 lb. minimum; 12 lb. maximum.

Wheels — 4.000" diameter, 1.000" wide at tire. Minimum.

Wing Thickness — 2.000 at center section. Minimum.

Wing Area — 800 square inches.

Idle Rule — No idle rule as such, except that the race must start from a standing start. No holding of aircraft is permitted. Any type of wheel brake is permissible.

Course — Standard Formula One with cut judges at each pylon. No flagmen at No. 1 pylon. Cut judge only.

Aircraft Specifications — Width at pilots position 6.000". Height 11.000" bottom of fuselage to top of canopy. Length 48.000" from front of airplane (not Spinner) to rudder post. Width across cheek cowls 9.500". Cheek cowls must be same size. Mufflers will be mandatory and ideally should not be visible. A DB rating of not over 90 should be enforced.

Suggested Contest — Stand-Off Scale judging. Awards given for this category. One round of Aerobatics. Separate awards given. One or more rounds of racing. Separate awards given. Awards given to the top winner of all three events combined scores. Scale round and Aerobatic flight occurs at the same time. Contestant may enter any one or all events.

Name of Event — FI / 10cc, Kong Racing, 1/4 Scale Racing, Whatever.

The intent of these rules is to have a Scale or Semi-Scale racing airplane that will not turn into a pure speed race. As Bob points out, if we make a few of these rules mandatory, a reasonable speed will result. This airplane can be used as a regular Stand-Off Scale plane and only time will tell if it will also be competitive in a pattern event. Surely, it can compete in Novice or Advance. If we can keep the appearance rules in, as in Formula One, an outstanding appearing airplane will result. Bob states that he has often thought the reason that the Quickies and Ugly Stick racers have not been as popular as they should have been, was that there was no pride in the appearance of the airplane. Bob would like to see this turn into an event that embraces all fields of R/C flying and not just the applied one event. This will not be the cheapest airplane to build or fly, but the feedback that has been received so far, from numerous people in the model industry, is that the time has come for a multi-purpose event which appeals to many different facets of the modeling fraternity and, which is long overdue. There are many reasons for the size of this airplane. One quarter scale is easy to build. It is practical and easy to make an internal muffler that is both quiet and efficient out of aluminum Coke cans. With the advent of geared engines and fuel pumps an extremely quiet and smooth aircraft will result, without the penalty of the large quantities of noise usually associated with these larger engines. The wing span of approximately 60" works out to be smaller than the average pattern ship. It is an ideal aircraft for air show work as many people are familiar with these airplanes, and can see them at a distance that makes a .40 powered racer just a speck.

Bob Seigelkoff is interested in your comments and, if you are interested in this new 10cc Formula One event, write Bob at 21658 Cloud Way, Hayward, California 94545.

Only time will tell, but this certainly looks like it will be a prestigious event.

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Odysseys In Flight is a non-profit organization (Federal Tax #11-2388774) well along the route to obtaining the U.S. Navy Aircraft Carrier U.S.S. Lexington (CVT-16) when it is decommissioned. Not only will the Lexington be preserved as a memorial into itself, but she will

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Cunningham On RC

CHUCK CUNNINGHAM

Which is worse, Winter time with no time or weather conditions to fly, or Summer time with no time or weather conditions to build?

Of course, it kind of depends on whether you're a builder or a flier; but if you're both, each season is rather tough. If you spent all of those long evenings last Winter getting a fleet ready to fly this Spring and Summer, you're in pretty good shape. But, how about the brainstorm you just had for the ultimate model - - - how do you get it built with long Spring and Summer evenings that just beg you to go out to fly?

Or, how about the gal who cooks your meals and darns your socks and just demands that you get out and mow the grass or spade up the garden 'cause her mother is tired of coming by your house and seeing *her* outside doing all that hard stuff while you're inside working on a model! It's really a tough life, isn't it? Now, if you could just con your mother-in-law into mowing your grass while your wife helps you work on your next model, then you've really arrived as a super con man!

Here's a suggestion that might work for you, though, if you find that you're pressed for time to get done all of the things that you want to do, plus do all of the things that you *have* to do. Pick up the hour that you lost to Daylight Saving Time. As I am writing this, Daylight Saving Time just started a couple of weeks ago, and so it is still fresh in my mind. I think that DST is great, only our government has not quite figured out the correct way to administrate it. What we really need is *two* hours of DST in the Summer, and one hour in the Winter. What might even be better would be two hours in the Winter and one in the Summer, with the year divided in half. I admit that this would probably be better for those of us in the sunny South and Southwest, but how about where you live? Wouldn't it be great to get to see the sun in the afternoon?

But, back to saving that hour. Since Daylight Saving Time begins in the Spring, and you set your clock ahead one hour, you find that you are getting up one hour later than you were. By the clock it's the same time, but your body is telling you that you're sleeping one hour later in the morning. This is the hour that you can save. Keep getting up at the same body time that you were, and use this extra hour to work on your models. Then, in the evening, if you have to mow the grass, or work in the yard, or whatever, you're going to be too tired to stay up that extra hour that you gained and can sack out early. Unless you're going flying or something else that you enjoy doing, then you can stay up later anyhow. Sleep is generally a matter of habit, and most normal adults can function pretty well on 6 to 6½ hours of sleep, so why not get more out of your day? Think of it, no one else will be up in your house at that time, and you can get a lot done in that peaceful hour.

◆

Here is another idea that I would like to pass along to you - - - in fact, a couple of them. First, why not put your name inside of your trainer type aircraft? Your name, address and phone number, to be exact. Most of us think that an R/C aircraft won't tend to fly away, that it will crash unless we are on the sticks all of the time. This is true of most of the high powered pattern type birds and racing aircraft, but a lot of trainers, if left to their own thoughts, just might, and occassionally do, fly away. What prompted this thought? The fact that the local Sheriff's office is holding its annual auction and included in the stuff to be auctioned off are a couple of wandering R/C models. They were simply picked up by honest citizens and turned into the Sheriff's Office. No identification, so on the auction block they will go.

And, the other bright idea, don't fly alone. It's sad that our world has progressed so far to the rear that it's not quite the safe place that it once was, but this is getting more true every day. Most flying fields are at a remote location due to the nature of our sport. For example, how would you feel if you were up with your favorite bird, enjoying the wide, uncluttered sky, when suddenly a voice whispers in your ear, "Stick em up." Do you "stick 'em up", keep flying, or what do you do? It's a pretty helpless feeling. It's a lot cheaper to let the robber take a few bucks out of your billfold then to crash a bird. What if you have a couple of rigs, one parked at the pit area and the other flying around the sky. Someone can pinch the sitting rig while you're flying and you would be unaware of it until you landed. Or, take a recent case of a pilot flying by himself. He had some problems and crash landed about 300 yards away from the pit area. He was walking over to pick up his slightly mangled bird, when suddenly a car pulled up to the crash site. A couple of guys got out, tossed the defunct ship into their car and sped away. By the time the pilot woke up to what was happening, it was too late. Perhaps flying with a partner would not have saved this rig but, then again, maybe it would have.

It's a pretty good idea to fly in pairs, and when one of you is flying, the other can keep an eye on the doings on the ground.

◆

The other day I received a letter asking how I go about beefing up the wings of my antique aircraft to take the loads imposed by acrobatic flying. Since I have probably overlooked this information, let me pass it along to you. First, and foremost, is to build strongly and well, and do not construct an overweight aircraft. When building the wings (and I have done this with a 7' Powerhouse and a 9' Dallaire Sportster), I use spruce spars rather than balsa. If the plans call for 1/4" square balsa spars, I use 1/4" spruce. Then I web between the spars from the center section to the tip. I install the webbing so that it is a lap glued joint against each spar, rather than trying to make a butt glue joint between the spars. If you install the webbing as you're putting each rib into place, then you can make sure that each piece is glued to both spars and each rib. On the Powerhouse, for example, the front spars are 1/4" square spruce, while the rear spar is 1/4" x 1/2" spruce. There's not much weight penalty, but it's one heck of a lot stronger. Dihedral braces are where you can also add a lot of strength. I use dihedral braces made from 1/4" aircraft plywood, full depth of the wing, and 12" long. If these are glued to the spars with lots of epoxy, the center section just isn't going to break. I also use 3/32" sheeting at the center section bottom of the wing and top, out past the point where the wing rubber bands will go. I also add a half rib to the front of each wing panel just at the point where the rubber bands will compress at the leading edge. At the trailing edge, where the rubber bands pass over the wing

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ENGINE CLINIC

from page 10

Lustrox is a very fine lapping agent used for polishing eye glass lenses and should never be used for cleaning an engine. When engines are new, Lustrox is sometimes run through the engine to polish in the high spots, but, even then, you have to be careful not to over-use it. Continued use can only result in excessive wear of the engine. Lustrox, like any lapping agent, stays in the engine and releases small amounts gradually. Residue from Lustrox comes out the exhaust black. Any time Lustrox or any lapping agent is run through an engine, the engine should be disassembled and cleaned. You will be surprised at how much lapping agent will be coating the inside of the crankshaft, etc. Lustrox is okay when used properly, but should never have been used just to keep your engine clean. Although you say you have not tried it on your Enya .35, this would account for the black goo if you had.

Dear Mr. Lee:

A friend of mine brought me back an Enya 19-V R/C engine model model 4005 from Japan last June.

I recently installed it in a little stick airplane. I ran 4 full tanks through it very rich and encountered no problems. I then set the engine fairly rich and took off. The engine ran about 2 minutes, started to slow down and overheated and quit. I then ran another tank through it and tried to fly again. The results were the same – about 2 minutes into the flight – overheat and quit. I set the engine richer and tried again with the same results. The engine gets so hot that you cannot touch it for about 4 or 5 minutes after it quits.

I broke the engine in on home brew fuel 75% alcohol, 25% castor oil, 5% nitro, using a 9/6 prop and muffler. I have tried changing props, plugs, fuel, tank position, and have moved the spray bar in approximately the center of the venturi. I have tried "store bought fuel" – even running without a muffler.

What do you suggest? I don't have any exotic tools but will try about anything.

I don't seem to be able to get full power at all. The head is not discolored.

Thank you.

Sincerely,
T.A. Bliss
Vacaville, California

First off, the Enya .19 was never noted for its lugging power and a 9/6 prop is a little too much propeller for the engine when new. You should be using a 9/5 or 9/4 so that the engine is not working as hard — especially when using the Enya muffler which is quite restrictive.

I would also guess that during the initial four rich break-in flights, the engine became varnished due to the heat and muffler. So, rather than the engine getting looser, it becomes tighter. This is why it is always a good idea to break-in an engine without a muffler if at all possible. The extra rich running accompanied with the back pressure and heat caused by the muffler results in excessive varnish build-up. You will have to disassemble the engine and clean the piston and sleeve with an SOS pad and water. Reassemble the engine and try using a 9/4 propeller.

Dear Clarence:

A simple question – when do you know your battery for starting your glow engine has had it? Specifically, can I use a voltmeter wired into my clips to monitor my starting battery condition? At what voltage does the battery need recharging or, in the case of a dry cell, when should I throw it out? Does this required minimum voltage vary with air temperature and, if so, could you relate minimum voltage requirements to air temperature?

Thanks in advance for your reply and also for your enjoyable and informitive column.

Regards & happy landings,
Chuck Mack
Palos Heights, Illinois

Voltage and current drain vary with individual makes of glow plugs as well as age of the plug itself. Some plugs will glow orange at 1½ volts and others only dull red requiring 2 volts. However, a voltmeter is not necessary. All you are concerned with is how brightly the plug glows. It must be bright orange. Bright red is okay, but takes longer to clear out a flooded engine. When the plug glows dull red or lower, it is time to get a new battery. Air temperature has little effect on how bright the plug glows. In warm weather, engines will start easier which, in turn, makes starting some times possible with a marginal battery that would not start an engine in cold weather.

Dear Mr. Lee:

I have a brand-new Super Tigre X-40 and an old G-40. Will put this on my Dumas Deep Vee (DV-40CF) 40 inches long.

Can you tell me what is the best carburetor (throttle type) able to get top performance and good idle. Heard about the Perry carburetor but I'm confused whether this is for X-40 or G-40. Also, can you tell me the difference between these two engines – which one is better? Thank you for your consideration.

Van V. Santos
San Francisco, California

Perry Aeromotive does not make a carburetor specifically for the Super

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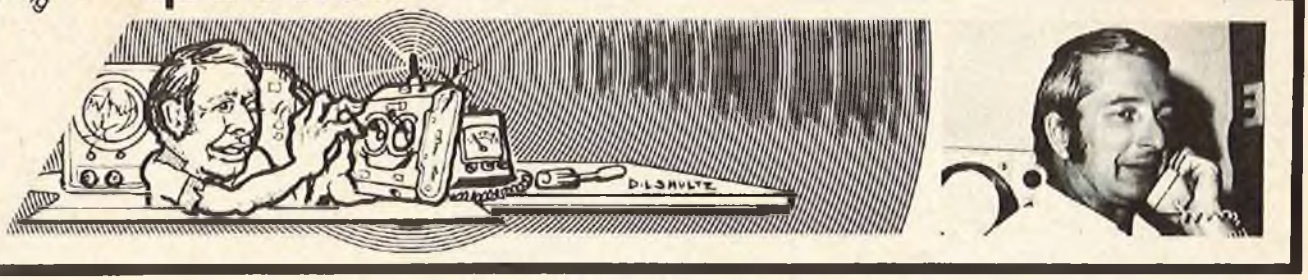
wing

Spectrum JIM ODDINO



Years ago, I remember hearing a story that one of our esteemed law makers tried to induce a bill to close the patent office. s reasoning was based on the great ides that had been made (I believe s happened in the late 1800's) and t surely everything of any value had rtainly been invented.

We've made some great strides in C in the last ten to fifteen years, but I arantee it's too soon to close the pa- t office.

Think about radio control applications en you read the following exerpt from British magazine called *Wireless rld.*

Tiny Transceivers & Satellites

A ten-dollar wrist radio using L.S.I. hniques could be used for personal mmunications within ten years, accord- to reports from the United States. ommunications News" reported in tember that the National Space Insti- predicted "within ten years a new eration of communications satellites ld provide the public with highly reli- interference-free personal communi- ons via a wrist radio which could be d for pleasure, business, emergency ations, rescue, health monitoring."

NSI's executive director, Charles itt said, "With adequate public inter- and support, such a satellite system ld be developed to service millions of ple with the ability to talk directly to other from wherever they are on land sea, or enter the telephone networks ugh the microphone on their wrist o for a new era in communication flex- y." These radios could use the same niques now used in digital watches If produced in large enough num- could sell for less than $10.00 each.

NSI is a non-profit making educa- al and scientific body chaired by nher von Braun, who was in charge of Apollo space programme. Its function communicate the benefits of the U.S. e programme to the American public. a speech to the Conference on Satel- Communication and Public Service on ember 9, NASA administrator, James cher said, "Studies have been made of ersonal communications system h involves direct broadcast from a st watch radio" to a high-capacity, lbeam satellite for retransmission to nd communications centrals. The llite might be 150 feet in diameter with capacity of handling up to 25,000 ched channels. The ground transmit- ould be small and low power, perhaps mW. With large scale integrated circuit techniques, the ground transmitter need not cost much more than $10.00." Such a system would allow the growth of a large number of ground stations, making space technology available to the man in the street. The basis of the technique was to put large aerials on high power transmitters in space, allowing a reduction in the size of the equipment needed below.

Don't let this stop you from buying a new system this year, because I think it will be a few years before we are controlling our models via satellite. However, it might be a good idea to start planning a campaign to ask for some R/C channels because the way our FCC moves, things take a long time. I'm very disappointed that it is taking so long to get FM approved for R/C use. It would appear to offer several advantages. I've been doing a lot of reading on the subject and must admit it is difficult to assess whether we would get better performance for a given power and bandwidth, but I think the following explanation from a book called "Communications Systems Engineering Theory" by Mr. Erling Sunde who was formerly with Bell Labs, is directly applicable to R/C model aircraft. Our biggest problems are the fact that our antenna orientation is constantly changing and our receivers are subject to many reflections from terrain and structures near our flying sites. This results in drastic changes in amplitude in the signal received in the aircraft.

Binary AM versus
Binary PM and FM

Because of the great range of fluctuation in transmission loss with Rayleigh fading, it is essential to provide automatic gain control at the receiver to prevent overloading and resultant adverse effects. Such gain control is activated by circuitry that integrates the received wave over a number of signal intervals *T*. With FM and PM, only a few pulse intervals are required, for the reason that the received carrier wave is nearly independent of the pulse patterns. It is thus possible to provide effective gain control against rapid variations in the received carrier wave that occurs over a few signal intervals. Moreover, with FM and PM, the distinction between marks and spaces is made by positive and negative deviations from zero threshold level in the detection process. This permits the use of limiters at the input to the detectors, to prevent the adverse effect of rapid fluctuations in the amplitude of the received carrier wave owing to fading. These advantages in applications to fading channels are not shared by AM, for reasons outlined next.

In binary AM or on-off carrier transmission, the received wave may be absent over a large number of consecutive signal intervals *T*. Hence automatic gain control must be activated by circuitry that integrates the received pulse train over a very large number of signal intervals *T*; otherwise gain would be increased during long spaces, regardless of the fading condition. For this reason, automatic gain control is inherently slow, in relation to the duration of a signal interval.

In R/C systems, our marks and spaces are quite predictable, so the A.G.C. may be optimized, but it still cannot be as good as a system with limiting.

I'll go out on a limb right now and predict that in the near future, virtually all R/C systems will use FM and the change-over will be as complete as it was when we switched from reeds to proportional.

It is happening already in Germany primarily due to the fact that it is so simple to build the receiver. Siemans, a German firm, has come out with two integrated circuits that do all the work for you.

Figure 1 is a simplified schematic of what a receiver might look like.

The signal picked up by the antenna is passed through a conventional double tuned pre-selector. Here the similarity ends. The first integrated circuit is a combination mixer and local oscillator. Very few external parts are required. A tuned circuit at the output picks out the desired intermediate frequency which must be passed through a narrow bandpass filter which could be one of the 455 KHz ceramic type or a 10.7 MHz crystal type. The output of the filter drives IC #2, which is a combination IF amplifier, limiter and discriminator (I assume). Again, very few external parts are required.

The serious experimenter, and I might add, one with a little time, should have very little trouble building a receiver. My problem has been to find the time. So, if any of you do follow up on this and get something going, I urge you to share it with our readers. The Siemans designation is S042 for the mixer/oscillator and S041 for the discriminator. So order your data sheets and get to work.

If that doesn't turn you on, and you're still looking for a better receiver, think

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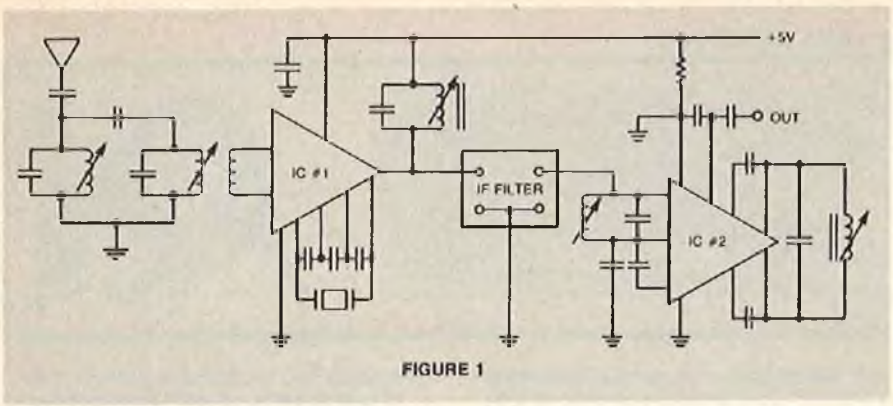

FIGURE 1

about this.

(1) No local oscillator.
(2) No intermediate frequency.
(3) No image response.
(4) No cross modulation.
(5) No intermodulation.
(6) No IF cans or ceramic filters.
(7) And it is legal now!

Fellow worker, Chip Conklin, and I had been kicking around various ideas for R/C receivers and the one that captured Chip's fancy was the use of a monolithic crystal filter operating at the transmitted radio frequency. The crystal filter he used had a center frequency of 53.5 MHz with a plus and minus 7.5 KHz bandwidth. Physically, it looks like the crystal in your present receiver, except it has three leads. If you look at the block diagram of Chip's receiver in Figure 2, you can see a pretty tiny receiver is feasible.

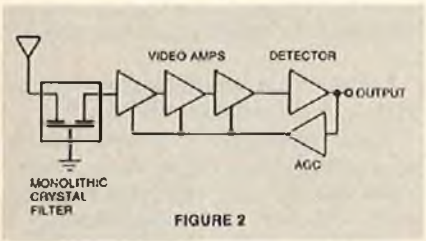

FIGURE 2

The video amps are Plessy SL 1611's with only coupling capacitors required external. They come packaged in the 8 pin dual in-line configuration. He has built, tested and flown one prototype and the results have been very good. The sensitivity isn't great, but I'm not sure we want real sensitive receivers.

You're waiting for the hooker? Well, the crystal filter may look like your present crystals, but it doesn't cost quite the same. In small quantities, the price is like $75.00, but don't worry, I remember when NPN silicon transistors cost $30.00 and now they are .10¢.

I've been encouraging Chip to submit an article on his receiver to RCM. Sounds like he could use some compensation to defray his crystal filter costs.

If you don't like that receiver approach, here is another one. The guys up at Signetics have a new device called a D-MOS dual gate FET. The SD 6000 contains both an RF amplifier and a mixer. A second device, the TCA 440, is designed to operate as a broadcast band AM radio with a built-in RF amp, mixer, IF amp and AM detector. Some of the guys at Signetics have put together a dual conversion receiver using these two devices. The RF section of the TCA 440 is used as the first IF amplifier at 10.7 MHz. One of the features of this design is a tremendous AGC range. Another is the tiny package that you can get the TCA 440 in. It looks like about one fourth the area of a standard dual inline package. Once again, I marvel at all the work that is going on by so many people. Keep it up you guys and send in your results, good and bad — you might save someone else a lot of time.

★

I'd like to thank all of you who have sent in letters encouraging the continuation of technical type discussions in this column. In particular, I'd like to thank Knut Michalsen who lives in Norway and sent in the data sheets on the Siemens integrated circuits. I was aware that they existed, but hadn't had much luck getting any info on them.

The following letter ought to make all of you guys look a little closer before giving up on these articles.

Dear Sir;

Even though I'm only 14, I enjoyed your article on the R/C oscillator in the May '77 issue of RCM. I must admit that it took some work to figure it out, but it was worthwhile. I would like you to publish more articles of this technical nature. I would prefer the next article to be about the RF power amp of the R/C transmitter.

Yours truly,
A future ham,
Fryderyk Tyra
Brooklyn, N.Y.

I was truly amazed at the favorable response on the oscillator article because it was pretty far out. We will try to do a power amplifier circuit in the future. The coming thing in that area is power FET's. One of these days I'll get a chance to play with one of these promising devices.

★

I'm beginning to think that someone ought to form a club for guys who are still flying Bonner equipment. The following letter is typical:

Dear Jim;

Please keep up the info on the more technical side. How about some info to adapt receiver front end to make monitor squeeler like World Engines – either from Ace, Royal or old discarded or retired receiver. I am still flying my Bonner 4RS 10 years now last February. I had a drive belt break last week on the ground. Do you know of anyone who might have some servo parts? I have used all I had on hand now. How about a mention for parts in your column?

Keep up the good work.

Sincerely,
F.D. Green.
1380 N. Chestnut
Fresno, CA 93703

Well Mr. Green, you just got yourself nominated as corresponding secretary. All you Bonner owners can trade schematics, parts, etc., through Mr. Green. I'm sure Howard would be proud to know his equipment is still functioning. I still think his harmonic drive servo was a great idea and I'm surprised no one has picked it up. I guess there might still be some patent rights that make the cost prohibitive, but I would think the materials problems could be solved in this day and age.

★

Dear Mr. Oddino;

I want to express my appreciation for your "Radio Spectrum" column which appeared in the May '77 issue covering the design of an RF oscillator. This type of article is long overdue and deserves a regular place in RCM. I hope you continue the design to include an entire RC system in future issues.

I'm an electrical engineer and amateur radio operator and have been collecting R/C schematics (Ace, Cannon, Heath, Kraft, Pro Line) to study in preparation to buying a new system. However, I find that component counts and circuit details vary drastically apparently due to design philosophies, although all the systems obviously work well. At this point, I couldn't honestly claim to be able to judge one system superior to another, based strictly on schematic diagrams.

In light of my experiences, I would like to see you make some mention of design philosophies where appropriate in your column. Specifically, could you cover the use of a commutated timer such as the Ace encoder versus a separate monostable per channel. FET's versus transistors for receiver front ends, ceramic versus LC tuned IF stages, and modularized RF sections as used by Heath and Kraft? I have heard rumors of bad problems with the Kraft modules which I suspect might be

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RADIO SPECTRUM

from page 16/15

due to reliance on crystal tolerances to achieve proper tuning between receiver and transmitter, since the modules are not sold as matched pairs. I would also welcome further discussion of future modulation techniques such as NBFM or SSB.

In closing, I feel that an understanding of one's RC system adds immeasurably to the enjoyment of this hobby and I appreciate your column.

Sincerely,
Donald J. Porter
Burbank, California

Thanks for the compliments Don. One of the things I hope to do with this column is to get people looking at the finer points of RC system design which will help them make a decision when it comes time to buy. There never seems to be a clear cut system that is head and shoulders above all the others in every respect (including cost), and therefore, one needs all the help he can get.

You ask a number of interesting questions which we'll talk about in future columns, but I will give each one a real quick answer right now. It is true that design philosophies vary considerably and for many good reasons. Ace was interested in a circuit that could be sold in kit form and could be put together by average modelers. They wanted a low parts count and a minimum of diodes which could be put in backwards or even marked backwards. World Engines, on the other hand, has had commutated encoders, but has gone the other way now in order to get better performance. They were never satisfied with the interaction that existed in their commutated circuits, even though it was very small. I hope to get some info on their new encoder circuit which I'll pass along.

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Sunday Flier

KEN WILLARD

Last month I went to Toledo and after seeing all the new items that were on display, I figured that was it for 1977, so I'd go down to the Model Airplane and Crafts Show in Anaheim, California, just to see some old friends and look at the display models.

I was wrong.

Not that Toledo isn't the "biggie." It is. And I hope the Weak Signals Club can somehow figure out a way to get more space — and also keep that blasted arena floor from getting so cold that it gave a lot of us a bad case of the flu.

But the Orange Coast RC'ers, together with the Hobby Industry Association of California (HIAC), put together an excellent show, and the Anaheim Convention Center really puts the Toledo Arena to shame when it comes to facilities. Also, a lot of California modelers didn't show their models in Toledo, for various reasons, and displayed them at Anaheim instead. There were some real beauties. More about that later.

What intrigued me was that there were some items introduced in Anameim at the MACS that didn't appear in Toledo. It's understandable; what with the RAMS show in Seattle, the WRAMS show on the east coast, the Chicago Hobby Industry show, the Houston show, Toledo, MACS, and some lesser known shows, manufacturers have to decide where to spend their advertising money, and they can't get to all of them unless they're really well heeled. Most of them aren't.

Another factor is that sometimes an item isn't quite ready in time for the earlier shows, and so it is held for the MACS show a month later. That happened this year, and from my viewpoint, as the saying goes, in spades.

As I usually do, when I first get to the exhibit hall, I take a walk up and down the aisles from one end of the show to the other, just to get the overview. You could see the same booths that were in evidence at Toledo, and probably at the WRAMS show as well. The display models were well arranged. Nice show. So I started talking with friends and aquaintances, and when I'd get to a booth I'd inquire, "Are you showing anything new that you didn't have at Toledo?" Mostly the answer was no. Then I came to the Kraft booth. Jack Albrecht was holding the fort as I came around the corner, not seeing the display on the counter.

"What's new, Jack?"

"Seen our little servos?"

"You mean the KPS-12's. I've got some."

"No. I mean the KPS-18's."

"The wha-a-a-t?"

Jack took me around to the counter, picked up a display board, and said, "How do you like them?"

I took one look and said, "I'll be dogoned. Phil has seen the light!"

Kraft KPS-18 servos give full house control at 5½ ounces.

By the time you read this, you will already know that Kraft's new subminiature servo weighs in at just slightly over 1/2 ounce, and is about 2/3rds the size of the Cannon, Ace, and Litco mini-servos. As of the time of this writing, no new small receiver has been designed, nor is the 100ma battery pack planned. But it's my guess they'll come along. For starters, though, the little servos have standard leads and can be used with current receivers interchangeably with other servos. A four channel, full house system, even with a 225ma pack, comes in around 5½ ounces. With a 100ma pack and a light receiver, the whole system will be under 4 ounces. Sure, you can only get about 20 minutes flight time before recharging, but that's four 5-minute flights, and these days, four flights is about all you will get, unless you want to hog the frequency. Quick chargers are available, too.

Some question exists as to the acceptance of the price of these little gems. At $60.00 each, there probably will be some buyer resistance. Kraft will sell a lot of them, anyway. Miniaturization opens up a lot of possibilities for flying — tennis courts, schoolyards, etc., and the muffled Cox QRC .049 doesn't disturb anybody. The market's there - - - just needs tapping.

There was a rumble at the show that, as small as Kraft's new servo is, watch for later developments and even smaller stuff. Great. I've been looking forward to 2 ounce full house rigs for a long time. Patio precision contests before the barbeque. How does that sound for fun?

Bob Williams and RTC's new trainer, ready to cover.

Another company which had a display at Toledo, but was showing something new at MACS was RTC Models — which stands for Ready To Cover. They showed the Windfree and the Wanderer at Toledo, and then introduced the RTC Trainer .40 at MACS. It's a 4-channel trainer with ailerons that Bob Williams says is very docile. Bob goes on the premise that a novice can learn just as well with full house controls, and then needs only to sharpen up his skill if he wants to fly something hotter. The plane comes virtually complete and ready to cover - - - only the wing needs to be joined and the tail glued on. This is to facilitate covering. All hardware is included. At $79.95 retail, it should be competitive.

Model Merchant, a relative newcomer located near Dallas, Texas, did not display at Toledo, and they had some very interesting items at MACS. The two which intrigued me most were a plastic and foam 1/2A job called the "Hobby Commander" with the engine mounted on a pylon, and a P-40 Warhawk model that had small retracts which work just like the full scale fighter, in that the wheels rotate through 90° while retracting to fit into the wheel wells behind the gear.

Jerry Small and Model Merchant's Hobby Commander 1/2A ARF.

The Hobby Commander only needs to have the wing sheets put together over a spar, glued together at the trailing and leading edges, then a leading edge strip installed. The wing then is inserted in a slot in the fuselage, radio installed, engine mounted, and you're ready to fly. At an introductory price of $19.95 (probably to go to $24.95 later), it should have a brisk sale. Jerry Small, who heads up the outfit, was interested when I pointed out that with a properly designed "shoe" on the bottom of the fuselage, it might be changed into a flying boat as well.

Jack Stafford and his accurate new Corsair scale job.

As I toured the show, it seemed like no matter which aisle I went down, somewhere along the line there'd be a Vought Corsair model — you know, the "Baa-Baa Black Sheep" inverted gull wing. GMC had a real nice 1/2A version; California Scale Models had one for .10's to .23's; and Jemco, of course, has a 54" job for .40's up to .60's. Last, but far from least, Jack Stafford Models is coming out with a Corsair, 1-5/16" to the foot scale, about a 55" span, mostly balsa, with some plastic parts and weighs around 5 to 6 pounds, depending

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Room Temperature Vulcanizing silastic rubber

By John A. Scott

● Many materials available today, although not specifically intended for modeling, are very useful for many jobs that no other material can do as well. One of the most useful materials in my shop is the tube of room temperature vulcanizing silastic rubber, more commonly called RTV. This material is a gasket, a cement, a sealant, a securing material and an energy absorber. It can also tolerate high temperatures and peels off non-porous surfaces, when required. An ideal combination of properties. Here are a few uses that I found for this miraculous material.

When mounting an engine, I apply a medium thickness coating on the mounting surface of the mounting lugs. Tightening the mounting screws squeezes the excess RTV into the screw cavity, sealing the cavity against oil penetration and securing the screws. The engine is also securely fastened to the mount. When the engine must be removed, a quick snap will break it loose. The mounting screws for a radial engine mount can be treated the same way.

The muffler mounting screws can be secured by coating the threads and the bottom of the screw head with RTV. When the screw is tightened, the adhesive locks the head and the screw body to the bracket. An easy twist of a screwdriver will loosen the screw when required. A thin coating on the muffler-engine joint prior to assembly prevents oil leakage at this joint.

Mounting a servo requires special attention to secure all screws. After completing the radio installation, a smear of RTV across the servo arm screw head prevents vibration backing the screw out, allowing the arm to pop off while performing a strenuous maneuver. A bridge of RTV from the servo mounting screw to the servo case prevents the mounting screw from backing out.

Wing saddles and access hatches are another excellent application of RTV. These openings must be sealed against the intrusion of oil. Saran Wrap, or a good mold release agent on the surface not to be coated, assures a good fit and a clean release. The RTV adheres firmly to a rough, porous surface or a clean smooth surface. Hatch cover screws should also be secured with a smear across the head and surrounding surface.

The joint between a control surface and the stationary surface must be sealed for consistent performance. Occasionally, after fastening the hinges in place, a small gap between the surfaces appears from nowhere. RTV can save the day. Forcing RTV into the gap, only at the hinge line, seals the gap perfectly. Extreme care must be used to prevent excessive build-up and the stiffening of the hinged joint.

Surface flutter can be a surprise to all of us with a new airframe and even with the "old reliable" when the linkage gets a little sloppy. RTV can save the day, again. A large drop between the control surface and the stationary surface at a point farthest from the control horn or torque rod connection to the surface will dampen the vibration and permit flying after approximately one hour. A permanent repair should be made when time is available.

Other uses I have found for RTV include: fastening antenna tubes to the inside of fiberglass fuselages; tacking servo and battery wires to the inside of the fuselage to eliminate wire vibration and fatigue fractures. The landing gear wire opening in the wing or fuselage can be sealed with RTV. Oil cannot soak into the mounting block when the wire is bedded in RTV.

Almost every day I find another use for RTV. Can you add any more? □

HERE'S HOW

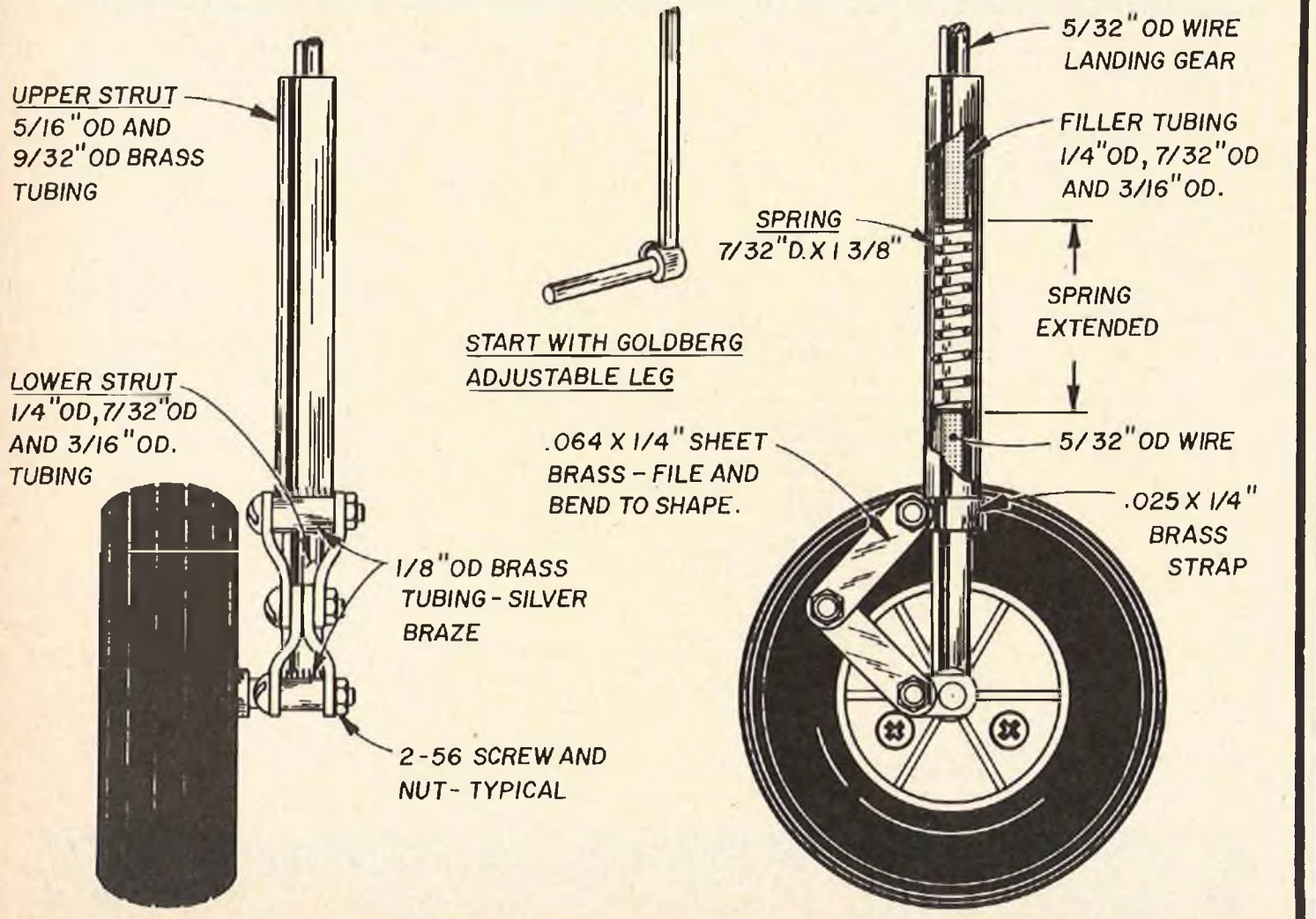
BY JERRY SMITH

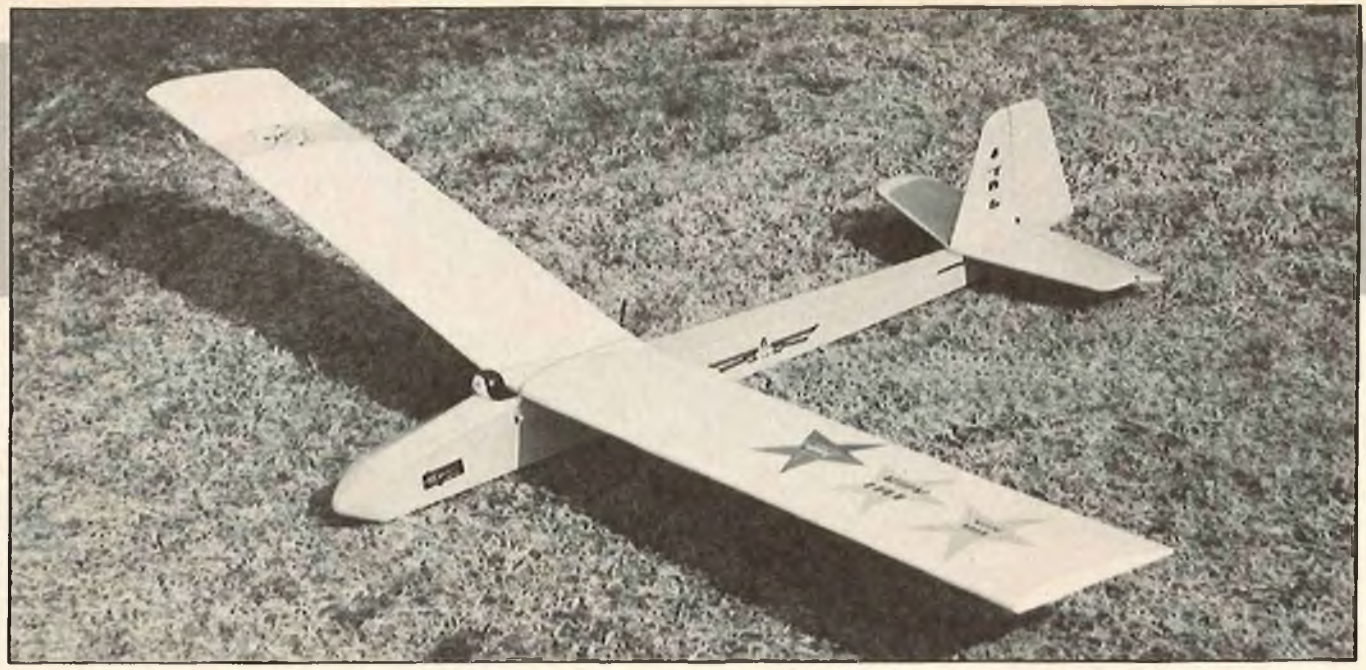
FEATURED THIS MONTH IS A FUNCTIONAL SHOCK LANDING GEAR STRUT DESIGNED BY ALEX COBLEIGH OF MODESTO, CA. MANY OF YOU SCALE MODELERS MAY BE INTERESTED IN TRYING THIS PARTICULAR DESIGN ON YOUR NEXT SCALE PROJECT. ALEX HAS BEEN TESTING THIS DESIGN ON AN 8 1/2 LB. PLATT T 28 WITH GOOD RESULTS HOWEVER, THE MAIN PROBLEM HAS BEEN ONE OF STRENGTH. LANDING GEARS DO TAKE A REAL BEATING. ESPECIALLY ON ROUGH LANDING STRIPS, NOT TO MENTION BOUNCY LANDINGS. (PILOT ERROR OF COURSE)

THE UPPER AND LOWER STRUTS, AS SHOWN IN THE DRAWING, ARE CONSTRUCTED USING PIECES OF BRASS TUBING. THE SCISSOR TIE ROD TUBES AND THE GOLDBERG ADJUSTABLE AXLE ARE SILVER BRAZED IN PLACE FOR MAXIMUM STRENGTH. IT IS RECOMMENDED THAT THE SILVER BRAZING BE DONE FIRST BECAUSE OF ITS HIGH HEAT REQUIREMENT. ALL OTHER SOLDERING IS ACCOMPLISHED WITH STAYBRITE FLUX AND SILVER SOLDER. THE SPRING MAY BE PURCHASED FROM THE CENTURY SPRING CO., LOS ANGELES, CA. (PART NO. G65Z) OR TRY YOUR LOCAL TRUE VALUE HARDWARE STORE.

STRENGTH MAY BE ADDED TO THE UPPER STRUT BY ADDING AN EXTRA THICKNESS OF TUBING. IN THIS CASE THE UPPER STRUT WOULD CONSIST OF 11/32"OD, 5/16"OD AND 9/32"OD BRASS TUBING. THE FILLER TUBING INSIDE WOULD REMAIN THE SAME.

THIS STRUT WILL ADD PLENTY OF REALISM TO YOUR MODEL BY ELIMINATING MOST OF THE SHOCK INCURRED FROM LANDING AND THEREBY PROVIDE BETTER CONTROL FOR SMOOTHER LANDINGS AND ROLL. OUR THANKS TO ALEX FOR SHARING HIS GREAT IDEA !





Although not quite as elegant as some of the gliders that have recently graced the pages of R/C Modeler, the E-Z II was designed mainly to be E-Z'ily built and, not necessarily, to be E-Z on the eye. However, it has a certain appeal, if mostly to the wallet, but it flies much better than it looks anyway, and that's the name of the game, after all.

This model was actually designed for Lisa, my 10 year old daughter, who had been expressing an interest in learning to fly R/C gliders. I took her request one step further, however, by drawing something so she could also learn a little about building models and, in fact, she did build almost all of the prototype shown here.

When planning the design, I decided that, wherever possible, pieces would be 36" long, or simple divisions of 36", and that no involved wood cutting would be necessary, hence the very simple lines shown on the plan. Most of the model is built from 1/4" square balsa, and so, if you're planning to build one of these models, it's worth looking well at the local hobby shop's supply, and picking out the better pieces.

As mentioned before, Lisa built most of the structure, and I helped as little as possible; my main contribution being to straighten up a few pieces here and there, and to cut and glue the wing joiners in place. A further item that we discovered during construction was that it proved much easier for Lisa to make pieces using a small hand saw, than by using a knife or razor blade; sawing also providing a straighter and smoother cut. One exception to this was the wing ribs, which are also discussed later in the construction notes and are easily cut using a razor blade and a straight-edge.

Most of the structure was completed during a couple of weeks of evenings, and covering took another two nights — so, if you're looking for a quick project, or something for your children to learn flying on, try our glider - - - it's E-Z II. This was proven, conclusively, by the prototype built by RCM's Fearless Leader. It's the one shown in the photos with transparent covering and an optional power pod. While he did have far more difficulty than Lisa in building the EZ-II, he did manage to complete it with only occasional assistance from other RCM staff members.

CONSTRUCTION

WINGS:

As we stated previously, one of the design rules we established was that most major dimensions would be three feet, so it should come as no surprise to discover that each wing panel happens to be 36" long, giving a total span of 72". The only other item that may raise an eyebrow on the experienced builder is the wing rib. Now ribs are usually wonderfully curvy creations, with exotic names such as Rhode St. Genese 28, or

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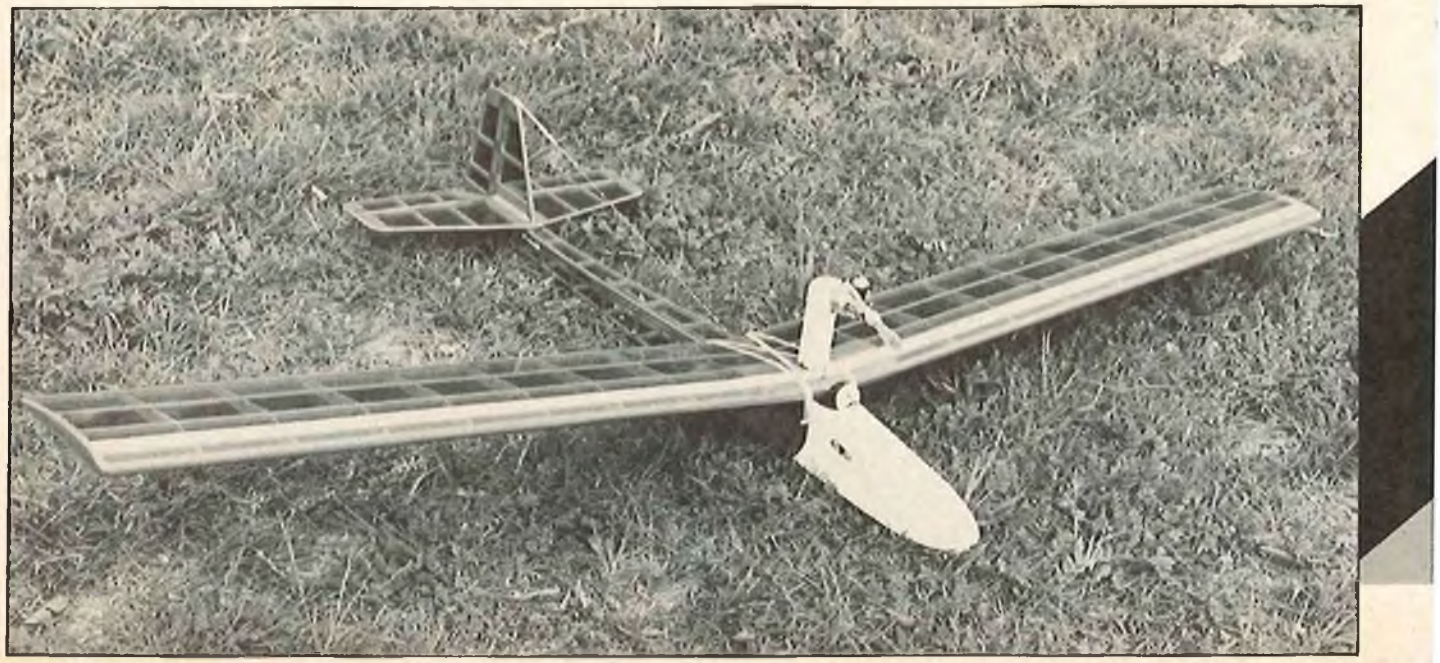


E-Z II

It may not be as easy on the eye as some graceful soaring machines, but it is easy to build and to fly. In fact, this six foot span slope or thermal soarer is an excellent knockabout sport machine, or is a trainer for that young RC'er in the family. The E-Z II can be hi-started or launched with the optional power pod.

By Jack and Lisa Headley

E-Z II

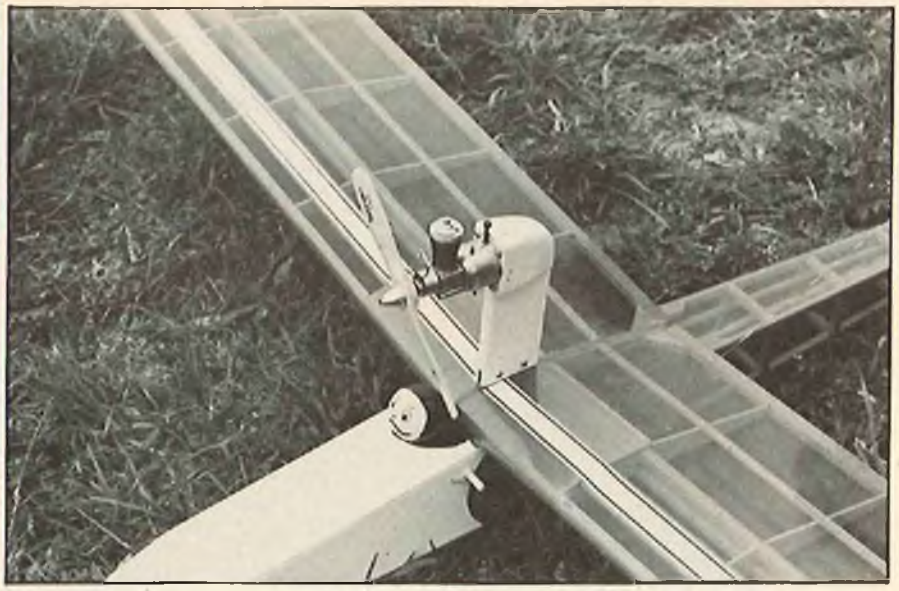
Designed By: J.W. Headley

TYPE AIRCRAFT
2 Channel Glider
WINGSPAN
72 Inches
WING CHORD
7½ Inches
TOTAL WING AREA
540 Square Inches
WING LOCATION
Top Of Fuselage
AIRFOIL
Flat Bottom
WING PLANFORM
Constant Chord
DIHEDRAL, EACH TIP
4 Inches
O.A. FUSELAGE LENGTH
40½ Inches
RADIO COMPARTMENT AREA
(L) 11" X (W) 2" X (H) 2⅜"
STABILIZER SPAN
18 Inches
STABILIZER CHORD (incl. elev.)
4¾" (Avg.)
STABILIZER AREA
82 Sq. In.
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
5¾ Inches
VERTICAL FIN WIDTH (incl. rudder)
5½" (Avg.)
REC. ENGINE SIZE
.049 (on optional power pod)
FUEL TANK SIZE
Tank Mount
REC. NO. OF CHANNELS
2
CONTROL FUNCTIONS
Rudder & Elevator
BASIC MATERIALS USED IN CONSTRUCTION

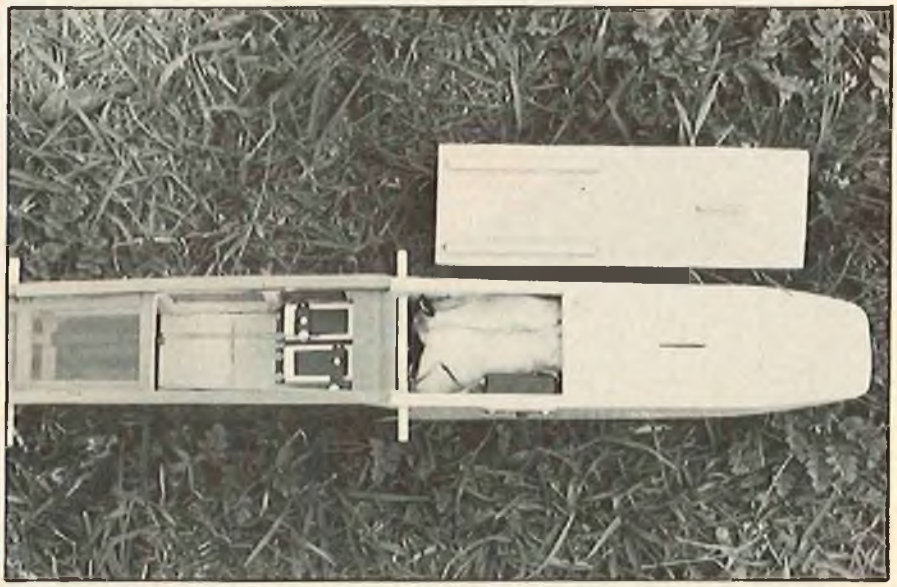
Fuselage	Balsa & Ply
Wing	Balsa
Empennage	Balsa
Wt. Ready-To-Fly	27 Oz.
Wing Loading	7.2 Oz/Sq. Ft.

MATERIALS LIST

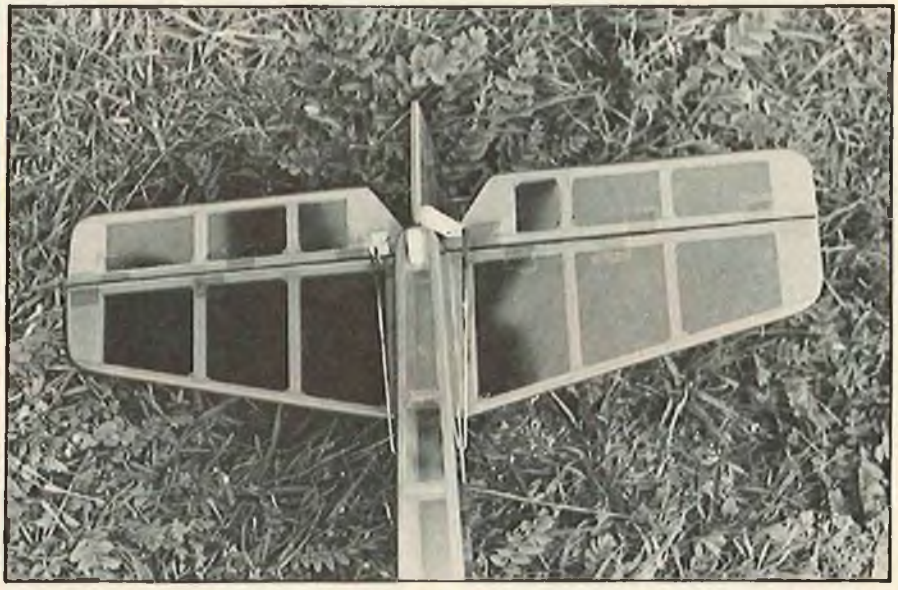
18 — 1/4" x 1/4" x 36" balsa: basic framework & main wing spars
5 — 1/4" x 1/2" x 36" balsa; wing L.E., T.E.
4 — 1/8" x 1/8" x 36" balsa; wing spars.
2 — 3/32" x 1/4" x 36" balsa; wing spars.
1 — 1/4" x 4" x 36" balsa; fuselage, empennage braces, wing tips, gussets, dihedral braces.
1 — 3/32" x 4" x 36" balsa; wing ribs and hatch floor.
1 — 1/16" x 4" x 36" balsa; hatch sides, spar webs, wing sheeting.
Scrap 1/8" ply (optional power pod, tow hook base); 3" x 3" block or scrap 1" x 3" x 3" balsa (nose block); pilot (optional); Golden Bee .049 (optional); 5½/3 or 6/4 prop (optional); nose skid (optional); hinges; Solarfilm or MonoKote.



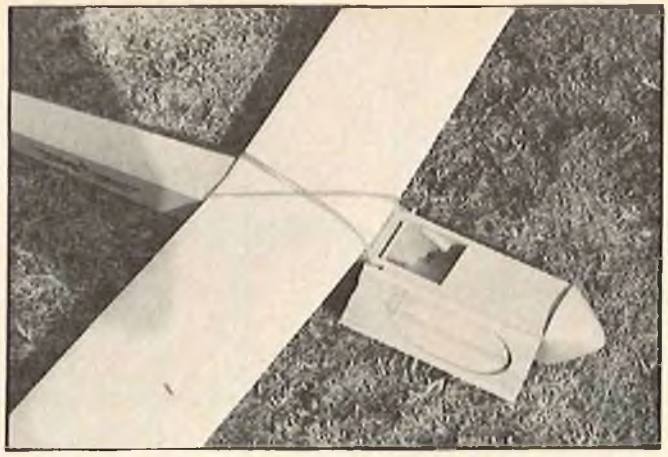
The bolt-on .049 power pod can easily be removed.



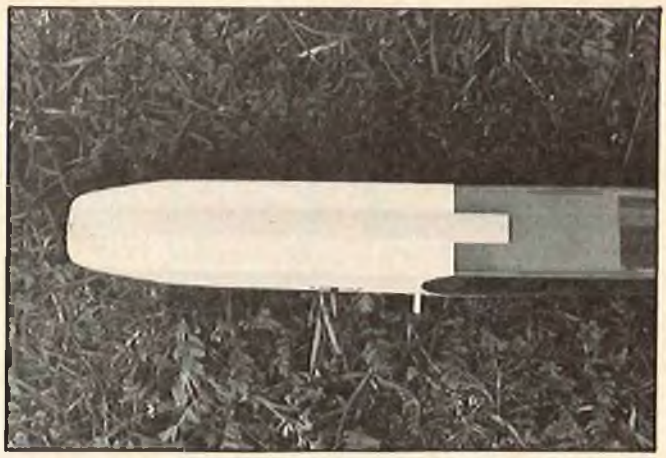
The radio and servo compartment. Note hatch hold-down.



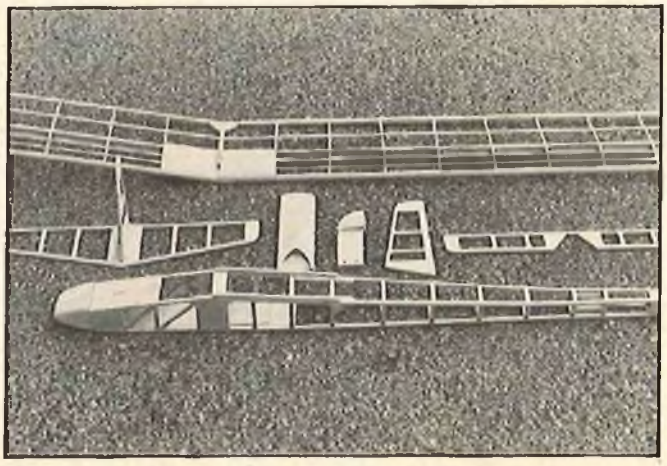
The empennage is light and strong. Note control linkages.



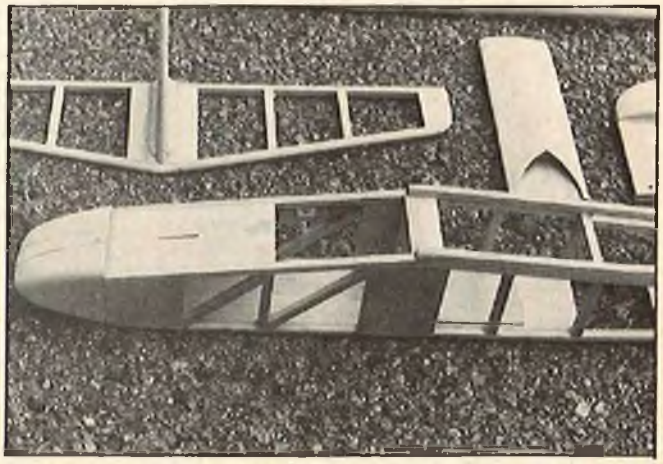
Author's prototype with side hinged front hatch.



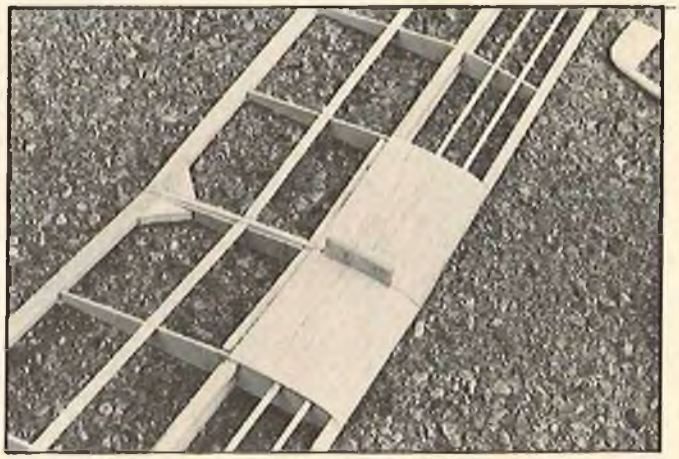
Strip of nylon over double stick tape serves as landing skid.



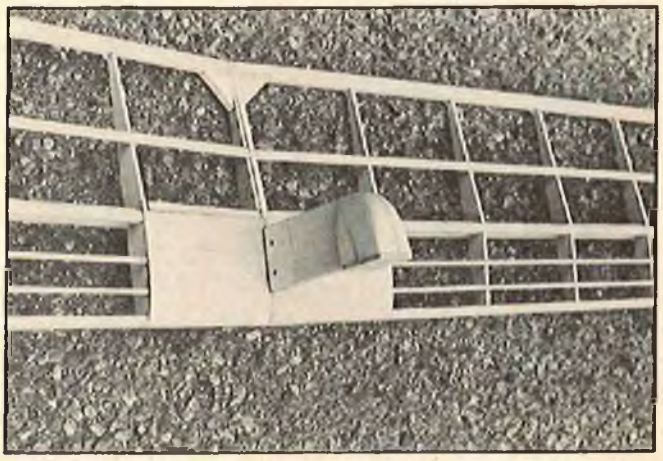
The framework of RCM's prototype of the E-Z II.



Close-up of nose, hatch hold-down, and radio compartment.



Power pod mounting tab is part of plywood center rib.



Optional power pod slipped in place over mounting tab.

Gottingen 501, and don't resemble our own creation at all which, incidentally, we've named the "Flying Triangle".

This is one of the simplifications we've made for the junior builder and it does speed up the construction time. The actual airfoil section is, of course, created when the upper surface spars are added, and these transform our triangle into a Clark Y, our favorite airfoil section.

Building the wing begins with cutting out a batch of these ribs, which are then notched for the 1/4" x 1/4" spars. Pin down on the plan the leading edge (unshaped), the lower 1/4" spar, and the trailing edge (shaped as shown). Now cement all except the center rib into place, followed by the upper 1/4" square spar. Now make up the other wing panel, remembering to omit the center rib also, and join these together in the center using the sheet braces. The central ribs can now be installed, then the upper surface spars, followed by the wing tip ribs. Rounding off the leading edge finishes the wing construction.

FUSELAGE:

Begin the fuselage construction by first looking through your supply of 1/4" square balsa and selecting two strong and stiff pieces for the lower longerons, and two strong, but flexible, pieces for the upper longerons. Now we will make up one fuselage side frame. Pin down on to the plan one upper and one lower longeron, then add the uprights and the 1/4" sheet pieces. After this has dried, make up another identical side frame,

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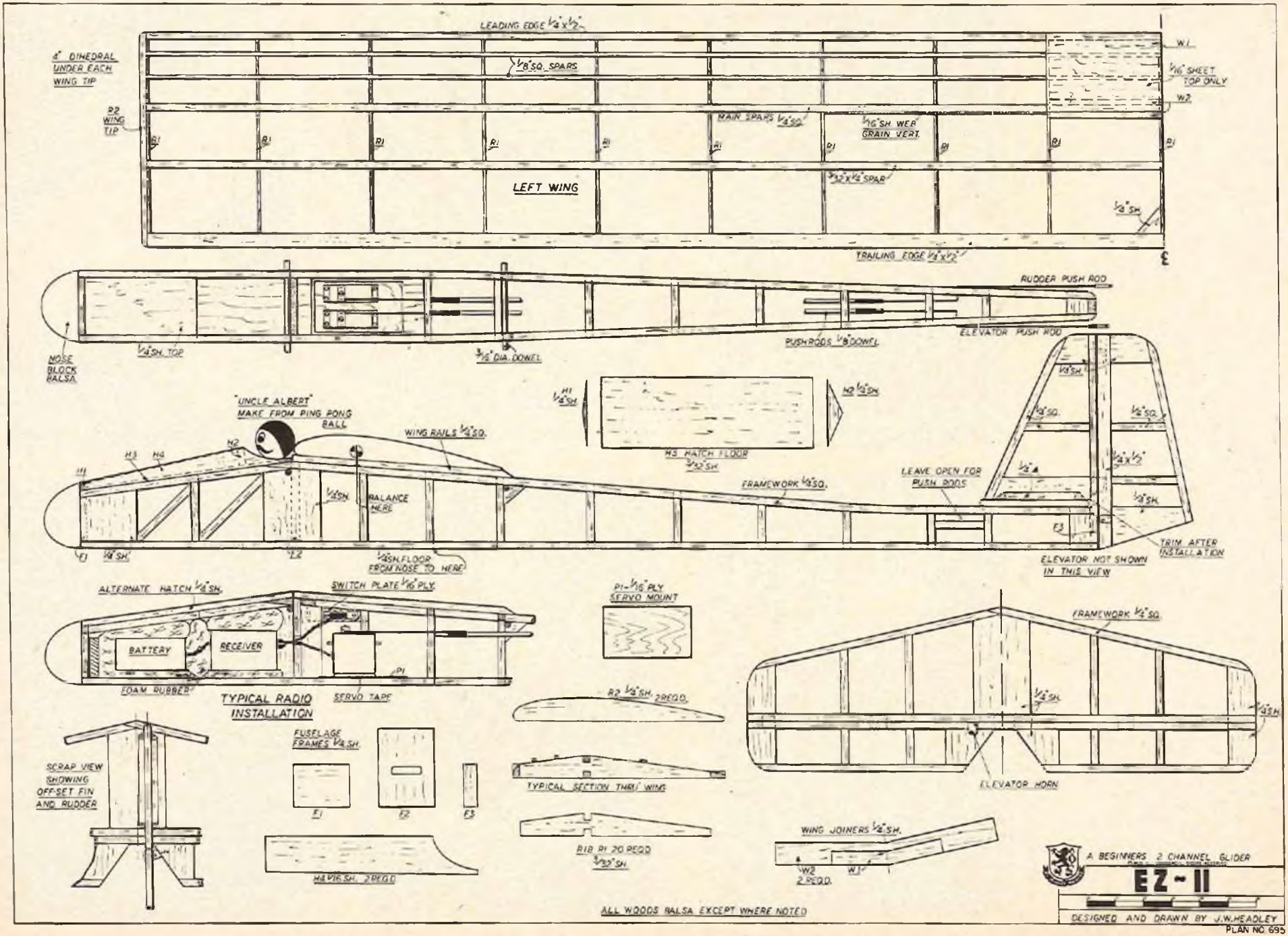
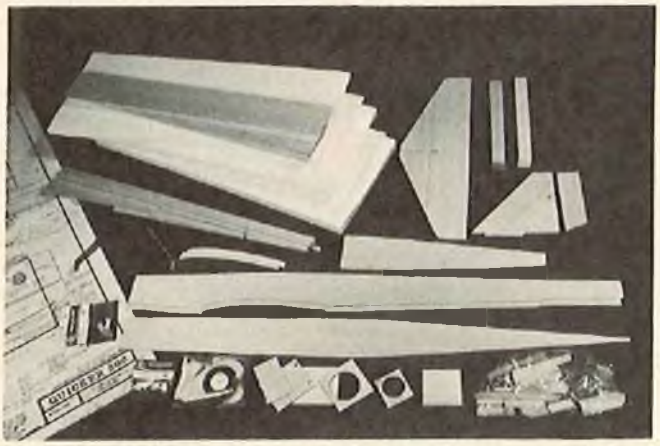
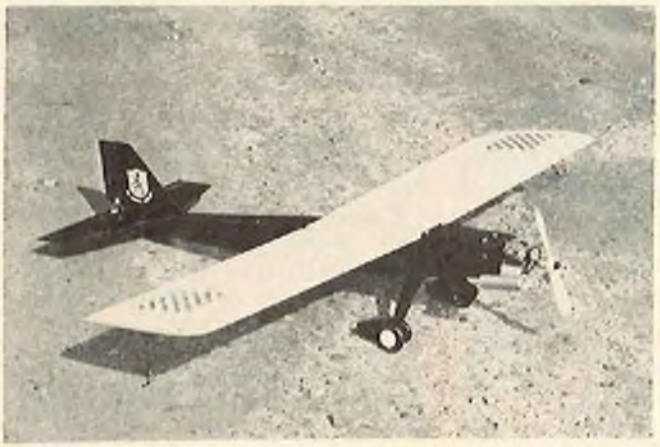
FULL SIZE PLANS AVAILABLE — SEE PAGE 189



RCM PRODUCT TEST

Kreidel Eng. Quicker 500





IMPRESSIONS	E	G	A	F	P	IMPRESSIONS	E	G	A	F	P
Packaging	●					Pre-Shaped Parts	●				
Plans	●					Parts Match to Plans	●				
Written Instructions		●				Overall Parts Fit	●				
Quality of Hardwood	●					Ease of Assembly	●				
Quality of Fiberglass			NA			Fidelity to Scale			NA		
Other Materials	●					Flight Performance	●				
Accessories		●				Overall Appeal		●			
Die-Cutting			NA								

E=Excellent / G=Good / A=Average / F=Fair / P=Poor

The Quicker 500, manufactured by Kreidel Engineering, is advertised as "the most competitive Formula 500 racer on the market." Because of the impressive showing it has made in its primary environment, we decided to try it as a general sport aircraft in the lower horsepower range, using an S.T. .23 instead of the class required K & B .40.

The kit, as provided, includes all wood parts, both balsa and plywood, nicely machined to size, pre-cut foam wing panels with planking, and a basic hardware package including a formed aluminum landing gear. We were also furnished the optional axle, wheel and wheel pants kit which sells for $6.50 extra.

The fuselage is constructed of balsa and plywood in the normal box configuration. The wings are cut from foam and covered with 1/16" balsa sheet. The tail surfaces are solid sheet construction throughout. Our model was joined with alaphatic resin, using epoxy in the high stress areas. It was covered with Ace Top Kote and painted black and white using Perfect Paints over the Top Kote. We prefer this method of finishing for a number of reasons; first of which is that you don't wind up with a bag full of too small remnants of expensive multi-colored covering material. We also feel that the Top Kote has better adhesion than other films and, when sprayed with Perfect Paint, there are no uncovered seams or gaps to cause trouble later. MonoKote checkerboard trim was applied to the upper wing panels for visibility.

A Super Tigre .23 with a Semco muffler was used for power and an Ace receiver with KPS-12 servos was used for control.

We had our doubts about the use of wheel pants and the Williams Bros. wheels on a grass field, particularly with the

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SPECIFICATIONS

Name ..... Quicker 500
Aircraft Type ..... Sport/Formula 500
Manufactured By ..... Kreidel Eng.
P.O. Box 1783
Whittier, California 90603
Mfg. Suggested Retail Price $43.95
Available From ..... Both Mfg. and Retail Outlets
Mfg. Recommended Usage ..... Competition
Wing Span ..... 50 Inches
Wing Chord ..... 10 Inches
Total Wing Area ..... 500 Square Inches
Fuselage Length ..... 38" Incl. Motor Mt.
Radio Compartment Dimensions ..... (L) 9½" x (W) 2½" x (H) 2½"
Wing Location ..... Shoulder Wing
Airfoil ..... Symmetrical
Wing Planform ..... Constant Chord
Dihedral ..... 3/4 Inch
Stabilizer Span ..... 17 Inches
Stabilizer Chord (Incl. elev.) ..... 5⅜" (Avg.)
Total Stab Area ..... 90 sq. inches
Stab Airfoil Section ..... Flat
Stabilizer Location ..... Top of Fuselage
Vertical Fin Height ..... 5⅝ Inches
Vertical Fin Width (Incl. rud.) ..... 5⅞" (Avg.)
Mfg. Rec. Engine Range ..... .20-.40
Recommended Fuel Tank Size ..... 4-8 Ounce
Landing Gear ..... Conventional
Recommended No. Of Channels 4
Recommended Control Functions ..... Rud., Elev., Throt. & Ail.
Basic Materials Used In Construction:
Fuselage ..... Balsa & Plywood
Wing ..... Foam & Balsa
Tail Surfaces ..... Balsa
Hardware Included In Kit ..... See Text
Plan Size ..... 36" x 47" (1 sheet)
Building Instructions on Plan Sheets ..... Yes
Instruction Manual ..... No
Construction Photos ..... No
Kit Includes ..... Shaped Parts
Mfg. Rec. Flying Weight ..... 56-70 ozs.
Wing loading based on rec. flying wt. ..... 16.1 — 17.3 oz./sq. ft.

RCM PROTOTYPE

Weight, Ready To Fly ..... 52 Ounces
Wing Loading ..... 14.9 oz./sq. ft.
Covering & finishing materials used . Top Kote, Perfect Pnt, MonoKote
Engine Make & Disp. ..... ST .23
Muffler Used ..... Semco
Radio Used ..... Ace RC
Tank Size Used ..... 4 Ounce

TOM BROGDEN TAKES

Tom Brogden from Marietta, Georgia, won the three way tie breaking fly-off to capture First Place in Formula I Expert Class at Bakersfield, California, on May 15, 1977. Terry Prather came in second and Bob Smith was third. The first three places in Standard Class went to Rex Raymond, Tad Sato, and Rowe Awe, respectively.

The fantastic BARKS club has conducted the world's largest Formula I Pylon Races for several years and are now calling it Bakersfield International Air Races. A group attended from Mexico City, Mexico, a big happy bunch from Canada, another group from Japan, and a couple of fun guys from Johannesburg, South Africa.

The pre-entries exceeded 130 contestants which resulted in 53 pilots in Expert and 55 in Standard Class at race time. The weather was excellent, in the lower 80's, for the six rounds of racing. While this year's fastest time was slightly higher (Prather 1:16.1), the overall speeds seem to have increased along with a noticeable lower loss of aircraft factor.

Expert Class winners (L to R): 1st, Bob Brogden; 2nd, Terry Prather; 3rd, Bob Smith.

Standard Class winners (L to R): 1st, Rex Raymond; 2nd, Tad Sato; 3rd, Rowe Awe.

Every single aircraft at Bakersfield was an outstanding example of craftsmanship, beauty, and performance. The flying skills demonstrated were almost unbelievable. This is considered as routine by the Formula I racing group.

For power plants it was a toss-up between K & B and the Terry Tiger (Super Tigre). Brogden was flying K & B, while Prather and Smith used Terry Tigers. When this racing event was originated some 10 years ago, standard front rotor .40's were used for power. It was interesting to see several high performance K & B front rotor engines being flown at Bakersfield.

Following Saturday's full schedule of hotly contested races, the demonstration flights as always were a welcome change of pace. Bob Violett again thrilled the crowd with his superb A4D ducted fan jet model. Lloyd Marohl proved that his lawn mower would fly better than it could cut grass — with slow rolls, inverted flight, etc. Paul Kinney flew a .60 powered 1/4 scale Toni kitted by CB Associates. It flew at about 1/4 the speed of the Formula I racers.

Once again we must congratulate the dedicated workers of the BARKS club and Model Airplane News for conducting the Bakersfield International Air Races. There is none better. □

Larry Eckersley, Canada, placed 6th in Standard Class which earned him the high point trophy for a foreign contestant. Gail Bramley shares his joy.

BAKERSFIELD

By Dick Tichenor

TOP ROW, LEFT: This group came from Mexico City to race. TOP ROW, RIGHT: Maple Leaf forever! The happy bunch from Canada. 2ND ROW, LEFT: Our highly competitive racing team from Tokyo, Japan. 2ND ROW, RIGHT: Al Prather (L), was host to Graham Rennie and Dicky Beukes from Johannesburg, South Africa. ABOVE, LEFT: Jeff Bertken's front rotor installation. ABOVE, RIGHT: The Japanese team was using this audio tachometer. Looked good. LEFT: Paul Kinney with his 1/4 scale Toni built from kit by CB Associates.

GLOSTER GAMECOCK I

By
Flt. Lt. Gordon E. Whitehead

The Gloster Gamecock is one of the finest sport scale aircraft ever presented by R/C Modeler Magazine. Combine that fact with two wings for the biplane fan and you have a .60 to .80 powered machine that is hard to resist. The author's prototype, pictured here, was a real crowd pleaser at the 1974 and 1975 British Nationals.

I built my first Gloster Gamecock model back in 1967. It was my first attempt at R/C Scale, was Elfin 1.49 powered, 36" span and steered by single channel radio. Once trimmed out, she was a great fun flyer and made me thereafter want to build a full-house job. Well, it took me until 1973 to screw up the courage to design her, and early in 1974, I commenced construction, to finish just in time for the British Nats. The ship was a great crowd-puller at both the 1974 and 1975 Nats, where she finished 6th in Class II (Stand-Off) Scale on each occasion. In 1975, she was 2nd on static points behind Pete Neate's DH2, and attained the highest flying points of all biplanes in the event, despite strong, blustery winds.

Harry Folland, Gloster's chief designer of the 20's, certainly had an eye for style — he was responsible for the SE5a and Gladiator designs, and his name is perpetuated in the Folland Gnat, as flown by the RAF Red Arrows Aerobatic team. The stocky, purposeful lines of the ship, combined with the brilliant and colorful squadron markings of the period, produce an air of extrovert gaiety equalled by very few other aircraft. Developed from the "Grebe", the Gamecock served with numbers 3, 17, 23, 32 and 43 squadrons, and saw front line RAF service from 1926 to 1931. Profile No. 33 shows the wide choice of markings, my ship representing that of the then Sqn. Ldr. R. Collishaw, C.O. of 23 Sqn. The shape of the ship is the result of much effort, and I re-drew all the outlines twice before I was satisfied with them — photos often display significant differences from published 3-views!

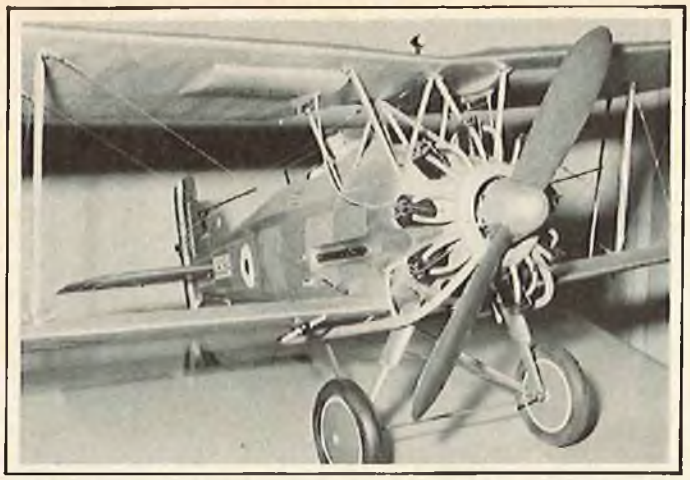
Most written accounts of the Gamecock highlight the handling characteristics of the ship; she was highly aerobatic, tricky in a spin, and she suffered from wing flutter at high speed! The latter two characteristics are enough to put anyone off making a model Gamecock, but no problems have been encountered. First, model structures are inherently stronger than the full-size, so minimizing the flutter problem. Second, the model displays a marked reluctance to spin; even so, I've never let one develop just to be on the safe side! The Gamecock represented a turning point in fighter design. She was the last all-wood RAF fighter, and the first with sufficient power to do a 360° upward roll and still have enough steam left to be pushed over the top. In her time, she was the RAF's premier aerobatic ship, and featured at many air pageants and shows, piloted by such men as the then Plt. Off. Douglas Bader (who was in 23 Sqn. at the time, incidentally).

However, that's enough about the full-size. I hope that I've whetted your appetite. I found that reading about the Gamecock is habit-forming, so unless you really want a 5' span, highly colored, crowd-pulling, excitingly aerobatic scale biplane, turn to another article quickly!

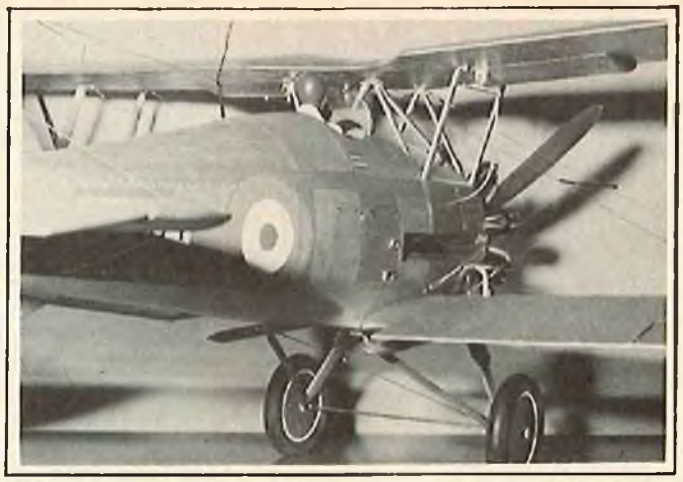
CONSTRUCTION

General: The structure is quite straight-forward, and most of the finer points are detailed on the drawings. Although the model is only recommended for the more experienced builder and flier, any scale fan will want to start building the relatively more complex subjects eventually, so I intend to cover the subject pretty comprehensively. The majority of the woodwork was stuck together with PVA white glue, but 5-minute and 24-hour epoxy were used, as was contact glue.

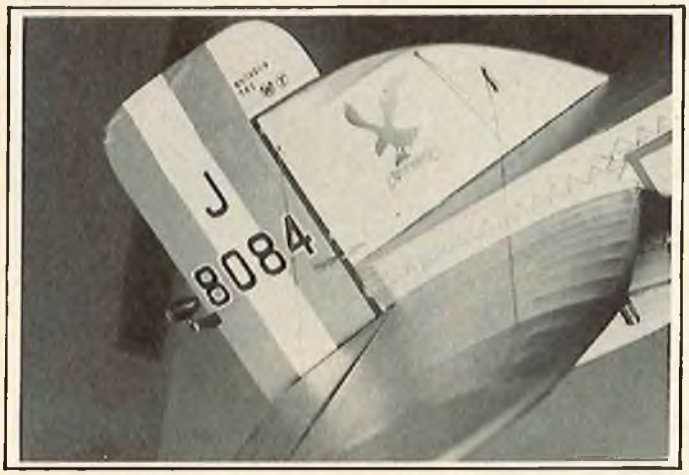
Wings: Build both sets of wings first, as they will be needed to aid fuselage building. Study the drawings and cut out all the parts first — construction is much less of a chore when you make yourself a pre-cut kit. Pre-assemble all the laminated parts at this stage. The lower spars are pinned down with 1/8" packing underneath, together with the T.E. Ribs are glued in place, followed by L.E., riblets, top spars, aileron spars, aileron ribs and tips. The 1/32" ply spar webs and the Warren-type bracing are important



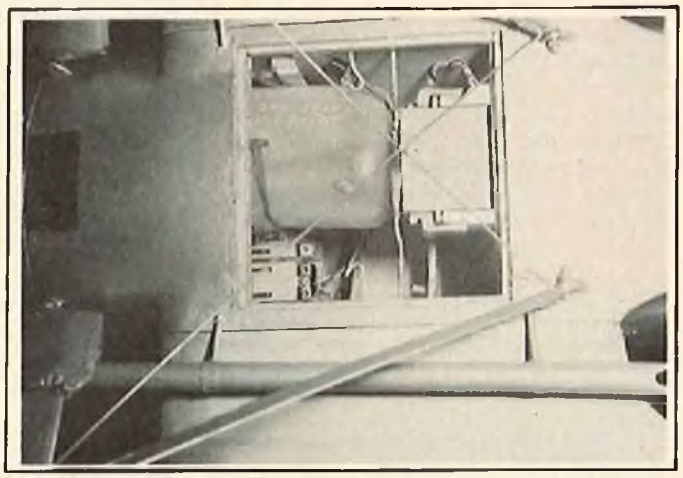
Front view of the Gloster Gamecock II. Dummy cylinders add to overall appeal.



Close attention to details, such as fabric stitching, lends realism to the finished model.

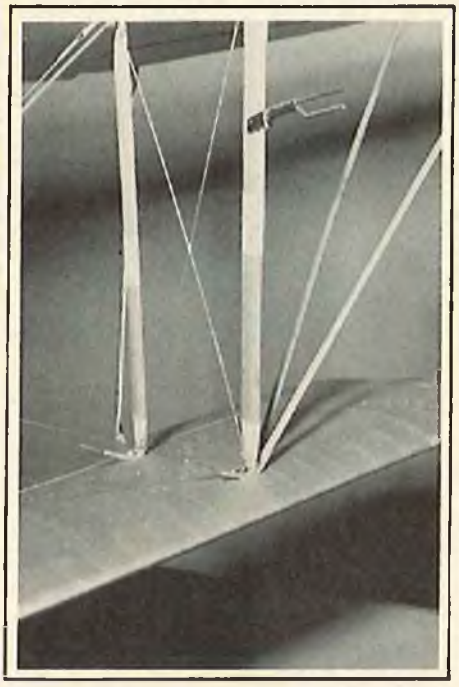


Close-up view of the vertical and horizontal tail surfaces. Note author's detailing.

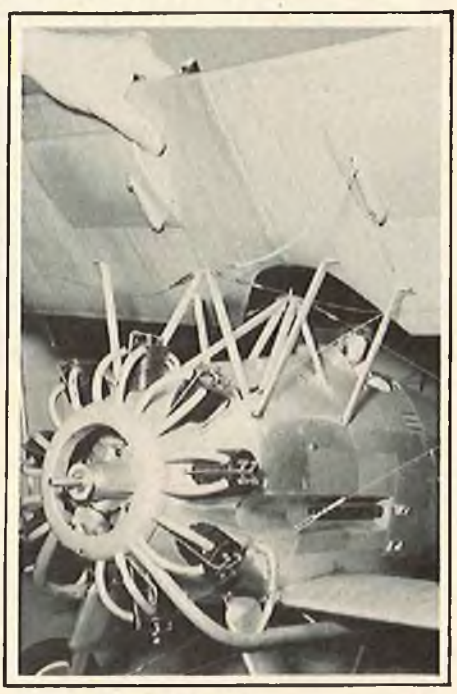


The hatch is removed in this photo to show fuel tank and servo installation.

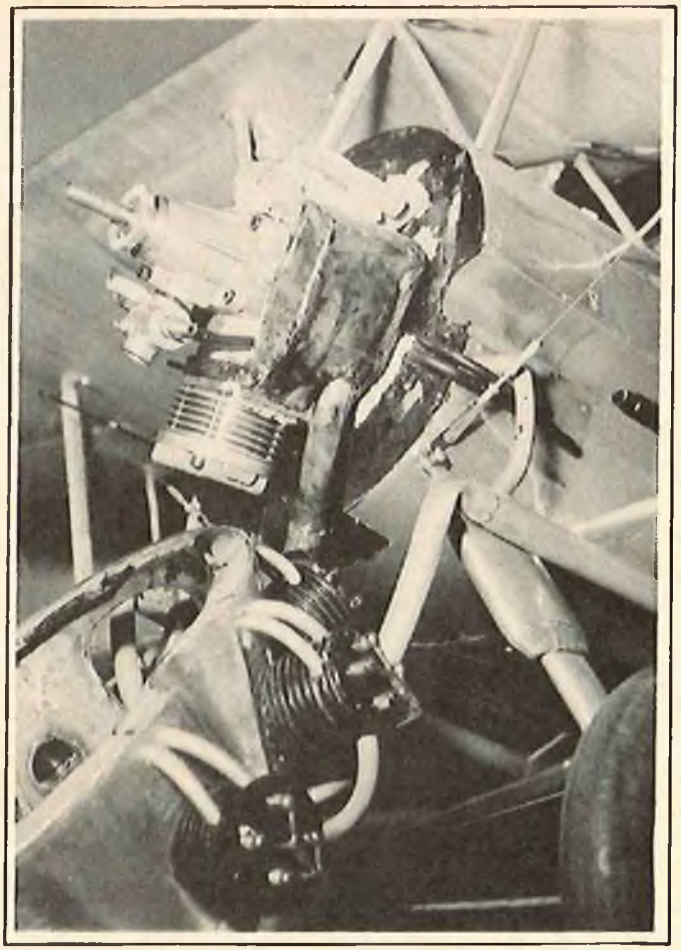
View of functional tail skid and horizontal stabilizer wire brace attachments.



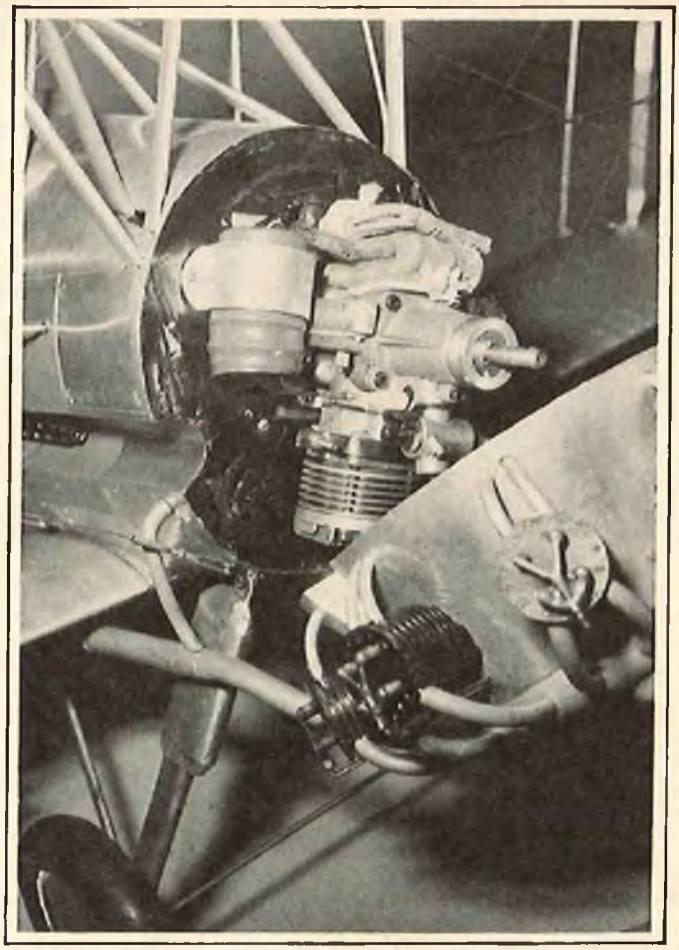
An up-close view of the wing struts and wire bracing.



The author holds the upper wing to illustrate details on the underside.



Cowl with dummy cylinders are removed in this view to illustrate engine and muffler mounting.



Firewall details on the opposite side of the engine. See text for construction particulars.

for rigidity, so don't forget them. The top wings are joined at the center using alloy strip epoxied in place. Besides bracing this area, the metal prevents the cabane locating studs from splintering the wood in the event of a cartwheel. The central bolts only locate the wing and do not tie it down; they are vital for constant wing alignment.

Install all blind nuts and make up the interplane struts exactly as on the plan. You'll need these for cabane alignment, and I do not subscribe to the view that interplane struts should be individually tailor-made to each position. Two sets of struts of unmatched lengths will merely support the wing in a state of misalignment. The outer vee struts are not structural members on this model (although they were necessary on the full-size because of the large tip overhang) so they *can* be tailor-made.

Fuselage: The hardest part is the cabane area. Make a pre-cut kit, once again to smooth the building sequence. Assemble the basic sides from strip and 3/16" sheet. Contact glue the 1/16" ply doublers in place, followed by the 1/8" ply strut supporting doublers. Carefully position and glue the 3/32" ply root facing rib. Join the sides squarely with F1, F3, F3B, F5a and a cross-brace at F5. Join the sternpost and add the remaining cross-braces. Epoxy the lower wing attachment tubes in place.

Now for that cabane. Bend the cabane struts to shape and drill holes. The bottom holes can be slotted to ease adjustment. Loosely bolt the inverted-vees to the basic fuselage and bolt the diagonals in place. Slide the lower wing in place, plug the top wing into the cabane studs. Bolt the interplane struts. Check to ensure that the wings are square with the fuselage by measuring from tip to sternpost. Ensure correct incidence on the top wing. Drill the fuselage bolt holes and bolt up tight. Then epoxy and screw the diagonals only in place. When set, remove the wings and cabane, carefully storing the latter on one side. Bolt and epoxy the undercarriage lugs in place, then finish the fuselage.

Engine sidethrust is built-in, but downthrust is achieved by using thrust wedges under the mounting lugs. Sorry about the tank position! It has to come out to get at the radio, but feeds okay, and there is no noticeable C.G. shift between full and empty. Inside there is plenty of radio room, but keep the gear well forward. Study the throttle linkage — I turned the carb back-to-front on the HP61 so that the throttle linkage would not snag on the silencer. Fill and vent tubes pass through F1 and emerge under the cowl.

The sprung landing gear shown is simple and strong, and preferable to a soldered-up wire job. Note, however, that the front legs are not soldered to the axle. If you incorporate the springing, and solder the bottom joint solid, the rear strut ends will fracture due to flexing — I speak from experience! The cowl is easy to make and care with the fastening and location lugs will reward you with a rigid, but quickly removable, assembly. I used Veron Hawker Tomtit cylinders, but balsa dowel wrapped with string would no doubt be as effective.

Tail Surfaces: As usual with short nosed models, the tail must be kept light, so the lightest balsa must be selected. I incorporated an adjustable leadscrew to vary the tail incidence, as I was uncertain at what angle to set the surface. The final setting, unchanged since trimming flights, is that shown on the plan. The mechanism weighed 2 ounces — equal in effect to 1 pound of lead in the cowl! Since my model carries 1 pound of lead in the cowl, I left the device off the plant to save you problems. As a matter of interest, the full-size aircraft had a +5½ to −2 degree variation in tail incidence, and if the tailplane angle worries you, just look carefully at the photo on page 3 of Profile Publications #33!

The fixed stab slides into place and is held by the bracing wires. The elevator

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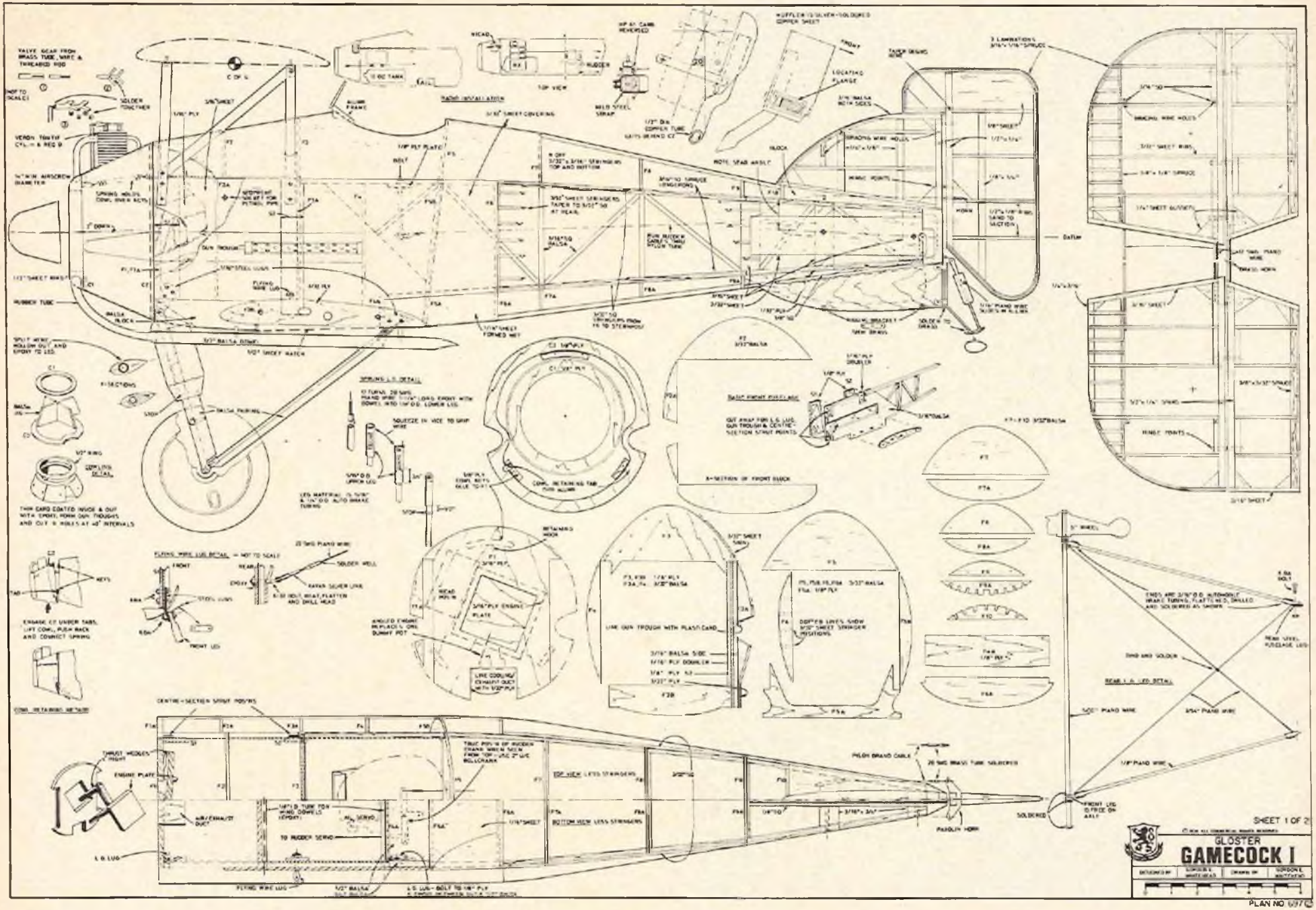
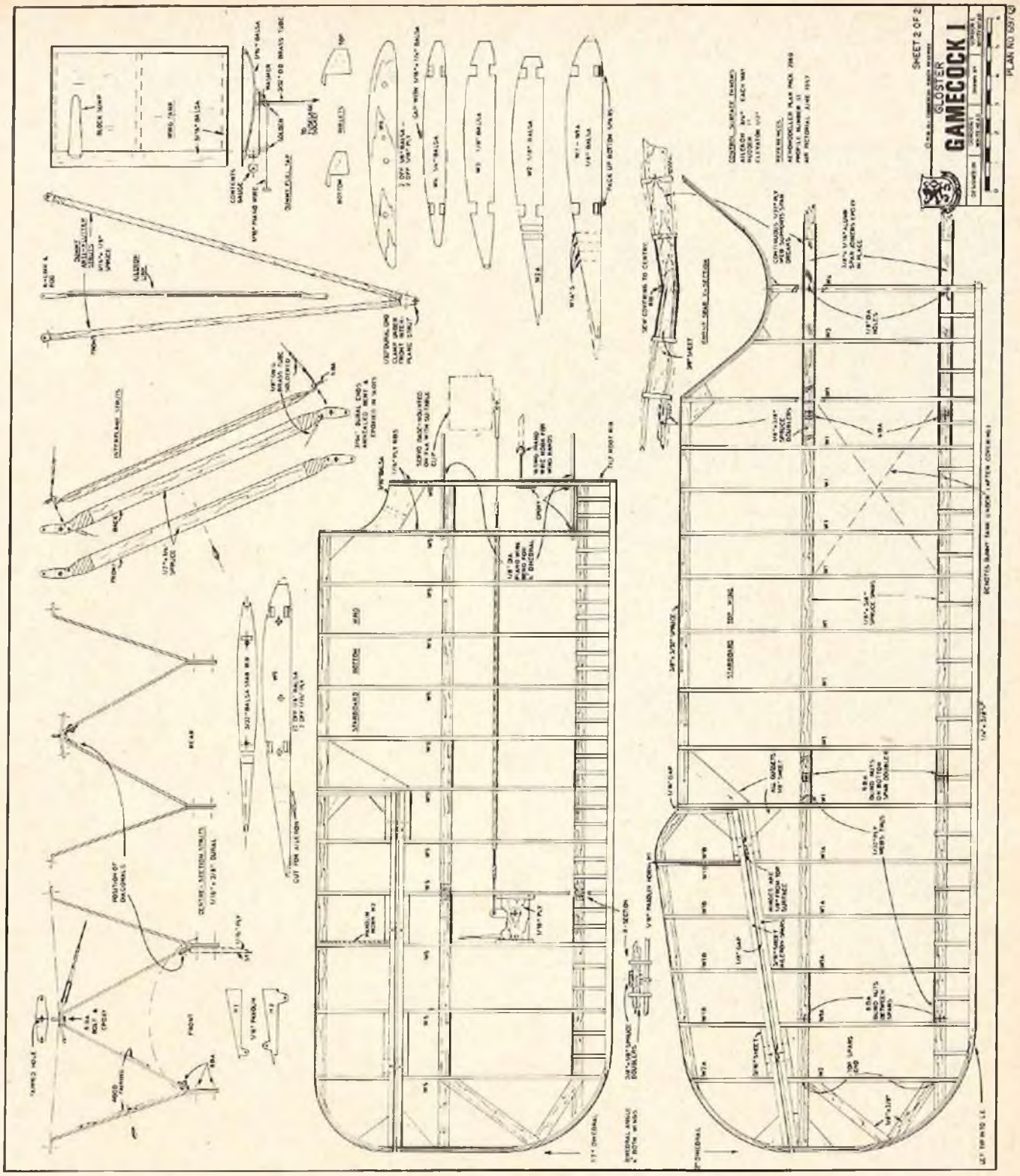
FULL SIZE PLANS AVAILABLE — SEE PAGE 189





GLOSTER GAMECOCK I
Designed By: Flt. Lt. Gordon E. Whitehead, RAF

TYPE AIRCRAFT
Stand-Off Scale Biplane
WINGSPAN
59½ Inches
WING CHORD
10½ Inches
TOTAL WING AREA
1050 Square Inches

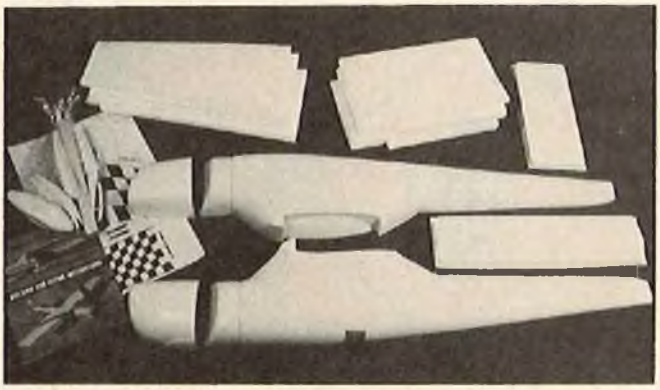
WING LOCATION
Biplane
AIRFOIL
Flat Bottom
WING PLANFORM
Constant Chord
DIHEDRAL, EACH TIP
2" top wing — 1.7" bottom wing
O.A. FUSELAGE LENGTH
39½ Inches
RADIO COMPARTMENT AREA
(L) 6" X (W) 4¾" X (H) 3"
STABILIZER SPAN
18 Inches

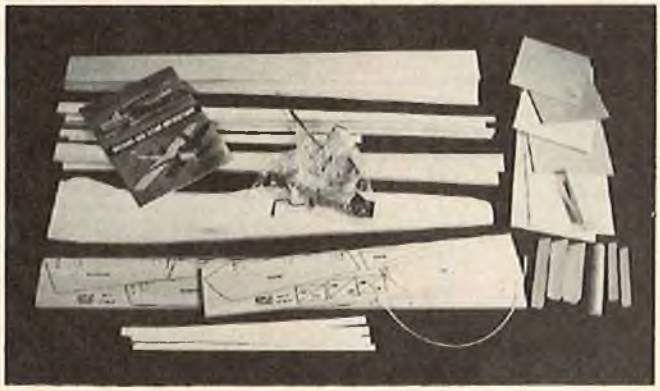
STABILIZER CHORD (incl. elev.)
8 Inches
STABILIZER AREA
132 Square Inches
STAB AIRFOIL SECTION
Symmetrical
STABILIZER LOCATION
Mid-Fuselage
VERTICAL FIN HEIGHT
5½ Inches
VERTICAL FIN WIDTH (incl. rudder)
8¼" (Avg.)
REC. ENGINE SIZE
.60 - .80 cu. in.

FUEL TANK SIZE
12 Ounce
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
4
CONTROL FUNCTIONS
Rud., Elev., Ail., & Throt.
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Balsa, Ply & Spruce
Wing ..... Balsa, Ply & Spruce
Empennage ..... Balsa and Spruce
Weight Ready-To-Fly ..... 152 Oz.
Wing Loading ..... 20.85 Oz./Sq. Ft.

RCM PRODUCT TEST

Sig Mfg. Co. Cessna 150





IMPRESSIONS	E	G	A	F	P	IMPRESSIONS	E	G	A	F	P
Packaging		●				Pre-Shaped Parts		●			
Plans			NA			Parts Match to Plans			NA		
Written Instructions	●					Overall Parts Fit		●			
Quality of Hardwood			●			Ease of Assembly		●			
Quality of Fiberglass			NA			Fidelity to Scale	●				
Other Materials	●					Flight Performance	●				
Accessories	●					Overall Appeal	●				
Die-Cutting			●								

E=Excellent / G=Good / A=Average / F=Fair / P=Poor

SPECIFICATIONS

Name ..... Cessna 150
Aircraft Type ..... Sport/Stand-Off Scale
Manufactured By ..... Sig Mfg. Co. Inc.
401 S. Front Street
Montezuma, Iowa 50171
Mfg. Suggested Retail Price $59.95
Available From ..... Both Mfg. & Retail Outlets
Mfg. Recommended Usage ..... General Sport Aircraft
Wing Span ..... 65 Inches
Wing Chord ..... 10 Inches
Total Wing Area ..... 645 Square Inches
Fuselage Length ..... 40 Inches
Radio Compartment Dimensions . Two — (L) 5½" x (W) 2½" x (H) 3"
Wing Location ..... High Wing
Airfoil ..... Semi-Symmetrical
Wing Planform .....
..... Constant Chord — center section
..... Double Taper — tip panels
Dihedral ..... 1¼ Inches
Stabilizer Span ..... 20 Inches
Stabilizer Chord (incl. elev.) ..... 5¼" (Avg.)
Total Stab Area ..... 105 Square Inches
Stab Airfoil Section ..... Flat
Stabilizer Location ..... Top of Fuselage
Vertical Fin Height ..... 9 Inches
Vertical Fin Width (incl. rud.) ..... 5⅜ Inches
Mfg. Rec. Engine Range ..... .45 — .61
Recommended Fuel Tank Size ..... 8 — 12
Landing Gear ..... Tricycle
Recommended No. Of Channels ..... 4 — 5
Rec. Control Functions ..... Elev., Ail., Rud., Throt., Flaps
Basic Materials Used In Construction:
Fuselage ..... Balsa & Formed Plastic
Wing ..... Foam-balsa covered, Plastic
Tail Surfaces ..... Balsa
Hardware Included In Kit ..... See Text
Plan Size ..... NA
Building Instructions on Plan Sheets ..... NA
Instruction Manual ..... Yes (12 pages)
Construction Photos ..... Yes
Kit Includes ..... Shaped, Die-Cut, Printed Parts
Mfg. Rec. Flying Weight ..... 120 Ounces
Wing loading based on rec. flying wt. ..... 26.78 oz./sq. ft.

RCM PROTOTYPE

Weight, Ready To Fly ..... 132 Ounces
Wing Loading ..... 29.46 oz./sq. ft.
Covering & finishing materials used ..... See Text
Engine Make & Disp. ..... Super Tigre .60
Muffler Used ..... Tatone
Radio Used ..... S & O 6 channel
Tank Size Used ..... 12 Ounce

The Cessna 150, designed by Hank Pohlmann and manufactured by Sig Manufacturing Co., Inc., can be built either for sport flying or sport scale as the prototype.

The Cessna 150 is another one of Sig's Kwik-Bilt kits utilizing scale shaped ABS plastic fuselage shells. Unlike other models with plastic fuselages, the Kwik-Bilt Cessna does not depend on the shell for strength. The strength is based on a solid balsa center profile, beefed up with plywood doublers. The tail, wing, engine and landing gear are all mounted on this profile center. After a "destructive test", it was found that this concept works extremely well. The flaps and ailerons are also covered with crimped ABS plastic, adding more to the scale effect.

The prototype was built as per Sig's instruction booklet with the only modification being K & S streamline tubing replacing the spruce struts. All wood parts were covered with silkspan, then Sig Supercoat Dope was used over the entire plane in preparation for Sig Supercoat Color Dope; red, white, and blue. The windshield and windows were painted with a mixture

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RC FLYING AND THE LAW

Understanding AMA Insurance

By
Arthur J. Sabin
Assoc. Prof. of Law

PART III

If you play a word association game with the average R/C modeler, chances are that saying "AMA" will elicit "insurance." And rightly so. In these times of heightened awareness of the legal liability involved in operating R/C models, insurance coverage afforded as part of membership in the Academy of Model Aeronautics is particularly important to R/C pilots and operators of any other R/C model or device. More speed, more power, more beginners, more spectators . . . add up to increasing hazards and heightened exposure.

The plain fact is that serious personal injury and property damage can result (and has resulted) from operating R/C models. If you are sued, if you are charged with negligence in the construction or operation of your models, you want insurance coverage, not only to pay for your negligence if you were in fact at fault, but also to pay the cost of defense. The cost of "winning" a law suit can be terribly expensive — in effect, you can win and lose!

The answer is obviously two-fold; care in the building of the model, proper installation of reliable radio equipment and safe, competent flying — backed by insurance in the event any personal injury or property damage should result from the operation of that model.

Now just what is the insurance you get as an AMA member? Basically, the AMA carries a master policy for the benefit of its members. That policy is, however, essentially *secondary* coverage. By that it is meant that the insurance begins its effectiveness only *after* your *primary* coverage is exhausted. Primary coverage comes from your homeowner's or tenant's policy. In effect, the AMA insurance carrier knows that most R/C modelers (the AMA area of greatest injury exposure) are homeowners or people living in apartments where they would normally carry tenant's insurance.

The primary coverage you have as a homeowner or tenant with the tenant's policy insures your property against such perils as fire, theft, windstorm and the like. It also insures you against liability in the event of your negligence resulting in injury to persons on your property (guests, passersby) who are injured (falls on a sidewalk, down broken stairs, etc.) and pays for the defense of suits against you by any such person. Most importantly for our purposes, the usual policy also insures you against your negligent injury to persons or property *off of your premises,* such as playing baseball and hitting someone or smashing someone's window with a golf ball. Excluded are injuries done while driving a vehicle; for this you must have separate automobile insurance.

The limits of the usual homeowner's policy are typically $100,000 up to $300,000 for any one occurrence of injury or death to any person or persons; this same amount covers any property damage which occurs as either a part of or separate from any such injury to person(s).

Now, assume you are flying your model and it injures someone. They sue you in negligence for their injuries. *If* you have a homeowner's policy or tenant's policy, it would normally take over defense of the action and AMA insurance would have no involvement because the damages claimed in the suit were within the policy limits of your homeowner's or tenant's policy. This is also true of those many instances where injuries or property damage results and the matter is settled without resort to litigation; once again it's your homeowner's or tenant's insurance carrier that covers the matter, handling the claim and paying for those injuries and/or damages.

But let's say the matter is a serious one and no settlement is possible; suit follows and the claim for damages is $250,000. This is not unusual in our "inflationary verdict" time and especially when you understand that it generally costs no more to sue for $100,000 than for $250,000. Your policy limit is $100,000 for that single injury. Then and *only* then will the AMA carrier step in and cover the balance of the potential claim from $100,000 to $250,000, up to $1,000,000 in the United States and Canada; up to $500,000 in other locations. Now realistically, most suits result in settlements or verdicts of less than $100,000, so that the exposure of the AMA carrier is not that great.

By now you might be thinking, well I understand the "umbrella" nature of the AMA insurance, covering the RC'er with a homeowner's or tenant's policy to higher limits, but suppose the person involved in operating the model has no homeowner's or tenant's insurance, then what happens? The answer is that for such a person, the AMA coverage is all that he/she has; there being no underlying primary insurance, the AMA insurance starts with dollar one coverage. Here the AMA carrier will defend you and pay any settlement or verdict up to the $1,000,000 limit for occurrences in the United States and Canada.

One clear responsibility of the R/C model operator in the event of an accident is to *immediately* notify his/her homeowner's or tenant's carrier, preferably in writing, giving reasonable details as to what occurred and to whom. The same is true of those without such primary or underlying coverage; notify the AMA immediately. They, in turn, will take your report by phone (202-347-2751) and send you forms so that you can, in writing, explain what transpired. The same is true of those serious incidents where AMA secondary coverage *may* be involved; if in doubt, notify the AMA.

Now one major aspect that is rarely understood about the AMA coverage is that all AMA coverage is limited to, "liability from accidents arising from the operation and use of any model aircraft, model car, or model boat, *in accordance with the Official Safety Code(s) of the Academy of Model Aeronautics."* That is a quotation from the policy itself between the insurance carrier and the AMA, with emphasis added to point out a very real limitation to the coverage, regardless of whether the AMA is the primary or secondary carrier involved. So, if you've thrown away that AMA Safety Code or even are not aware of its contents, get acquainted! If a failure to abide by that code — which is pretty broad — is clearly involved, the AMA carrier may refuse to defend or otherwise honor the claim, in effect, denying coverage.

Furthermore, the policy states in part that there is no obligation for, "bodily injury or property damage arising out of the ownership, maintenance, operation or use of model aircraft, model cars or model boats *not constructed* and operated in accordance with current AMA Official Model Aircraft Safety Code." Again the emphasis is supplied to highlight another limitation — construction in accordance with safety codes. Here there are less specifics to point to because no construction codes have been promulgated other than limits defined for competition-type models, but you can be certain that the failure to construct the model with reasonable proficiency and competency related to its anticipated use may ultimately result in a denial of coverage.

Another much misunderstood matter is that of the liability of an AMA member

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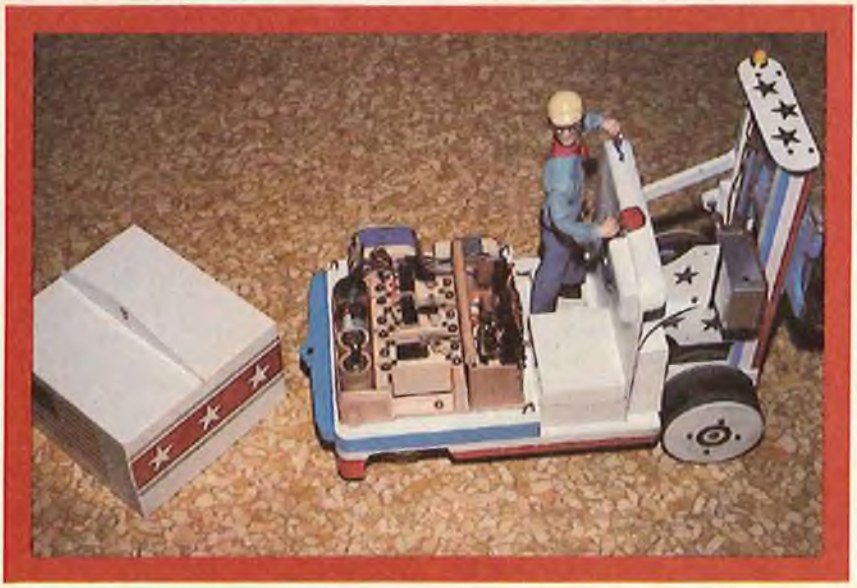
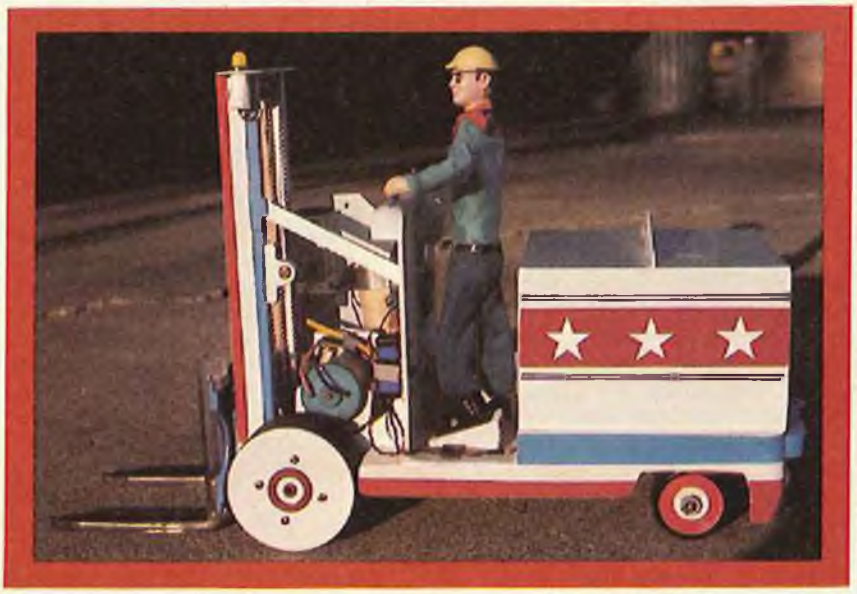


A fork lift is a fascinating piece of machinery and a real work horse. This RC version has two speeds, forward and reverse; hoist up and down; a safety light, horn; and steers with the two rear wheels. Complete with Henry, the operator, it is an excellent project for those rainy, non-flying days, and definitely a sobering item for that next party . . .

RC FORK LIFT TRUCK

By Pete Mathis



It was over 40 years ago that I got my first taste of balsa, pins, music wire, glue, dope, etc. Here it is some 40 years later and I'm still building models, only the size and costs have changed.

I can remember my first Comet models — 10 cents each including the glue and covering! I know I have built hundreds of models since then. After the small rubber models, came the larger ones — free-flight, control line and, in 1948, I started what I think was the best, R/C.

In the early days of R/C, all we had was single channel radios. Many hours were spent working on "mickey mouse" systems trying to get two-speed engines and engine shut-offs to work.

My first radio was a gas tube receiver built from a magazine article. The airplane was Walt Good's "Rudder Bug", a 72" rudder-only, which I still have today. I've been in R/C ever since and my latest is a 140" T-Tail towline glider.

Now my first non-flying R/C project is this Fork Lift Truck. The idea came from where I work (in a steel mill). The fork lift is a fascinating piece of machinery, a real work horse, and I thought it would make a good project for R/C, and it has.

I think before I start with the R/C version, I had better explain a little about the real thing. It measures 10 feet long, 7 feet high and weighs 13,000 pounds. It will lift 10,000 pounds, and is used to transport and pile materials from one place to another. In industry, its many uses include pushing, pulling, or lifting anything which can be balanced on the forks. It is battery powered and steered by a servo motor, and will turn on a dime.

It can be steered with one hand, shifting gears and operating the hoist with the other. It has two foot pedals — a clutch and a brake.

The R/C version of the fork lift has two speeds, forward and reverse, hoist up and down, a safety light, horn, and steers with the two rear wheels.

A fork lift will not operate without an operator — so I made one who I call "Henry." His body is constructed of 3/8" foam rubber, while his head is an old pilot from one of my gliders. His helmet is plastic formed over a screwdriver handle with a heat gun. The shoes and hands are carved from balsa and the glasses are made of wire. Henry's head swivels and looks in the direction the truck is moving.

The hoist gear box, which is located halfway up on the hoist uprights, has a 3/8" wood drum. A 30 pound test monofilament fish line is wound around the drum and around the upper and lower upright shafts and secured to the fork plate unit. This line is in one piece and serves as a power line to raise and lower the hoist. The two vertical chains seen between the two hoist uprights are dummies and are available in arts and crafts stores. I tried to use materials that are available almost everywhere. A lot of them you can find at home in your workshop if you are a modeler.

If you are a fisherman, or know one, you probably have the front wheels — they are fish line spools. They should measure about 2½" O.D. and 1¼" wide and should be open on one side. They even look like wheels. You will probably find that they have a 1/2" hole in which case you will have to bush it down to 1/4". I found some plastic pipe just the right size at the hardware store. The tires are 2½" I.D. rubber hose found at the local auto supply store.

The rear wheels are of hardwood. I used maple, although any tight grained hardwood will do. If you cannot find maple, old furniture is a good source, since some pieces have round legs.

The forks are made of 1/4" plexiglass which comes in many colors and is usually available at hobby shops and plastic supply stores. I used Ethylene Di-Cloride (E.D.C.), also available at your plastic supply or chemical supply store, to weld the plexiglass together.

The drive motor, gear train, batteries and charger were found in a battery operated grass clipper. It's the small hand-held type used to trim your lawn. There are many brands on the market, but all do not have the right kind of gears. The one I used was purchased from Sears Roebuck and Co., in the Chicago area. The model number is 240-86811 and is called the *Cordless Grass Clipper*. You can also order the parts separately if you wish to do so. Here are the part numbers: Part #3, #3901 Motor Base Assembly; #5, #3902 Gear Train Assembly; #7, #3964 Battery Pack; #6, #3963 Charger. I have found it cheaper to order the complete grass clipper and take the parts out. You use practically all the parts anyway, and the cost was under $20.00. If you ask around the neighborhood, you might find some broken clippers and some parts may be usable, especially the batteries and chargers.

The hoist motor was found at Radio Shack, Part #273-214. The motors are 3 volts and have no pinion. Slot car racers have brass pinions or you can use plastic ones. The latter will be explained later. The other gears are one set of K.P.S. 14's from your R/C hobby shop; there are four gears to a set.

The controller parts came from Radio Shack: nine micro switches; six S.P.D.T. (#275-016); and three roller switches (#275-017). All the rest you probably have: three bicycle spokes and a couple of extra servo control arms.

The horn is also from Radio Shack (#273-004), and the safety light is a 3 volt pilot light available from most electronic outlets, and usually come with 6 volt or 12 volt bulbs. 3 volt bulbs can be purchased separately.

All the rest of the materials such as brass tubing, plywood, wood dowels, music wire, epoxy and dope can be found in any hobby shop.

CONSTRUCTION

First you can start with the body frame. I used 5-minute epoxy to speed up the construction; although, in some cases, I used Wilhold glue. When cutting out the frame parts — note that the three side pieces require two of each; B9, B7 and B4. The 1/8" groove, 1/8" deep in B7, is for the firewall B2. Clamp the two B4's together and drill out the 9/32" holes for the front axle bearing. When cutting the hole in B6 for the steering servo, you may be using a different servo, so cut the opening accordingly. Cut the two hoist uprights from maple — 3/8" x 3/4" x 10½" with a full length 1/8" groove, 5/32" deep, clamp together, and drill the two 1/4" holes at each end for the upper and lower shafts. Measure and drill holes for the 3/16" wood dowels in the back side of the uprights and in B2. The opening for the horn can also be cut at this time. Glue the three side pieces, B4, B7 and B9 together and let dry, making sure they are straight and for opposite sides. Now complete the rest of the frame except the uprights. They are put on after the rest of the frame is completed. I built mine upside down on a piece of glass and let the firewall hang off the edge of the table. Make the control cover on top of the firewall from balsa. The control handles are straight pins with large heads. The steering control is fabricated from balsa and 1/8" brass tubing. These are dummies of course. The uprights may now be installed parallel to the firewall. If you put the upper and lower shafts in place, these will help hold the uprights together while aligning them (do not epoxy the shafts). I used small flathead wood screws at the bottom of the uprights and B4.

The Fork Plate Unit

This unit consists of six pieces: the fork plate made of 3/16" plywood; the back plate which is a 1/8" plywood rectangle; two vertical separators; one horizontal piece with a 1/16" hole; and the aluminum fitting which bolts across the top, also having a 1/16" hole. All the wood pieces can be glued together at the same time, allowing to dry thoroughly. Then drill the holes for the two 4-40 bolts which hold the aluminum fitting. Now that you have the fork plate unit finished, cut a 40" piece of 30 pound test monofilament fish line, tie a knot in the center of the line around a toothpick, push one end of the line down through the 1/16" hole in the cross piece in the fork plate unit and the other end up through the 1/16" hole in the aluminum fitting. Next, bolt the aluminum fitting to the fork plate unit. Now you have the toothpick between the aluminum fitting and the fork plate unit. Snip off any excess length of the toothpick. You can now slide the fork plate unit in the groove in the hoist upright, making sure that it slides very smoothly.

Forks

The two forks are cut from 1/4" plexiglass. Each fork requires two pieces. After cutting the two pieces of each fork to shape, bend by heating the center section very slowly over a small flame (I used the kitchen gas stove for this) until it becomes very flexible. Now bend it 90 degrees over a wood form made of 1" x 6" pine sheeting and hold until cool. Make sure they both are identical, then weld the small hooked piece to the top of each fork. Use E.D.C. for this, wetting each side to be welded, waiting one minute, then put in place and clamp until dry. Now use a fine file on the edges, then wet sand with 360 paper and buff with a fine compound. (It might be a good idea to take a piece of scrap plexiglass and practice making bends and welds.) After they are completed, clamp together and drill the 1/16" hole for the wire to hold the bottom of the forks down against the fork plate.

Wheels

The front wheels are used almost as is - - - just grind off the outer flange so you can slide the tire on and then bush the 1/2" hole to 1/4" to fit the axle. The wheel on the drive side must be secured to the axle. Drill a 1/8" hole down through the wheel including the hub and bushing, then insert a 1/8" steel pin through the axle and epoxy in place. The rear wheels were made of maple, using 1" stock cutting 1⅞" circles, drilling a 3/16" hole for the axle, putting a 3/16" bolt (2" long)

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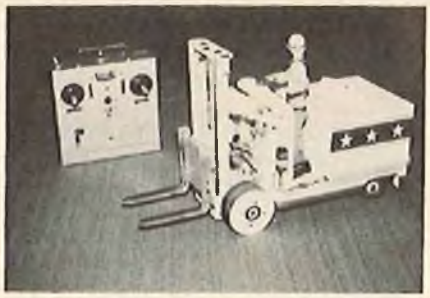
Senior Truck and Henry, the operator, with heavy load.

Henry in reverse.



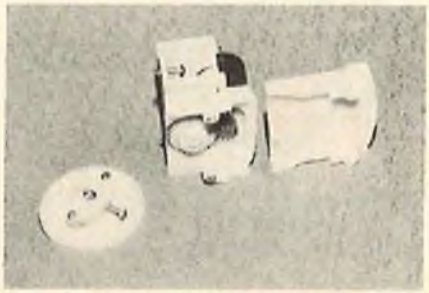
Lift Truck & 6 ch. transmitter. Trim or flap control lever top right used for light, slow speed and horn.

Top view of Senior Truck. Controller system in neutral; nicad batteries in rear; receiver, batteries on side.

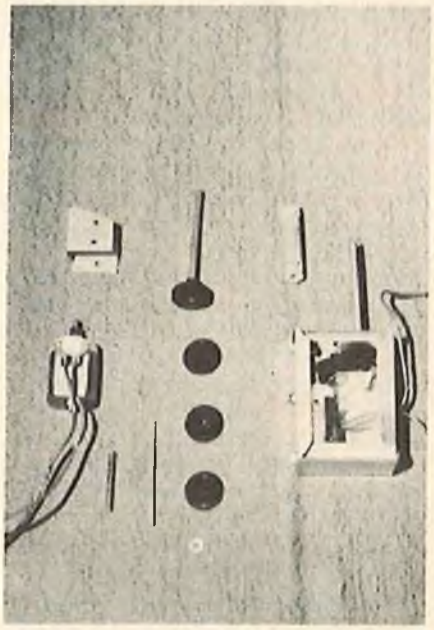
Bottom of truck with wheels in full turn. (R) Resistor in top center of truck for slow speed.

Drive motor & gear train. Note how forks slide over top of fork plate; weld visible on top of plexiglass fork.

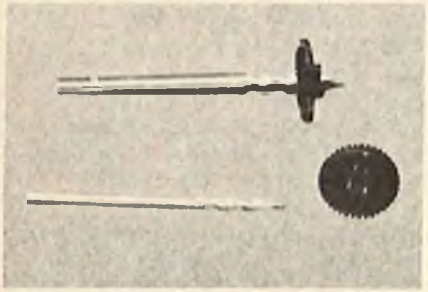
Complete drive assembly, drive wheel and drive gear secured with wood hub and set screw.



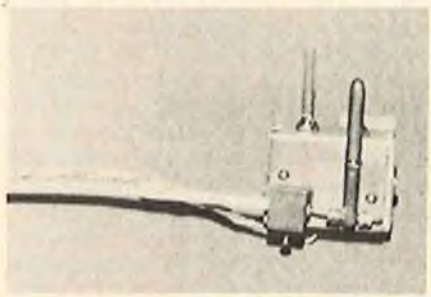
Drive motor in saddle mount and plastic motor base with top half cut away; gear secured to axle by set screw.



Complete hoist gear box on right and all parts on left.



Hand-made reamers from old drills. Cutting edge has been ground to a point.



Junior Truck control box with bike brake cable for steering; 6 wire cable goes to the lift truck.

Junior Truck with battery box on rear instead of controller system.

Lift Truck ready for Fork Plate Unit.

Author, in rear, operating Junior Truck and Senior Truck.

through the hole, securing with a nut and putting in the chuck in your drill press or hand drill. You can use a wood rasp and sandpaper and work it down to 1¾" O.D. Use 7/32" O.D. brass tubing for a bearing.

Drive Motor and Gears

After removing the motor and gears from the grass clipper, note that the large gear has a pin on one side — grind it off and sand smooth. Then, from maple, make a hub 1" in diameter and 1/4" thick. Drill a 1/4" hole for the axle and a 1/8" hole down through the hub to the center. Drill and bolt the hub to the gear with 3-48 bolts and slide the gear on the axle up to the 1/8" hole. Now, using a 6-32 bolt, screw down through the 1/8" hole in the hub and into the axle. This will lock the gear and will complete the axle.

Cut off the upper portion of the plastic motor base since the top half is not needed. Make your saddle motor mount from 1/4" pine. Using the mounting holes already in the plastic base, screw the motor to the saddle mount. This complete unit is bolted to the floor of the front section and the gears will mesh with the large gear on the axle and will be adjusted when the fork lift is completed.

Steering Section

The two L-shaped wheel blocks, made from maple, are identical. The 3/16" steel axles are epoxied as are the 1/8" vertical steel pins. The 1/8" pins fit into the 5/32" O.D. bushings in the wheel support block and held in place with 1/8" collars on top of the fork lift floor. Make absolutely sure the wheels move freely. The unit is ready for the pushrods from the servo. The two L-shaped blocks are connected by the 1/16" wire, fitting into bushings in the rear of the blocks. This wire is bent in a U-shape and it might take a couple of tries to get the exact length. The latter is very important so that the wheels will track properly.

HOIST GEAR BOX

Cut the box and bracket from .018 aluminum, drilling all holes, and making your bends. You need not make the cover. When bending the bracket, make sure the 1/8" diameter hole ends on the upper right when looking from the open end. Cut one piece of brass tubing 3/32" O.D., 15/16" long and one piece 1/8" O.D., 2-7/16" long. Cut one piece of 3/8" wood dowel 1-5/16" long and drill a 1/8" diameter hole lengthwise through the center. The one piece of .047 wire, 1" long, need not be music wire.

Ream out the hole in the drive gear to fit the 1/8" shaft (you can make a reamer by taking an old 1/8" drill and tapering the sharp end down to a point with a grinder), working very slowly when reaming the holes. Insert the 1/8" brass tubing in the hole of the drive gear. This should be a very tight fit, so a drop of Hot Stuff adhesive will help here. Push the tubing all the way through and flush with the bottom of the gear. Ream out the #2 gear, using the same method as explained for the drive gear, using a .096 diameter drill. This gear should slide freely over the 3/32" O.D. tubing. The pinion gear can either be cut from a larger gear, such as a #3 gear by cutting away the larger part of the gear, or find a brass pinion from slot car parts. In the latter case, it should have 10 teeth. This pinion will have to be reamed out to fit the motor shaft, usually .078 diameter. Make sure you have a tight fit on this assembly.

Starting Assembly Of Gear Box

Insert the 1/8" diameter shaft, with drive gear secured, through the large hole in the gear bracket from the inside and install the other three gears. Now epoxy the shafts to the brackets and clip off the excess .047 wire on the top side. Now you can put the motor with pinion in the box, then bracket and tighten down, making sure the gears mesh freely. Slide the 3/8" wood dowel over the 1/8" shaft and drill 1/16" diameter holes all the way through.

The box cover is made from 1/16" plywood. Using sheet metal screws, fasten the cover to the box. Epoxy the gear box to the hoist upright. The pillow block can be made using pine, drilling a 5/32" diameter hole for the bearing. Slide in place and epoxy to the upright on the other side.

Controller Unit

Knowing that everyone will not use the same radios, the mounting of the servos will, of necessity, be different and you will have to change the mounting accordingly. The whole unit is mounted on a piece of 1/8" plywood so, if your receiver and batteries aren't any larger than the ones I used, you can construct it as shown. The four nicad batteries in the rear are only used for the hoist, light, horn and drive motor. I made a box for them from 3/32" balsa, and another box for the receiver batteries on the side. The receiver is held in place with a metal clamp attached to the front section which holds the micro-switches. This section is made of three pieces of 1/16" plywood. The two side pieces have two 3/32" diameter holes for the two pieces of brass tubing 3⅝" long which hold the micro-switches. The cross piece glues to the rear of the two side pieces 1¾" x 3⅝", this piece having three slots for the passage of the three bicycle spokes. The front of the section is open for easy access to the switches. Slide on the three roller micro-switches and four lever switches on the 3/32" brass tubes. Fasten the lever switches in groups of two and the three roller switches all together using Scotch tape. Screw on the three contactor blocks, X, Y, Z, on the spokes and line up the A and B servos and switches so that, when the servos are extended, the switches are closed. When lining up the C servo and the roller switches, make sure that the switches close one at a time. This servo is operated with the trim lever from the transmitter. Mount the two lever micro-switches on the top of A and B servos, #6 and #7, gluing each on a piece of 1/32" plywood, and bolting them to the servo using the bolts that hold the servo together. These two switches are operated by a servo arm fastened on top of the regular arm, then the servo arm becomes a bellcrank. When the servos are in neutral, the switches are closed. A balsa cap on top of the slotted 1/16" plywood cross piece acts as a keeper for the three bicycle spokes. The cap is not glued so that it can be removed when it is necessary to adjust the spoke pushrods.

When you complete the controller construction, strip everything from the body frame and paint before doing the final wiring. Make a cover for the controller from 3/32" balsa and a cover for the steering servo, also from balsa. I covered these sections with MonoKote. The rest of the Fork Lift Truck can be painted with either dope or enamel. There will be no fuel problem here. Mine was painted with Aero Gloss dope.

When painting the hoist uprights, mask the 1/8" groove and, when dry, coat the groove with parafin wax to make the hoist work smoothly.

Now that you have everything ready for wiring, the switches are all in the open and easy to get to. The wires go down through a hole below the switches and to a terminal strip underneath.

A word about the operator, Henry. His body is made of two layers of foam rubber with a 3/32" O.D. brass tubing through the center. The arms and legs are 3/8" square foam rubber sandwiched and cemented between the 2 layers of his body and 1/32" diameter soft wire to stiffen the arms and legs. Using a 12" piece of 1/32" diameter music wire, epoxy one end to the head of Henry and run it down through the 3/32" O.D. tubing, make a bend, and let it drag on the floor. This will make his head follow the direction of the truck. His clothing was made on our sewing machine.

Now you can finish the hoist by installing the fish line, placing a block under the fork plate unit so it rests 1/2 way up on the uprights. Take the line up over the upper hoist shaft and down and around the drum, starting in the center front and winding 7 times around and down through the 1/16" hole in the end of the drum, forcing a toothpick down through the hole. This will hold the line in place. Now take the lower line from the hoist unit down around the lower hoist shaft and wind around the drum in the center front and, making 7 winds, down through the other 1/16" hole. Force the toothpick in the same way, epoxying both ends and clipping off the excess. Do not make the line too tight. A little light oil will help

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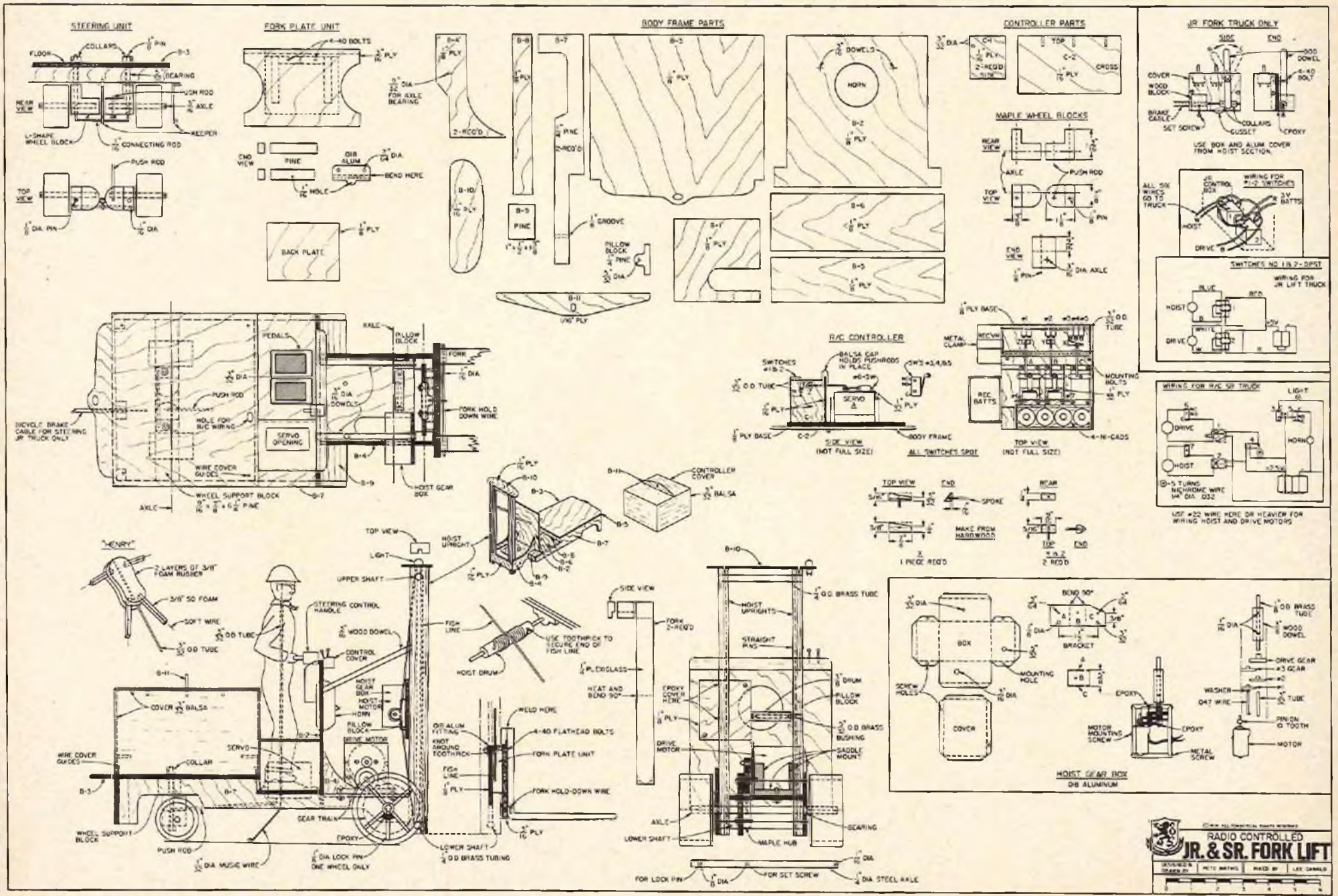
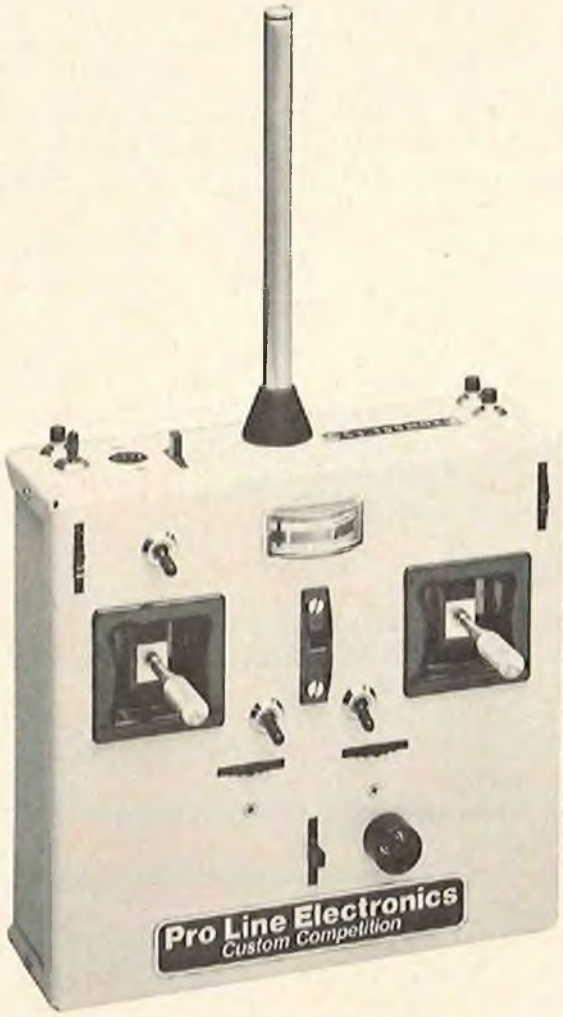
FULL SIZE PLANS AVAILABLE — SEE PAGE 189



RADIO SPECS

PRO LINE
PL-7-O-C, PL-7-S-C
CUSTOM COMPETITION SERIES



PRO LINE
PL-7-O-C, PL-7-S-C
7 CHANNEL
CUSTOM COMPETITION
RADIO CONTROL SYSTEM

MARKETED BY
PRO LINE ELECTRONICS, INC.
10632 NORTH 21ST AVE., SUITE 11
PHOENIX, ARIZONA 85029

FEATURES

TRANSMITTER

- Number of Channels: 7 — 6 proportional, 1 switched.
- Case material: Vinyl laminated aluminum.
- Voltage: Full voltage stability down to 4.0 volts.
- Adjustable and reversible push button trim functions on aileron, elevator, and throttle channels.
- Power supply: Two 4.8V, 500 MA rechargeable nickel-cadmium battery packs.
- Gimbals: Available with 2 stick open or single stick open gimbals.

RECEIVER

- Silicon, low power CMOS integrated circuitry.
- IF Frequency: 455 kc (4 narrow band pass stages).
- Sensitivity: 1.0 microvolt for full control.
- Selectivity: 3 db down at less than 3.5 KHz.
- Image Rejection: 72 MHz band, 10 db.; 53 MHz band, 18 db.; 27 MHz band, 34 db.

SERVOS

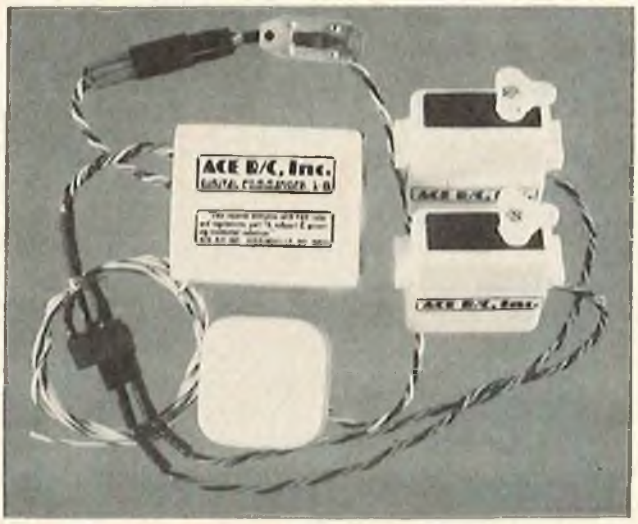
- "Selected": PLS-1, PLS-11, and PLS-15 available.

SYSTEM

- Airborne battery pack available, 550, 500, or 225 MAH, all rechargeable nickel-cadmium battery cells.
- Connectors: Three pin Deans connectors.
- Charger: Either standard or dual rate fast charger.
- Servo Trays: System comes complete with applicable servo trays.
- Shipping Container: Shock resistant fitted styrofoam container.

RADIO SPECS

ACE R/C DIGITAL COMMANDER KIT



MINIFLITE PACK OPTION

ACE R/C
DIGITAL COMMANDER
3 CHANNEL SYSTEM KIT

MARKETED BY
ACE R/C, INC.
116 W. 19TH ST.
HIGGINSVILLE, MO 64037

FEATURES

TRANSMITTER

- Number of Channels: Three proportional channels with trim; expandable to nine channels with new case and controls.
- Case Material: Red vinyl laminated aluminum.
- Type Gimbals: Dunham Open Gimbal.
- Type Pots: Plastic conductive.
- Meter: Expanded scale voltmeter.
- Power Supply: 9V Dry; can be converted to Ni-cad.
- Frequencies: 27, 53, and 72/75 MHz.
- Weight: 1 lb., 15 oz.
- Size: 5⅞" x 5⅞" x 2⅛".
- Unique Features: Assembled powerful R.F. deck; commutated encoder for low parts count and high reliability.

RECEIVER

- Weight: 1.5 oz.
- Size: 1" x 1½" x 1¾".
- Current Drain: 7 ma
- Sensitivity: 3 uv
- Number of Channels: One through eight.
- Type of Decoder: CMOS IC.
- Front End: Double Tuned.
- Case Material: ABS

SERVO

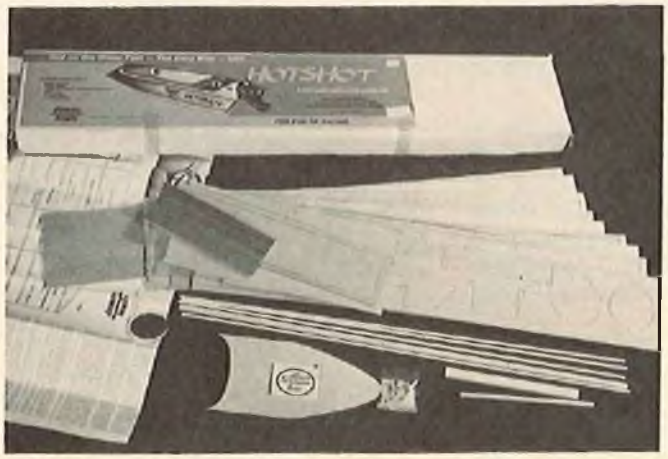
- Amplifier: Signetics 544 IC
- Mechanics: D & R Bantam (Dunham Micro in Micro System option).
- Weight: 1.25 oz. (Micro option: .75 oz.)
- Size: 3/4" x 1⅜" x 1½" (Micro: .625 x 1/25" x 1.28").
- Motor Size: 16mm 11 ohm (Micro: J-5 11mm 12 ohm).
- Thrust: Will lift 8 lbs. from inner hole. (Micro will lift 4 lbs.)
- Unique Feature: Servo will work with most other receivers.

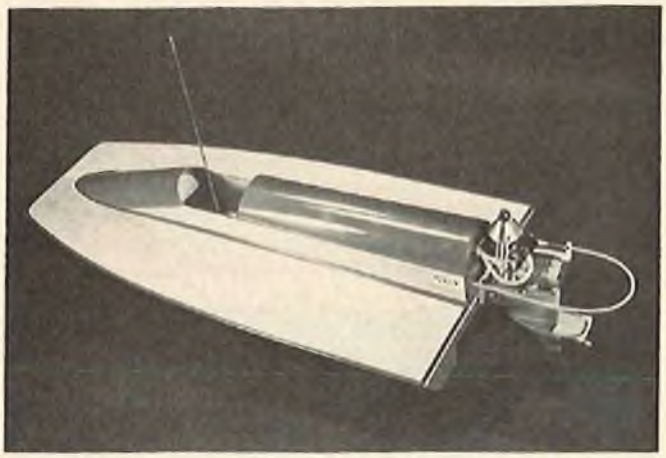
SYSTEM

- Airborne Power: 4.8V GE 450 mah Nickel-Cadmium (Micro: 4.8V GE 100 mah Nickel-Cadmium).
- Connectors: Deans Three Pin.
- Type Charger: Wall type.
- Construction: Transmitter RF deck comes assembled and tuned — one servo is assembled — easy to follow step-by-step building instructions. Micro flight pack available as an option.
- Service Available: Eight service centers throughout the U.S.

RCM PRODUCT TEST

Dumas Boats
Hot Shot





IMPRESSIONS	E	G	A	F	P	IMPRESSIONS	E	G	A	F	P
Packaging	●					Pre-Shaped Parts	●				
Plans		●				Parts Match to Plans			NA		
Written Instructions	●					Overall Parts Fit	●				
Quality of Hardwood		●				Ease of Assembly	●				
Quality of Fiberglass			NA			Fidelity to Scale			NA		
Other Materials		●				Flight Performance	●				
Accessories		●				Overall Appeal	●				
Die-Cutting		●									

E=Excellent / G=Good / A=Average / F=Fair / P=Poor

The Hot Shot is an outboard tunnel hull powered boat manufactured by Dumas Products. The basic materials used in the construction are birch and mahogany plywood hull, while the hardware package contains a turn fin and screws. Wooden parts are both die-cut and pre-shaped. Our prototype weighed 64 ounces and was finished with K & B resin and K & B Super Poxy paint. The engine used was the K & B 3.5cc outboard engine, while the radio used was a Cox-Sanwa 2 channel system.

We found no modification necessary for this kit, although we recommend that you follow instructions to the letter while constructing the rear canopy. There is no warning, but if you don't follow the instructions, a severe warp will result.

With regards to the overall kit, it is excellent and especially recommended for the beginner because of its simplicity. Once built, you simply bolt on the engine, install your radio, and you're ready for the pond. There is no stuffing box, shaft, or universal joints to worry about with this power boat. With regards to performance, if you make sure that your Center of Gravity is in the proper place, and that you have set it up initially for a minimum turning radius of 15 feet, the boat is easy to handle, even for the beginner, who is utilizing this for his first power boat. In addition, once you have become proficient in handling the Hot Shot, there is no reason why it cannot be highly competitive in power boat racing circles.

Priced at $22.95, this excellent addition to the Dumas line is a proven performer and a winner in every respect. □

SPECIFICATIONS

Name	Hot Shot
Boat Type	Outboard Tunnel Hull
Manufactured By	Dumas Boats 790 S. Park Avenue Tucson, Arizona 85719
Mfg. Suggested Retail Price	$22.95
Available From	Mfg. & Retail Outlets
Mfg. Recommended Usage	Sport or Competition
Length	24 Inches
Beam	12½ Inches
Radio Compartment Dimensions	(L) 6¾" x (W) 2½" x (H) 2⅜"
Hull	Tunnel Hull
Mfg. Rec. Engine Range	K & B 3.5cc Outboard
Recommended Fuel Tank Size	6 Oz.
Rec. Number of Channels	2
Recommended Control Functions	Steering & Throttle
Basic Materials Used In Construction:	
Hull	Birch & Mahogany Plywood
Hardware Included In Kit	See Text
Plan Size	24" x 30"
Building Instructions on Plan Sheets	Yes
Instruction Manual	No
Construction Photos	Yes
Kit Includes	Die-Cut & Shaped Parts

RCM PROTOTYPE

Weight, Ready To Run	64 Ounces
Covering & finishing materials used	K & B resin & K & B Super Poxy
Engine Make & Disp.	K & B 3.5cc
Muffler Used	Yes
Radio Used	Cox 2 channel
Tank Size Used	6 Ounce

NRCHA

THAT HELICOPTER DIVING RIGHT TURN

BY DON LODGE

Overhead, the Kavan Jet Ranger has just completed the first portion of a Figure 8 maneuver. The model has picked up speed and, as it crosses the center and begins the right turn, the man on the transmitter realizes he must rack it around to prevent drifting out too far — and the stage is set. The machine goes into the high speed right turn, the nose drops a little, speed increases still more and the uncontrollable spiral continues until the model is all but destroyed at ground impact. The bewildered man on the transmitter is in shock wondering what happened!

Well, what really **did** happen? Why does this helicopter become uncontrollable at high speed, nose down, and in a right turn?

First of all, we know that the main rotor blades are receiving an input from somewhere, telling them to produce a nose down cyclic pitch and slight right hand cyclic roll. Excessive control deflection immediately comes to mind. Could it be that the aerodynamic pitching moments on the blades are distorting the blade angles to produce the phenomenon? No, I think not. Quick and dirty calculations indicate that, because the model uses a symmetrical airfoil and the feathering axis is just about on the center of pressure, it is unlikely that the relatively small blade pitching moments, resulting from the center of pressure excursions with angle of attack, could be a significant factor in the problem.

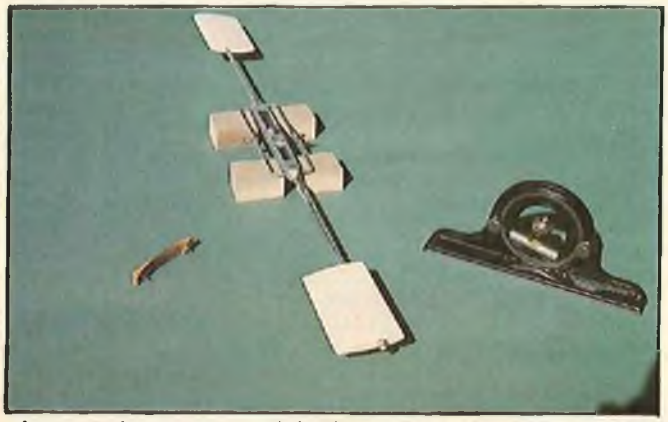
The control rotor, however, is a different matter. In addition to its duties as a stabilizing gyro, the control rotor also serves as a boost to the cyclic system. It has high authority in controlling the main rotor blade angles. This, of course, is accomplished by varying the pitch of the small airfoils, or "paddles," at the ends of the control rotor arms, one cycle each revolution. These paddles produce lift forces, up or down, and cause the control rotor to flap one cycle per revolution. Because the control rotor is attached to

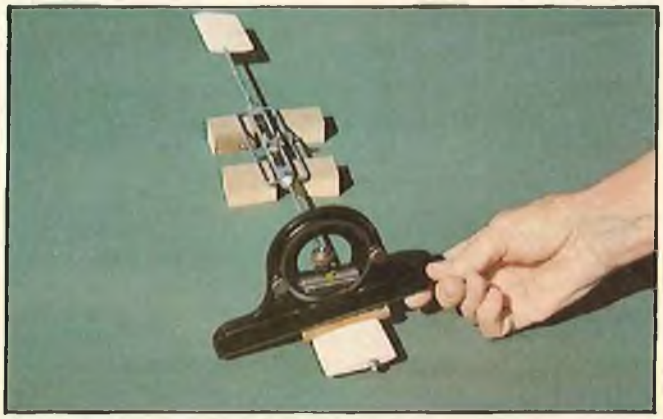
About The Author

Don Lodge's modeling experience goes back many years, having held the FAI Endurance Record, Class E Gas Senior in 1937. During World War II, he was a military flight instructor. Don holds a degree in Aeronautical Engineering from Purdue University.

To add to his credits, the author is a full-size helicopter pilot and a helicopter flight test engineer with twenty years experience for such firms as Cessna, Hiller and Lockheed. Lodge has taught helicopter theory of flight for the U.S. Navy at the Test Pilot School, Pax River, during 1961-1962. He is also the author of a text on rotary winged aircraft, entitled 'Introduction To The Helicopter,' copyrighted in 1962.

Currently, Don Lodge flies scratch-built fixed wing R/C aircraft and the modified Kavan Jet Ranger helicopter described in the text.





A convenient method of rigging paddles. Contour a block to fit the airfoil. Position the control rotor on a level base using blocks as shown. Use contoured block and bubble protractor to set paddle angle.

End view of control rotor showing the +8° paddle rigging.

The author with the training fuselage used in the tests.

the main rotor blade arms through mixing links, the flapping action of the control rotor directly affects the main rotor blade pitch angles. It, therefore, follows that, if the control rotor is not responding correctly to servo inputs, then the main rotor, although receiving direct servo inputs, is being heavily biased by the false boost inputs from the control rotor.

Let's analyze the forces on the control paddles at the instant immediately after the man on the transmitter has finally realized the model is out of control. He has applied full aft and full left transmitter inputs, and yet the model continues to auger in.

Premises:

(1) Model is assembled and rigged per Kavan kit instructions including the standard 50 x 90mm paddles.

(2) Main rotor speed = 920 rpm. (Kavan recommendation).

(3) Forward speed = 50 mph (best estimate of witnesses).

(4) Full nose up and full left cyclic input have been applied to the control paddles just prior to the instant of this analysis.

Simplifying Assumptions:

(1) The flapping derivatives, that is, flapping velocity and acceleration, are of second order and will be considered negligible.

(2) Control rotor airfoil is approximated by the NACA 0015 symmetrical section (15% thickness).

Method:

Control paddle lift (up or down) is calculated for 12 azimuth positions around the rotor. These forces will be summarized in direction and magnitude to determine whether the control rotor response is consistant or contrary to the input signal.

Symbols

Ω = rotor rotational speed
= 920 rpm = $96.3 \frac{\text{rad.}}{\text{sec.}}$

r = control paddle radius = .83 ft.

v = control paddle tangential speed $= \Omega R = 80$ ft./sec.

V = model forward speed
= 50 mph = 73 ft./sec.

ψ = azimuth position of control paddle starting with $\psi = 0°$ (aft) and continuing counter-clockwise looking down on rotor.

θ = mast tilt relative to line normal to flight path.

ϕ = control paddle incidence at a given azimuth relative to plane of rotation.

β = inflow angle relative to plane of rotation.

α = control paddle angle of attack at a given azimuth, where $\alpha = \beta + \phi$

^{v}R = resultant inflow velocity on the control paddle.

The first step in this analysis is to determine the mast tilt (θ) relative to the line of flight for the premised conditions (Figure 1).

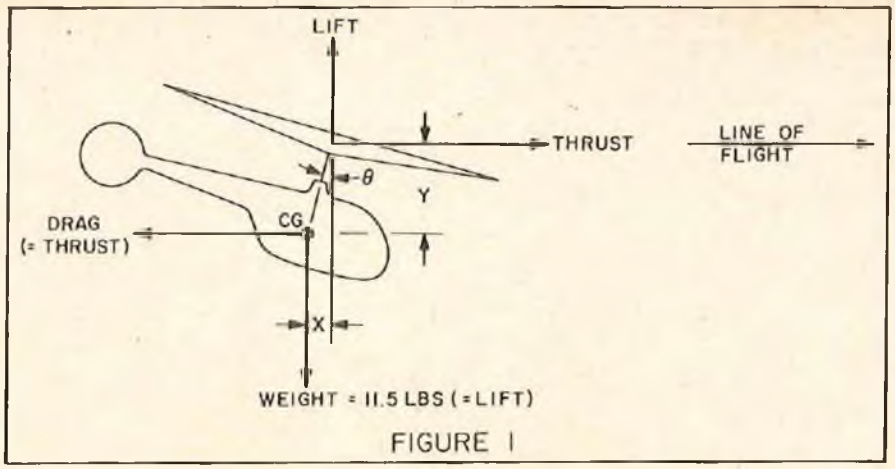


FIGURE 1

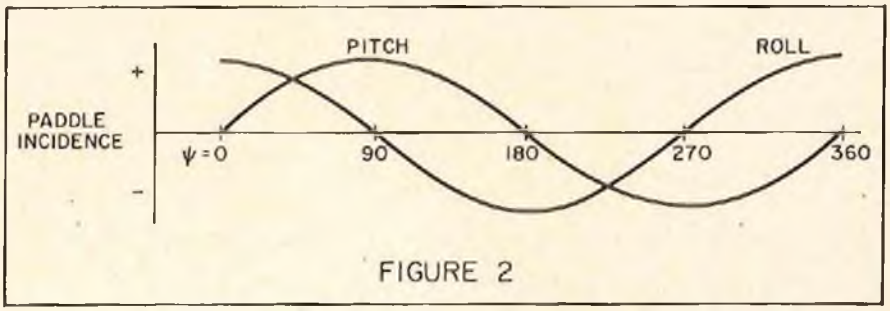


FIGURE 2

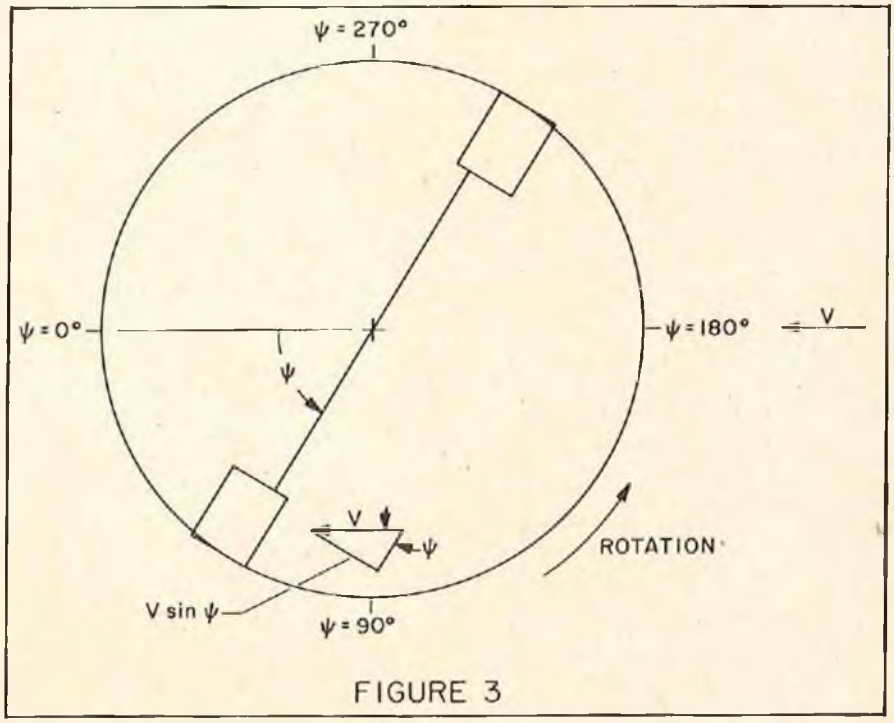


FIGURE 3

Summation of moments about the C.G.:

$$LX = TY \quad \text{or} \quad X = \frac{TY}{L}$$

Where thrust = drag = 1.28 Aq

A = equivalent flat plate area estimated = 65 in^2 = .45 ft^2

q = dynamic air pressure
= $1/2 \rho v^2$ = 6.34 lbs./$ft.^2$

Now then:

$$\theta = \arctan \frac{X}{y}$$

$$\theta = \arctan \frac{(1.28)(A)(q)}{11.5}$$

$$\theta = 17.7° \simeq 18°$$

The Kavan rigging instructions call out 6mm total or ± 3mm pitch or roll swashplate tilt measured at the rotating ball joint, which translates to approximately ± 8.9° maximum feathering at the paddle. The control paddle incidence (ϕ) varies in simple harmonic motion with azimuth as in Figure 2.

For the **premised condition** (full nose up and full left cyclic inputs), the incidence at any given azimuth is the algebraic sum of the two inputs:

or

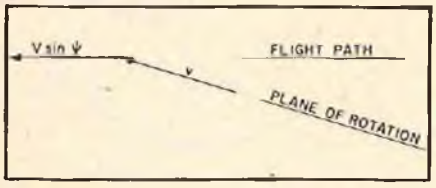
$$\phi = 8.9 \sin \psi + 8.9 \cos \psi$$

Now consider the velocity acting on the paddle at any given azimuth (Figure 3).

Where V sin ψ is the tangential component of velocity along the flight path for any given azimuth.

Now let's look at the paddle of Figure 3 when $\psi = 90°$.

From Figures 3 and 4, inflow vectors can be shown as:



Now let's replace V sin ψ by components that are **parallel** and **normal** to the plane of rotation.

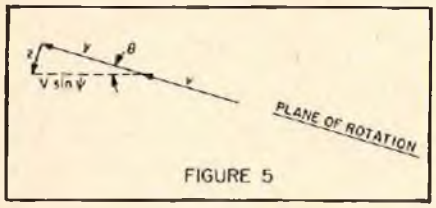


FIGURE 5

Where, in Figure 5, y is the **inplane** tangential component of inflow velocity due to forward speed at a given azimuth and is expressed as:

$$y = V \sin \psi \cos \theta$$

Note that y will be negative in retreating quadrants.

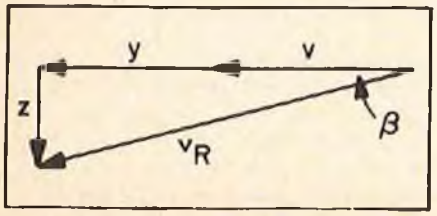
And, where Z is the **normal** component of inflow velocity, due to forward speed at any atimuth, and is expressed as:

$$Z = -V \sin \theta = -22.6 \text{ ft./sec.}$$

Note that it is a constant and is minus because the inflow is **down**.

We now have the required information to calculate the resultant inflow velocity (v_R) and angle of attack (α) on the control paddle. From these, we can calculate the lift at any azimuth.

Where:



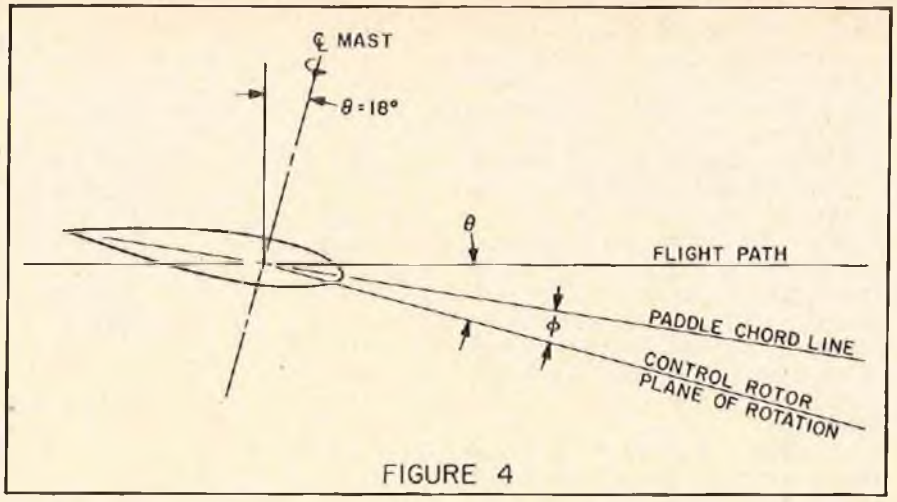


FIGURE 4

$$\beta = \text{arc tan} \frac{Z}{y + v}$$

$$\alpha = \beta + \phi$$

or

$$\alpha = \left(\text{arc tan} \frac{-V \sin \theta}{V \sin \psi \cos \theta + v} \right) + 8.9 \sin \psi + 8.9 \cos \psi \text{ (degrees)}$$

$$v_R = \frac{V \sin \psi \cos \theta + v}{\cos \beta} \text{ (ft./sec.)}$$

and lift on the paddle is:

$L = C_L \, 1/2 \rho \, v_R^2 \, K$ (lbs.)

Where:

C_L = lift coefficient for NACA 0015 airfoil. $\frac{dC_L}{d\alpha}$ two dimensional data used. Ref. NACA TR 669.

ρ = standard air density = .002378 slugs/ft.^{3}

K = correction factor for low aspect ratio = .43 (Ref: Principles of Aerodynamics, Dwinnell).

Table I shows the lift calculated at 30° intervals of azimuth.

ψ	**lift**
0	−.11 lbs. (down)
30	+.02 lbs. (up)
60	+.13 lbs. (up)
90	0
120	−.28 lbs. (down)
150	−.46 lbs. (down)
180	stalled
210	stalled
240	stalled
270	stalled
300	stalled
330	stalled

Figure 6 is a plot of the lift calculated in Table I, in which the circumference of the control rotor has been rolled out flat. There are several interesting aspects of this plot. Note that the paddles are stalled over a major portion of the revolution. Thus the control rotor, if it is to be effective as a control boost for the main rotor blades, can do so only during the azimuth positions ranging from about ψ = 345° to about 150°. If the unstalled (shaded) area under the curve is integrated, the **resultant net force** is .3 pounds **down**, and occurs at approximately ψ = 94°. Since the control rotor is an unrestrained gyro, maximum flapping displacement follows the force input by 90° and occurs at ψ = 184°. Now then, the main rotor is also a gyro. If it is a teetering rotor, like a Bell or Hiller, the phase angle between applied force and maximum displacement is again 90°. If, however, the rotor is constrained from freely flapping, it can be shown mathematically that the phase angle becomes something less than 90°, depending on the degree of restraint, damping, etc. For example, it was roughly 60° on the Lockheed Cheyenne "Rigid Rotor." The Kavan model helicopter is also restrained from freely flapping by the snubber. On my particular model, the phase angle is approximately 75°, and I suspect this is representative of most Kavan Jet Rangers flying.

Now then, what do we have so far? The control rotor **force** is down at 94° and the **displacement** is therefore down at 184°. The main rotor blade (90° behind the paddle) receives a down **force** input at 94° and the maximum **displacement** is down at 94° + 75° = 169°. This causes a nose down and right roll attitude as shown in Figure 7.

To summarize, although a portion of the nose up-left roll signal is going to the blades through the mixing links, the aerodynamic forces acting in opposition on the paddles at this instant have over-powered the nose up-left roll — and the helicopter is now uncontrollable! The results of this analysis suggests that the above situation did not suddenly materialize at 50 mph; but probably started quite subtlely at a somewhat lower speed, with the man on the transmitter

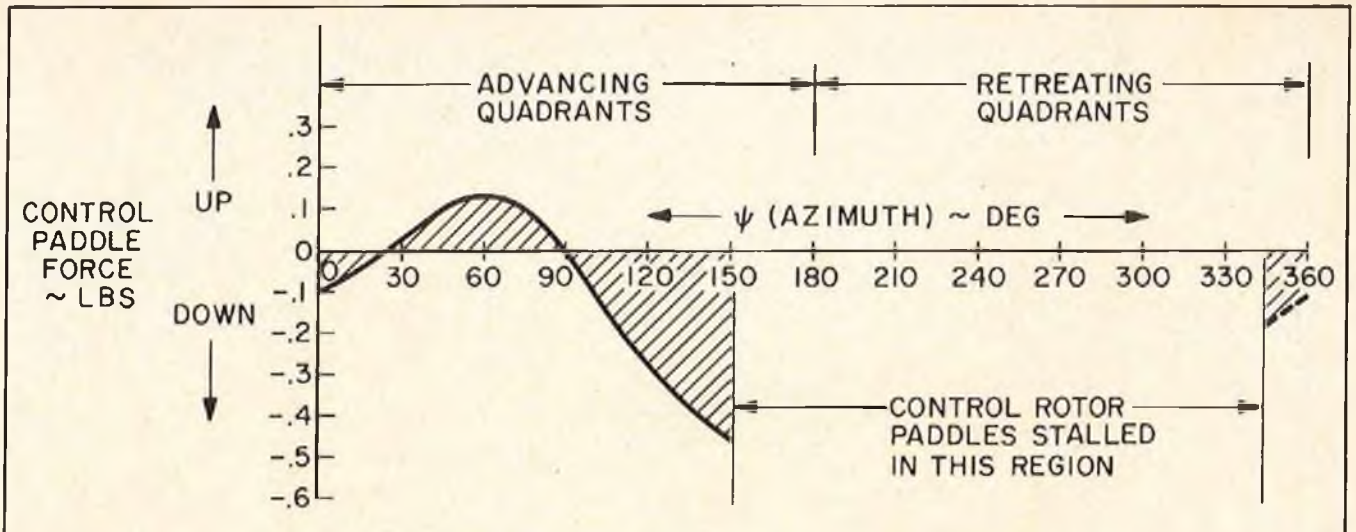


FIGURE 6
CONTROL ROTOR PADDLE FORCE VS AZIMUTH

- KAVAN JET RANGER
- RIGGED PER INSTRUCTIONS
- ROTOR RPM = 920 (STANDARD)
- V = 50 MPH
- FULL AFT AND FULL LEFT CYC

automatically compensating with ever-increasing aft and left inputs. Only after he finally reaches full input travel on the transmitter stick, does he realize he is about to "buy the farm." We can also see why the high speed left turns are not sensitive. The instability is still present, but when the "control reversal" effect takes over, the result is merely an automatic recovery from the left turn.

At this point, it should be noted that the Kavan Jet Ranger was singled out for this analysis only because the phenomenon has been repeatedly experienced with this model. The theory suggests, however, that it will happen to **any** of the current designs, using the control rotor airfoils set to 0° if the model can be flown at high enough speeds. The Kavan Jet Ranger is aerodynamically clean, and is therefore capable of these speeds.

"Okay", you say, "what can be done about it?" Now that we have a better understanding of what is going on, three suggestions come to light:

(1) Provide Positive Speed Stability

You can do this quite easily by re-rigging the control paddles from 0° (per Kavan kit instructions) to about +7° or +8°. Referring to Figure 6, the result is to shift the entire curve upward. It is the most important single modification you can make to deter this "control reversal" effect. Don't be afraid to try it. (The extra drag created by the paddle incidence calculates out to less than 5% of your engine power.) At low speeds, there is no appreciable difference in handling characteristics. However, at high speeds, if the stick is moved forward a moderate increment, the speed will increase a corresponding increment and the model will then tend to **hold that speed** — rather than continue to increase until the stick increment must be taken out. Incidently, to my knowledge, the Hiller helicopters were the only commercially produced full-size

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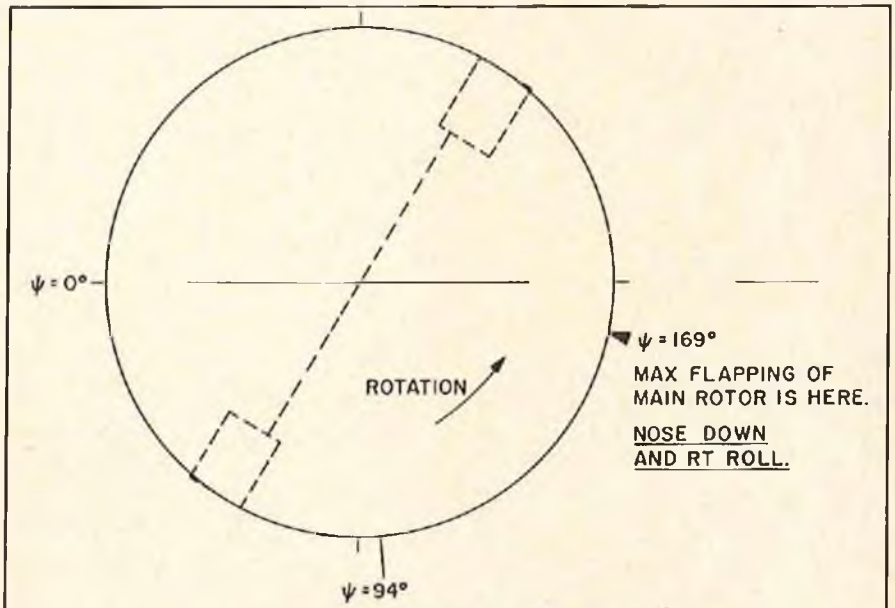


FIGURE 7

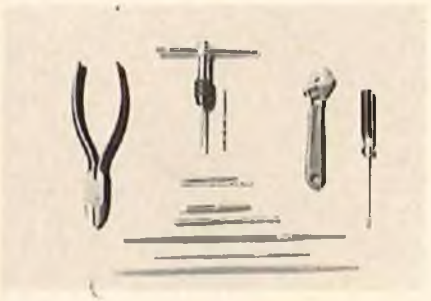
RCM WORKSHOP

By Fred Reese

BASIC TOOLS FOR BUILDING MODEL AIRCRAFT

The tool selection presented here is intended for the person getting started in modeling, however, it is also sufficient for most advanced building projects.

These are the basic hand tools, all of which should be in everyone's tool box. The tools are from left to right: scissors, razor saw (Zona shown), X-Acto No. 1 knife and pack of #11 blades, single edge razor blades, pliers, long nosed pliers, flat file, small and medium screwdrivers.



Some additional hand tools, which I use, that can be purchased as needed. From left to right: Diagonal cutters for metal but not piano wire, tap holder and 4-40 tap and corresponding #41 drill, 6-32 tap and #38 drill, 1/4-20 tap and 3/16" drill for wood (standard nylon wing hold-down bolt size), 8" triangular file, 6" round file, 8" round file, small adjustable wrench, small Phillips screwdriver.

This is a Dremel Moto Tool model 260 and the two most important attachments that make some really tough jobs easy. In the tool is the #407 drum sander which is useful for shaping and hollowing wood. The bag is a pack of #408 coarse grit replacement bands for the drum sander. Above, left, is a #402 mandrel and #409 cutting wheel along with a pack of 36 replacement discs. This is the best

tool for cutting piano wire or other hard steel such as bolts or landing gear wire.

A large sanding block such as this 4" x 9" block, is one of the handiest tools you have and is a must. Use contact cement to bond the #50 or #80 grit garnet or aluminum oxide paper to a piece of pine, balsa or plywood. With the large, coarse sanding block, you will shape and true edges for better glue joints and parts fit. You may also choose to cover the other side of the block with #100 grit paper for finer sanding.

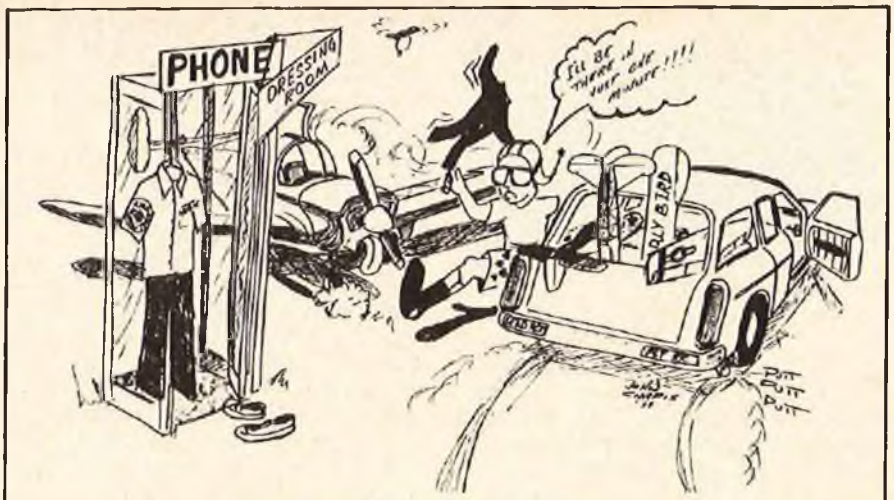
An electric drill with a basic assortment of sharp drill bits is necessary; however, the drill does not have to be expensive. The drill bits most frequently used are: 1/16", 3/32", 1/8", 5/32", 3/16", and 1/4". Additional "in between" sizes are nice, but can be purchased as you feel the need.

A soldering iron is needed for most kits and must be considered a basic tool. I prefer the instant heat, gun type, such as the Weller Model D-550

shown, which comes in a complete kit including extra tips, solder and an excellent book on basic soldering. This heavy duty soldering gun will handle big jobs and yet is small enough for fine work too. If given a choice of two sizes of a tool, I usually choose the larger because it will generally do the work easier and have a greater capacity.

A razor plane is a handy tool for shaping wood that would be a chore if you were using a sanding block alone. Certainly not a necessary tool, but you use it a lot if you have it. The Wilkro Razor Plane shown uses standard double edge razor blades and the depth of cut can be adjusted. X-Acto also makes a small plane, however, it requires a sharpening stone to keep it sharp. I have both types. The X-Acto will make deeper cuts, but the Wilkro will make finer cuts.

This is an iron used to apply iron-on covering material such as Super MonoKote, Econokote, Solarfilm, Coverite, Flite Kote or any of the others. The irons are made by several companies and all seem to work well. A household iron for clothing will do the job, but is very heavy to use. The heat guns are useful for shrinking the sealed film without marking the wood underneath, but you will still need an iron for the edges, and the iron will do it all. □



It was good enough for Superman . . .

ARMCHAIR ACE

BY HOBIE STEELE

Before I start, let's define a couple of terms. *Weekend* is, more-or-less, sometime after noon on Wednesday and can extend, roughly, through Sunday. *Shore* has nothing, necessarily, to do with the beach, but indicates that portion of the Continental U.S.A.'s geography, consisting of the Delmarva Peninsula (Delaware, Maryland, and Virginia's Eastern Shore, get it?) where I live. The Eastern Shore is the land east of the Chesapeake Bay, which is our equivalent of the Bay of California.

Anyhow, I had Friday off and had arranged for a Civil Air Patrol CFI (i.e. instructor) to check me out in an ancient CAP Super Cub. Although it had been ten years or so since I'd flown a full scale taildrager — most recent flying in "spam" cans with milking stool landing gears — it was my intention to show that CFI a thing or two about flying conventional landing geared aircraft. All my models have conventional gears and that should count. Well, I showed him, all right — damn near ground-looped the little bugger — on take-off!

It turned out that what was to be a routine check-out of an hour or so evolved into a 200-mile (plus) round trip up to Hagerstown, Maryland, near the West Virginia and Pennsylvania line. On return we found ourselves somewhat short of operating equipment, including the generator, radios, and some other stuff I'd better not name. But although a safe and pleasant trip, the whole scene was a little like getting to the model flying site, finding they'd moved it, and you'd forgotten your transmitter. Prior planning prevents poor performance, but if the engine runs, launch it and hope. So, like many aeromodeling incidents, we made it back anyway.

I returned home just in time to receive a phone call from Cris Crispin, our local M.A.R.K.S. (Mid Atlantic Radio Kontrol Society) Air Show Team Manager, informing me that instead of two shows this weekend, we had three — one Saturday and two Sunday. Now to top all this activity off, the weekend was further complicated by Suzie's having tickets to a Peter Nero concert Friday night and a production of *Kiss Me Kate* in a neighboring town Saturday night. Mercy! I wasn't that hot on either one, but she's a good cook and Peter Nero appearing in Dorchester County (population 29,400) is about the equivalent of Hanno Prettner showing up at the local flying site of a ten-member club for pattern demonstrations! So I went.

Saturday looked complicated what with living fifteen miles out of "town" (population 12,000), an hour's drive away from the first airshow team date in Delaware which was some distance from the planned theatre for that evening. Since Suzie had chores at our 1½ acre mosquito ranch and dandelion farm, she couldn't make the airshow, but opted to meet me at the theatre that night for our second evening of culture in a row. Now, in order not to have cars spread all around Lower Delaware and Maryland, I hitched a ride to a private airport in Delaware with *Rudder* Magazine's Ed Nabb in his split-tailed dive bomber (Ercoupe), where Leroy Myers' lovely wife Mae picked me up — that is, she drove me to the show team date.

After the show, our Pattern Proficio Cliff Morris drove me to Salisbury, Maryland, where I was to meet Suzie for the theature — by way of Laurel, Delaware, to check out the airport where our third show of the weekend was to take place on Sunday. Glad we stopped in Laurel 'cause I got a chance to ride through a practice session with an aerobatic Luscombe pilot based at the local airport where the M.A.R.K.S. Airshow Team would share the limelight with some full scale barnstormers the next day. The loops and hammerheads were fine, but I must admit I closed my eyes during one snap roll.

Sunday was the M.A.R.K.S. Show Team's two-a-day with two shows scheduled at locations about forty-five minutes apart. Being a little late leaving home, my pickup truck must have seemed a bit bizarre bursting through the Sunday traffic at well over 55 with an "Easy Does It" sticker on the rear bumper!

Our second show was the finale of an afternoon-long airshow which included two full scale aerobatic acts and we arrived to find the airport's PA system inoperative with no announcer for the full-scale airshow. Once again aeromodeling saved the day as the M.A.R.K.S. announcer (me) and public address system pulled the promoter out of a spot, carrying the action not only for their own model airshow, but for the big birds as well. As usual, the M.A.R.K.S. performance pulled more applause than the full-scale barnstormers due to the closer and faster action of the aeromodels.

After the show, M.A.R.K.S. President, Charlie Campbell, made a priceless comment. Some guys were wrestling a 1" to 1" (full) scale Stearman toward a hangar across the runway from where it had been tied down on static display. As they neared the center of the runway, Charlie quipped, "Reckon they're going to try to hand-launch that thing?!"

Heard another story from club member Dan Alvarez, a Delaware physician, who was once Minister of Health in Cuba. The Cuban Air Force was checking him out in a T-6 and Dan heard that the instructor who was going to solo him the next day showed his confidence in students by removing the rear (instructor's) control stick and throwing it out the window *in flight*. Dan made his preparations and when the big moment came, the instructor tapped him on the shoulder and threw his control stick out of the open canopy. Dan nodded, removed *his* stick and threw *it* out! The instructor cringed, turned green, hollered the Spanish equivalent of "Hit the silk!" and bailed out. Dan grinned, pulled out the spare control stick he had hidden aboard before the flight, inserted it and landed the T-6 — passing his instructor's billowy descent on his way in. It's sort of like a new RC'er disconnecting the buddy box and continuing to fly to the master's consternation and chagrin.

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A SIMPLE INEXPENSIVE SUN SHIELD

Idea By Ken Parker
Written By Ferd Chappa

This is an easy project most any RC modeler worth his salt can knock out in a few minutes . . . costs only a dollar or so per unit . . . and will provide sun strained eyes with a lot of relief.

With the exception of the plexiglass, the project is made up of bits and pieces that clutter most work benches anyway.

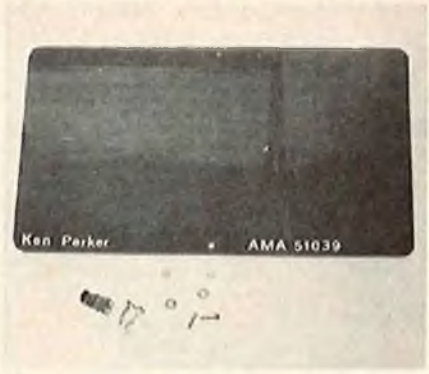
The idea for a sun shield which clips on your transmitter antenna isn't new. This particular one, however, has a couple of distinct advantages. First, you can make the shield any size you want and, second, to make four shields, like the one in the photographs, the cost was a grand total of $3.76.

It doesn't take a series 4700 computer to figure out that that is less than a buck a unit.

The size of the shield pictured is 4½" x 9½". The size was scientifically determined by figuring out how many shields could be cut out of the scrap of plexiglass which was bought without having any waste.

The spring clips which hold the shields to the transmitter antennas came out of Southern RC Mix-A-Matic Epoxy kits. They are perfect for this application and they already have the holes drilled in the center of the clip — holes that will be used to bolt the clip to the plexiglass.

You shouldn't have any trouble locating plexiglass — most cities have an outlet.



The shield is ready to assemble. The components include plexiglass, two spring clips, two bolts, two washers, two nuts. Absolute simplicity.

The spring clips are standard garden variety clips. These were pirated from a jug of epoxy out of a Southern RC Mix-A-Matic kit.

Pick the shade of plexiglass to suit your own requirements. The shade of the one pictured is just about right on a bright day if you also wear your sunglasses.

Due to the fact that, in this neck of the woods, we deal with Florida sun, most fliers down here unconsciously wear sunglasses any time they go out.

The plexiglass for this project was cut with a table saw using a plastic laminate cutting blade. Most hand saws that a typical modeler has on hand will do, however. You could use a coping saw, for example . . . or a Dremel jig saw. If you go this route, however, you will need to sand the edges of the plexiglass.

The steps are very simple and are as follows:

(1) Measure your plexiglass and cut to size.

(2) Round off corners with sandpaper (or disc sander).

(3) Drill holes for clips.

(4) Install bolts and clips (2-56, 3-48, or 4-40 will all fit in the Southern RC spring clip holes).

There is only one thing you have to be careful of. Plexiglass will scratch very easy. Be careful when you work with it and be careful afterwards when you are using it.

If you could talk your wife or girlfriend into sewing you a small bag to carry the shield in, that would be ideal. □

The shield merely clips off and on the transmitter antenna. Total hook-up time is about two seconds.

RCM PRODUCT TEST

Jemco Focke-Wulf 190D-9

IMPRESSIONS	E	G	A	F	P	IMPRESSIONS	E	G	A	F	P
Packaging	●					Pre-Shaped Parts	●				
Plans	●					Parts Match to Plans	●				
Written Instructions	●					Overall Parts Fit	●				
Quality of Hardwood		●				Ease of Assembly		●			
Quality of Fiberglass			NA			Fidelity to Scale		●			
Other Materials		●				Flight Performance	●				
Accessories		●				Overall Appeal	●				
Die-Cutting	●										

E=Excellent / G=Good / A=Average / F=Fair / P=Poor

Jemco of Vista, California, continues to expand its line of sport scale models designed specifically for engines in the .29 to .40 range. The Focke-Wulf 190D-9 is among the most recent of Jim Meister's designs to be kitted. The first impression on opening this kit is very pleasant — our kit was neatly packaged with parts appropriately separated and identified. The wood quality was extremely good, with clean, sharp edges, on sawed and die-cut parts. Easy to read plans and a thorough instruction booklet provide all the necessary information and direction needed by the average modeler.

Fuselage construction is most impressive: Jemco incorporates a full width jig which guarantees an absolutely true fuselage as well as perfect alignment of the engine mounts. The fuselage sides are keyed to the jig by die-cut notches further insuring proper alignment. Other interesting features of this kit include an ABS plastic turtle deck and rudder fairing plus an ABS cowl which attaches internally using only four screws. The model is additionally enhanced by a high quality canopy which is molded as a unit with the two 20mm cannons.

The wing is standard foam core with balsa sheeting but is designed so that either strip or standard ailerons (and flaps) may be installed. The prototype was built with retracts, and supplemental instructions for installation are available from Jemco for an additional $4.00.

If you wish to install retracts — by all means follow the suggestions of the manufacturer who uses Goldberg retracts

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SPECIFICATIONS

Name	Focke-Wulf 190D-9
Aircraft Type	Sport Scale
Manufactured By	Jemco 1305 Foothill Drive Vista, California 92083
Mfg. Suggested Retail Price	$48.50
Available From	Both Mfg. & Retail
Mfg. Recommended Usage	Sport/Stand-Off Scale
Wing Span	50 Inches
Wing Chord	9" (Avg.)
Total Wing Area	450 Square Inches
Fuselage Length	42.5 Inches
Radio Compartment Dimensions	(L) 9" x (W) 4.5" x (H) 3.5"
Wing Location	Low Wing
Airfoil	Semi-Symmetrical
Wing Planform	Double Taper
Dihedral (each tip)	2"
Stabilizer Span	17 Inches
Stabilizer Chord (incl. elev.)	4 Inches
Total Stab Area	68 Square Inches
Stab Airfoil Section	Flat
Stabilizer Location	Top of Fuselage
Vertical Fin Height	6 Inches
Vertical Fin Width (incl. rud.)	6.5" (Avg.)
Mfg. Rec. Engine Range	.29-.40
Mfg. Rec. Fuel Tank Size	6-8 oz.
Landing Gear	Conventional
Recommended No. Of Channels	4-6
Rec. Control Functions	Rud., Elev., Throt., Ail., Flaps, Ret.
Basic Materials Used In Construction:	
Fuselage	Balsa
Wing	Foam & Balsa
Tail Surfaces	Balsa
Hardware Included In Kit	See text
Plan Size	24" x 48" (1 sheet)
Building Instructions on Plan Sheets	Yes
Instruction Manual	Yes (6 pages)
Construction Photos	No
Kit Includes	Die-Cut & Shaped Parts
Mfg. Rec. Flying Weight	64-72 oz.
Wing loading based on rec. flying wt.	21-23 oz./sq. ft.

RCM PROTOTYPE

Weight, Ready To Fly	74 Ounces
Wing Loading	23 oz./sq. ft.
Covering & finishing materials used	K & B resin, glasscloth, Super Poxy
Engine Make & Disp.	Super Tigre .46
Muffler Used	Du-Bro
Radio Used	Kraft
Tank Size Used	8 Oz.

1977 RCM SLOPE SOARING
TROPHY RACES

By Ken Willard

Fred Weaver with winning Jon Lowe design.

Rick Walters and his second placer.

The 1977 RCM Slope Soaring Trophy Races are over. And you can bet on this; the 1978 Trophy Races are going to be the most slam-bang, devil-take-the hindermost, head-to-head confrontations between the hottest slope racing pilots in R/C that you'll ever see!

Why? Well, the odds are that the weather will be better, and some of the fantastically complex racing machines, which showed up this year, will have a better opportunity to display their full potential. Also, there will be some brand new designs, if all the plans I heard about are carried out.

But next year will be another story, so let's talk about this year. Versatility — the ability to fly in very light winds, and penetrate in moderately strong winds, paid handsome dividends. Every one of the top five winners was able to stay up in light air, while the heavier jobs had to struggle, and even lose out and go to the beach. When that happens, if they all go down, then the race is rerun. But if one stays up, he wins, and the others get a DNF (did not finish). And that hurt — particularly since the winds were such that only four rounds could be flown. The rules called for dropping your worst round, if five or more rounds were flown — then a DNF, or a mid-air, could be scratched from the record. But it just wasn't in the cards this year. All four rounds counted, and that eliminated some of the top ships — like Jerry Arana's, and Ken Kilbourne, whose mid-air with Rick Walters threw his plane out of control and down to the beach. And Bob Andris, with a very fast ship, just couldn't quite stay up in one race with light wind.

Oh, you could point to a lot of "What ifs--" that would have changed the whole outcome. But that doesn't change things this year — that's why next year shapes up as a real donnybrook. Every one of the top flyers thinks he could have won — if he'd done something just a bit different. That includes me — one of these days I'm going to learn to ballast my ship properly for each race. And the guys with the eleven pound jobs are going to find a way to carry all their sophisticated gear and be a bit lighter so they can handle light air, which can always happen.

Like on Saturday, April 23rd, the first day of the races. At 9 a.m., one hour before the scheduled start of the races, the wind was five miles an hour — out of the east yet! 180 degrees out of phase. The forecast was for west winds 10-20 mph, which never showed up. Instead, the wind gradually swung around to the north, with just a shade of west, and was virtually a straight shear wind. Out of the first few races, two had to be rerun, and two were won by a single plane struggling to stay airborne and complete the course. The wind never did get good enough for really tough racing — but that's when the versatility of some of the designs proved valuable.

Sunday, at 9 a.m., the wind was a straight shear wind out of the south, and gradually came around to west south west. It was light, but racing could be started, along around eleven a.m. After a few races, and this time with some good winds and tight finishes, the wind really picked up, hitting fifteen to twenty and right out of the west. Only problem was, it brought in a fog bank and the far end of the course went out of sight! So, break for lunch, come back, and between 2 and 4 p.m., flying between fog patches, the fourth round was completed, and the RCM 1977 Trophy Races were history.

The order of finish is shown in this article — but that really is only a part of the story. By far the most interesting phase of this year's event, was the serious thought given by the contestants, to ways in which they could get slightly ahead of the competition. Theories abounded, and each one had some good reasons. Let's look at some of them.

To begin with, consider the winning design, flown to first place by Fred Weaver. The airplane was designed by Jon Lowe, called the Avenger III. It is the third version of the basic design. The wing has an Eppler 387 root section, gradually changing to the Eppler 374 at the tip, and has about a 5 degree sweep of the quarter chord. The V-tail has an included angle of about 120 degrees (which probably will be modified next year), and control is accomplished with elevator, ailerons, and flaps. But there's a little kicker in there. Let Fred tell you.

"I have a button on the transmitter. It is used when I'm not using any flaps at all in a race. I don't have any coupling with the elevators, so I have a button which I press and the flaps go down to a pre-set amount for turning — about ten degrees — so I can roll into the turn, punch the button, pull the elevator, and get a real tight, snappy turn and dump the flap before I dump the elevator coming around and exit the turn cleanly and quickly."

The Avenger weighs seven and one half pounds bare, and that's why it could stay up so well in light air. Most of the time Fred didn't use any ballast at all — just pointed the nose down when the wind came up, turned tight, flew a good course, and won.

But not without a struggle, and some luck. After three rounds, Fred and Rick Walters were tied with three wins each — and then they met for the marbles. For three laps it was anybody's race, then blam! At the far pylon, three planes turning virtually in formation, and Rick and Ken Kilbourne had a mid-air. Ken went down. Rick stayed airborne, but by the time he got his racer back under control, Fred had pulled away and won. We'll never know what might have happened if that mid-air hadn't occurred.

Even so, Rick's second place was a real triumph over adversity. A short time before the races, Rick had a fire in his home that just about wiped him out. With dogged perseverance, he put his airplane back together, finishing it the day before the races. Never had a chance to practice — his first race was a test flight as well as a race!

Rick was using the same control system he developed a couple of years back — left aileron on the left stick, right

Brian Irvine and his third place Calypso.

Ken Willard's SuperDude took fourth.

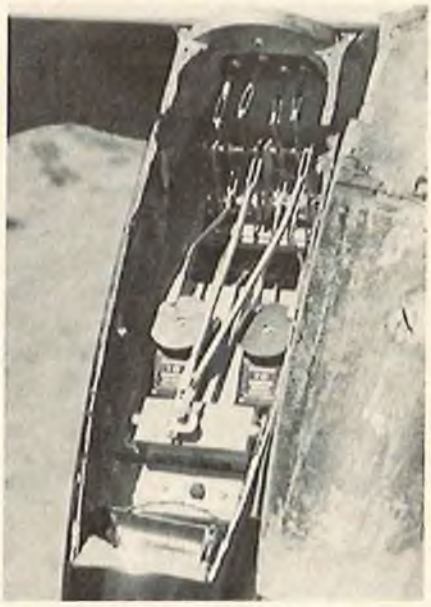
Ken Kilbourne and his design which tied for the best original.

aileron on the right stick, giving him the capability of infinite differential aileron if he wanted it, and both up or down trail if he desired by crossing controls so both ailerons would be either up trail or down trail as needed. He"ll be back next year, and tough!

Third, fourth and fifth places went to some fairly conventional designs. Brian Irvine's Calypso, at 7 pounds, 6 ounces bare, with a 9 percent NACA 63A209 center section airfoil, and 7 percent NACA 2407 tip, was fast but struggled in light air. My SuperDude, at 6 pounds, 2 ounces, with an Eppler 374 section throughout the 8 foot span, could stay up in any breeze at all — and that's what fooled me. I kept over-ballasting, and then had to raise the nose when the wind dropped. Cliff Tanaka's racer just did a good job of "hanging in there." Interesting observation — all but one of the first five placers had V-tails. Maybe that should tell me something?

But it was in the racers that came up from the southland that you could see a lot of unrealized potential. Ken Kilbourne, Jerry Krainock and Warren German collaborated on a design that shows great promise. Unfortunately, Ken had a mid-air, and Jerry cut a pylon, and Warren a DNF. But here's what Ken says about the design:

"The design is a high aspect ratio, constant chord wing. The theory is to operate at a constant Reynolds number to be able to pack heavy weight at low wind speeds. It uses a variable camber



Complex control mechanism of Ken Kilbourne's racer.

Perfect pylon turn by Jerry Krainock (plaid shirt) as pitted by Ken Kilbourne. Note line of sight as established by anemometer pole and flag pole, with racer just barely past the line to make a legal turn.

Blaine Rawdon with unique rotating wing design.

Blain Rawdon's pivoting mechanism for rotating wings.

Rick Pearson with flaperon/ independent flap design.

flap interconnect with ailerons. This means the flap also operates as the aileron but will droop 2 degrees and then also go to 90 degrees dive brakes. Control surfaces are aluminum. Three dif-

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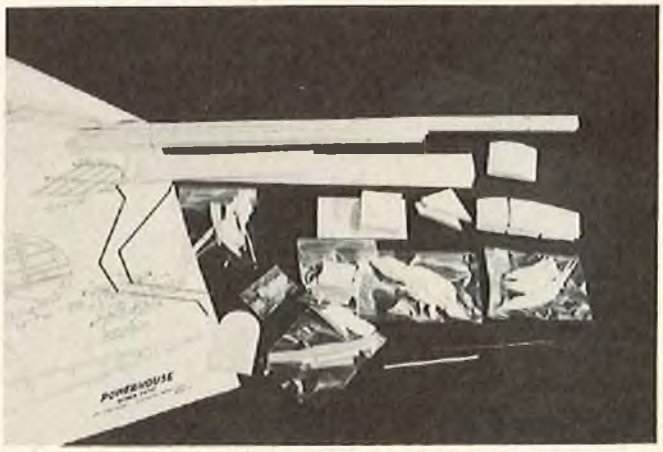
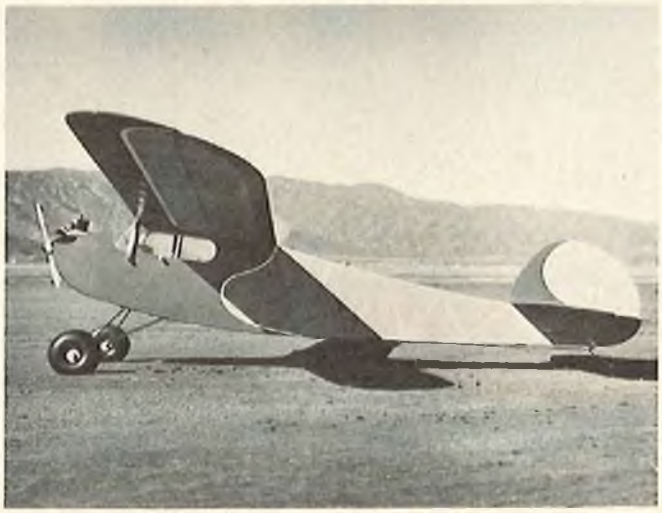
RCM PRODUCT TEST

Cal Aero Models Powerhouse





IMPRESSIONS	E	G	A	F	P	IMPRESSIONS	E	G	A	F	P
Packaging		●				Pre-Shaped Parts	●				
Plans	●					Parts Match to Plans	●				
Written Instructions			●			Overall Parts Fit	●				
Quality of Hardwood	●					Ease of Assembly				●	
Quality of Fiberglass			NA			Fidelity to Scale			NA		
Other Materials	●					Flight Performance	●				
Accessories			●			Overall Appeal		●			
Die-Cutting			NA								

E=Excellent / G=Good / A=Average / F=Fair / P=Poor

The Powerhouse is produced by Cal Aero Model of Huntington Beach, California.

The hardware included in the kit are nylon hinges and landing gear straps, formed landing gear, and sheet metal screws for the landing gear straps. All parts are shaped and none are die-cut, and detailed drawings are included.

An O.S. Max .15 was used for power while a 2 ounce Sullivan round tank was used, rather than the recommended 2 ounce Sullivan slant tank. Our prototype was finished with Silron, Aerogloss dope, and trimmed with DJ's Multi-Stripe.

With regard to the kit, conventional old-timer type construction tends to be more difficult to construct than the typical slab sided modern sport R/C aircraft. The fuselage is very narrow making it difficult to mount the radio gear and tank. However, the plans are of excellent quality as are the materials used throughout the kit. The pre-shaped parts are very neat and accurate, matching the plans exactly. From a construction standpoint, this is not a beginners model, but one that is sure to please the old-timer enthusiast.

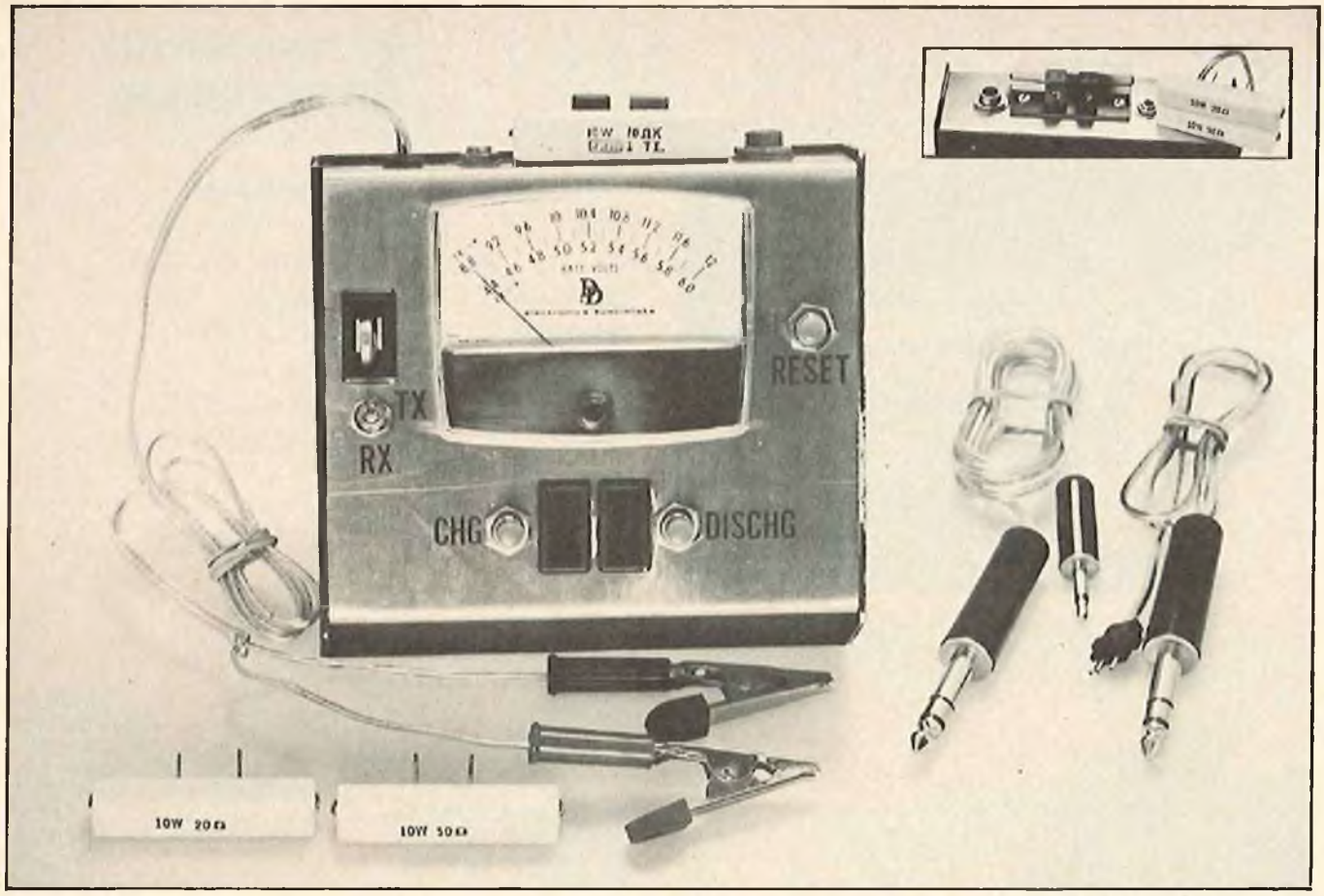
However, when you get to the flight characteristics, this is an excellent trainer type aircraft, with an exceptional glide, that you have to see to believe. As an all-around sport flier, trainer, or for competition in old-timer contests, it has to be rated as excellent with no bad characteristics whatsoever. An exceptionally good buy at the retail price of $31.50. □

SPECIFICATIONS

Name ..... Powerhouse
Aircraft Type ..... Sport/Old Timer
Manufactured By ..... Cal Aero Models
7142 Bluesails Ave.
Huntington Beach, California 92647
Mfg. Suggested Retail Price $31.50
Available From ..... Retail Outlets
Mfg. Recommended Usage ..... General Sport
Wing Span ..... 50 Inches
Wing Chord ..... 8.25 Inches
Total Wing Area ..... 394 Square Inches
Fuselage Length ..... 35 Inches
Radio Compartment Dimensions ..... (L) 10" x (W) 2" x (H) 5-3/16"
Wing Location ..... High Wing
Airfoil ..... Flat Bottom
Wing Planform ..... Constant Chord
Dihedral ..... 3½ Inches
Stabilizer Span ..... 18.5 Inches
Stabilizer Chord (incl. elev.) ..... 7⅞ Inches
Total Stab Area ..... 115 Square Inches
Stab Airfoil Section ..... Flat Bottom
Stabilizer Location ..... Top of Fuselage
Vertical Fin Height ..... 4.0 Inches
Vertical Fin Width (incl. rud.) ..... 7⅞ Inches
Mfg. Rec. Engine Range ..... .09-.15
Mfg. Rec. Fuel Tank Size ..... 2 Ounce
Landing Gear ..... Conventional
Recommended No. Of Channels 3
Recommended Control Functions ..... Rud., Elev., Throt.
Basic Materials Used In Construction:
Fuselage ..... Balsa, Ply & Spruce
Wing ..... Balsa & Ply
Tail Surfaces ..... Balsa & Spruce
Hardware Included In Kit ..... See Text
Plan Size ..... 45" x 35" (1 sheet)
Building Instructions on Plan Sheets ..... Yes
Instruction Manual ..... Yes (5 pages)
Construction Photos ..... No
Kit Includes ..... Shaped Parts
Mfg. Rec. Flying Weight ..... Not Given
Wing loading based on rec. flying wt. ..... Not Given

RCM PROTOTYPE

Weight, Ready To Fly ..... 38 Ounces
Wing Loading ..... 13.9 oz./sq. ft.
Covering & finishing materials used ..... See Text
Engine Make & Disp. ..... O.S. Max .15
Muffler Used ..... No
Radio Used ..... RS
Tank Size Used ..... 2 Ozs.



UPDATING THE

BY DOUG SPRENG

RCM BATTERY MANAGEMENT SYSTEM

Now you can test and field charge 100, 250, 500 MAH airborne nicad packs, as well as test 500 MAH transmitter packs! As you know, if you have read the February '77 issue of RCM, the Battery Management System is a useful tool for getting to know your receiver batteries. It will tell you when it is unsafe to fly, then recharge your batteries. By plotting a discharge curve, you may precisely determine the actual capacity of the pack in Milliampere Hours (MAH). By plotting a discharge curve monthly, any degradation of capacity due to shorted or high resistance cells is detected in time to prevent a crash. When a battery is cycled in this manner, memory formation is prevented.

The original unit was designed to test and charge 500 MAH receiver packs. This article describes how to modify the system to test and charge 100 MAH and 250 MAH receiver packs as well as 500 MAH packs, plus test 500 MAH transmitter batteries. It will not *charge* transmitter batteries, but since a healthy transmitter battery will last for eighteen or more 10-minute flights, I don't feel it's worth the added complexity and cost to have this feature. It will, however, determine the state of health of the transmitter pack.

How To Use It

The push-in terminal strip on the back of the unit is meant to hold one of the three different resistors; 10Ω, 20Ω or 50Ω. The 10Ω charges and discharges 500 MAH receiver packs. The 20Ω does the same for 250 MAH receiver packs and is used to test or discharge transmitter packs. The 50Ω resistor is used for 100 MAH receiver packs. The reason for the three different resistors is that it is desirable to take a voltage reading or continually discharge a pack at its "1C" rate. That is, a 500 MAH 5V (4.8V nom.) pack should be measured and discharged at 500 MA. Likewise, a 250 MAH (or 225 MAH) pack should be discharged at 250 MA and a 100 MAH pack obviously should be discharged at a 100 MA rate. The small toggle switch on the left side of the panel switches the meter and battery inputs from receiver to transmitter packs. The switch and input jack wiring is such that the meter can not accidently read transmitter voltage when the switch is in the receiver position. The meter will read right or not at all.

500 MAH Packs

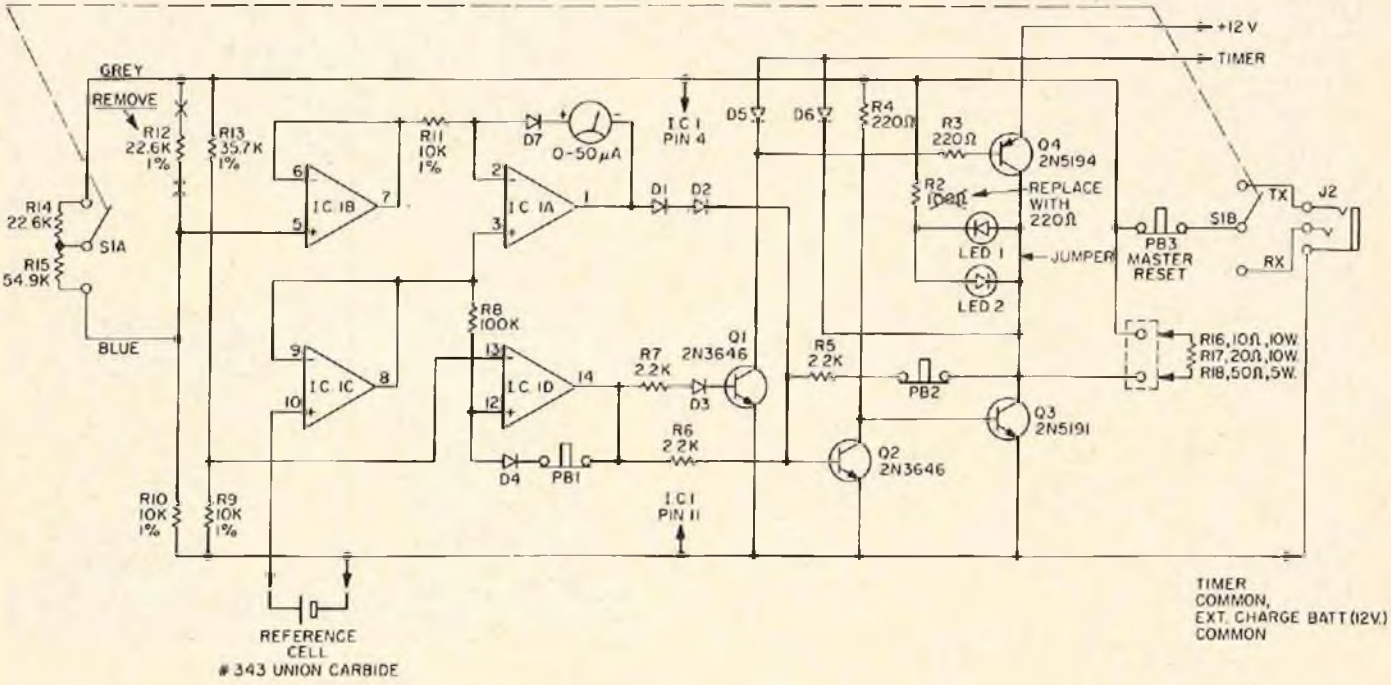
Insert the 10Ω resistor in the terminal block. Start with a pack that has been fully charged according to the manufacturer's instructions. After several flights, plug the B.M.S. (Battery Management System) into the charge jack mounted on the fuselage, throw the switch to the "Rx" position (down) and push the discharge button. The discharge L.E.D. will come on and the meter will read the battery voltage under a 500 MA load. Note this voltage, then immediately press the "Reset" button. The meter will now indicate the battery voltage under a 25 MA load. The difference in these readings is a good indication of the internal impedance (resistance) of the battery. It should vary about 0.2V (2 divisions) between the "1C" (500 MA for a 500 MAH pack) and the 25 MA loads. Now, if you have made a voltage vs. time graph (February '77 RCM, page 38), you will know how many minutes flying time you have left before the battery is at low cut-off under a 500 MA load. Obviously, the receiver and servos don't draw 500 MA continuously, but this will give a safety margin. If the battery voltage is too low, you may push the "charge" button and, if you have your B.M.S. connected to a 12V source such as a

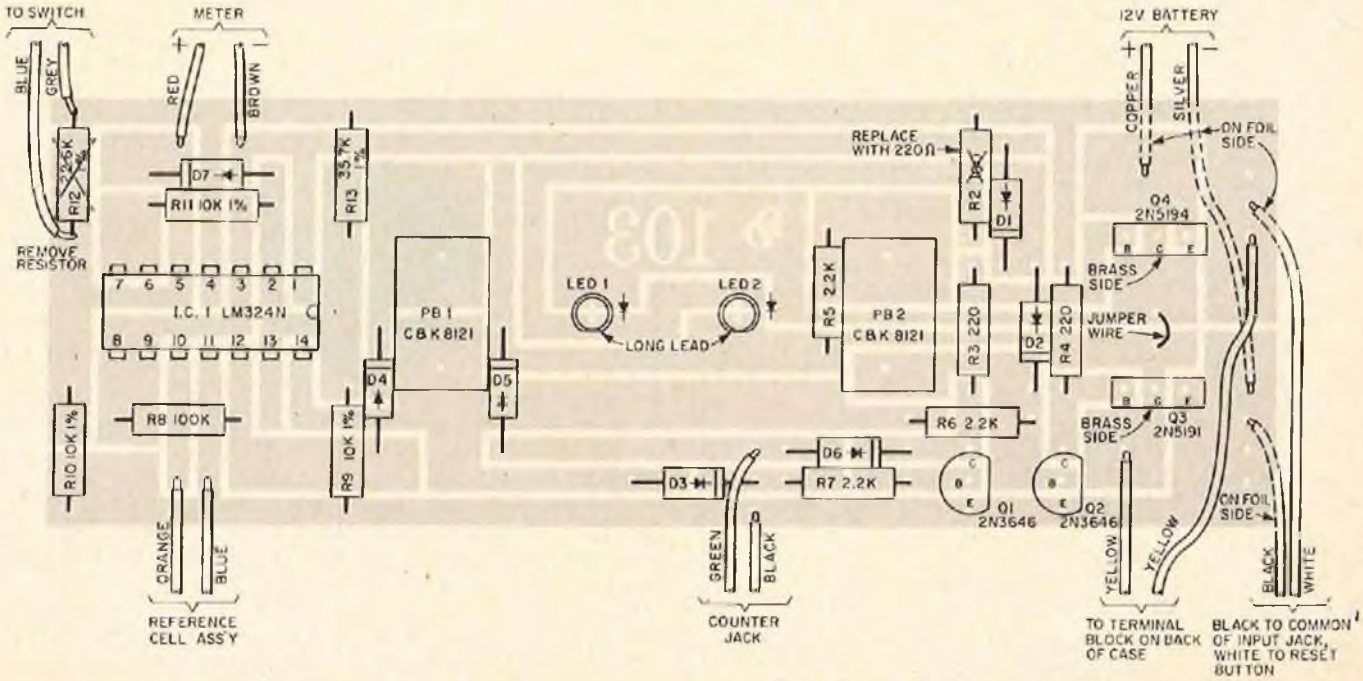
METER FACE

Battery Management System Update Parts List

Quan.	Ref.	Description	Radio Shack Part #
(1)	R14	22.6K 1% 1/8W resistor (2262)	—
(1)	R15	54.9K 1% 1/8W resistor (5492)	—
(1)	R2	220Ω 10% 1/4W res., red, red, brown	271-1300
(1)	R16	10Ω 10% 10W resistor as marked	271-132
(1)	R17	20Ω 10% 10W resistor as marked	—
(1)	R18	50Ω 10% 10W resistor as marked	271-133
(1)	S1ab	DPDT Subminiature Switch	275-814
(1)	J1	Spring Loaded Terminal Block	—
(2)	P1	3 cond. plug	274-139
(1)		Charge plug to mate with Tx.	—
	Misc.		
		Spkr. wire, hookup wire	—

EXPANDED SCALE VOLTMETER/CHARGER/DISCHARGER SCHEMATIC





EXPANDED SCALE VOLTMETER/CHARGER/DISCHARGER COMPONENT OVERLAY

motorcycle battery, the airborne pack will start charging at about a 630 MA rate. This is indicated by the charge L.E.D. coming on and the meter indicating a voltage above about 5.4V. A ten minute charge will put back about twenty minutes worth of flying time. You can let the charger terminate automatically, except on very hot days (see February '77 RCM, page 38).

100 & 250 MAH Packs

The modification described herein allows smaller packs to be tested. To check a 250 MAH pack, plug the 20Ω resistor into the terminal block. For 100 MAH packs, use the 50Ω resistor. The charge rate will be about 315 MA with 20Ω, and 125 MA with the 50Ω resistor. This means that you will have to charge longer to get the equivalent flight time.

Checking Transmitters

Practically all transmitters have 9.6V 500 MAH battery packs. There are some exceptions though, so consult your instruction manual to be sure. Although the transmitter voltage may be tested at the field, the normal use of the B.M.S. with the transmitter pack would be to run a voltage-time curve to test for battery capacity. Periodic capacity tests will give warning of failing cells. Since there are twice as many cells in the Tx pack, the chances of a cell failing are higher.

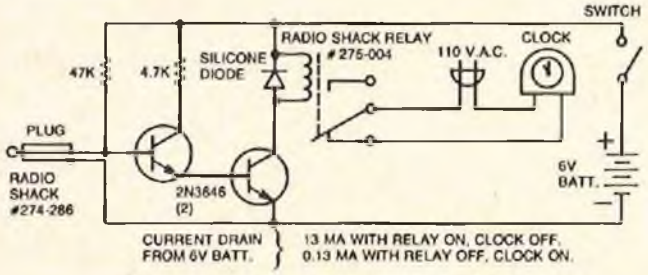
Errata

The original article in the February '77 RCM, erroneously stated that the capacity was determined by dividing the average current by the time in hours taken to discharge to 4.4V; *WRONG! MULTIPLY* the current (.5A.) times the time in hours, for instance:

0.5 (A.) x 1 (HR.) = .5AH (500 MAH)

Timing

The following circuit may be built to interface a clock with the output jack on the back of the B.M.S.



The clock runs only while discharge L.E.D. is on. **CAUTION!** Extreme care should be exercised when dealing with 110 V.A.C. circuits.

Assembly Steps

Step 1.

Remove reference cell from holder. Unsolder the red and brown wires from the meter; the yellow wires from the 10Ω resistor; the green and black wires from the output jack; the orange and violet wires from the board. Unsolder 12V battery leads and receiver battery leads from board.

Step 2.

Remove meter from case. Remove board assembly from case by unbolting the charge — discharge buttons from case. Remove the 10Ω resistor from back of case.

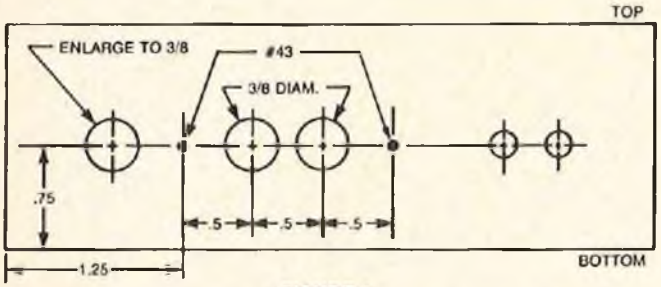


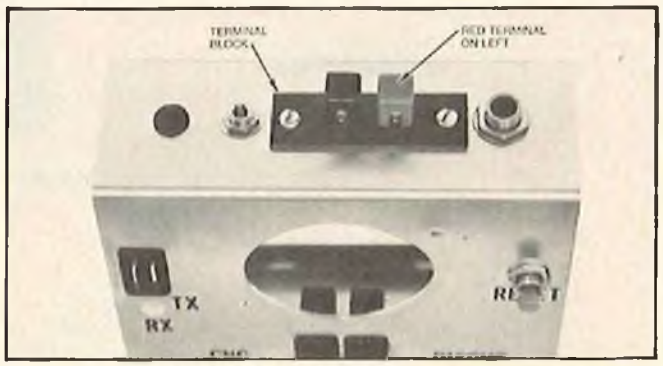
FIGURE 1
HOLE LAYOUT AND SIZE
(CASE VIEWED FROM BACK)

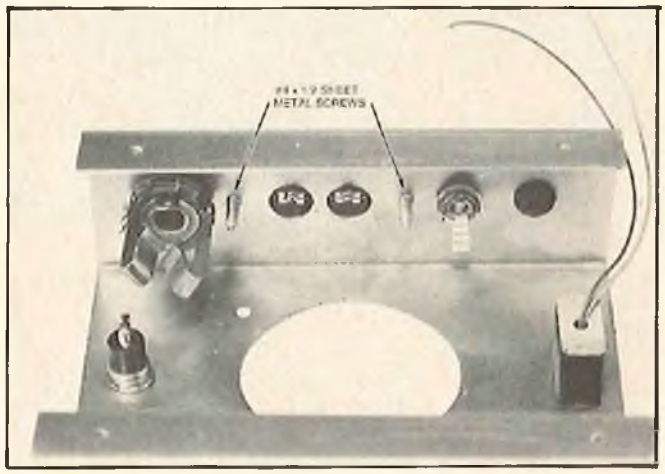
Step 3.

Drill a 1/4 diameter hole in line with and 3/16" below reference cell holder. Drill out back panel according to Figure 1. Do not attempt to drill 3/8" holes with a 3/8 drill. Use a 3/16" to 1/4" drill and use a hand reamer to bring them to size. De-burr all holes.

Step 4.

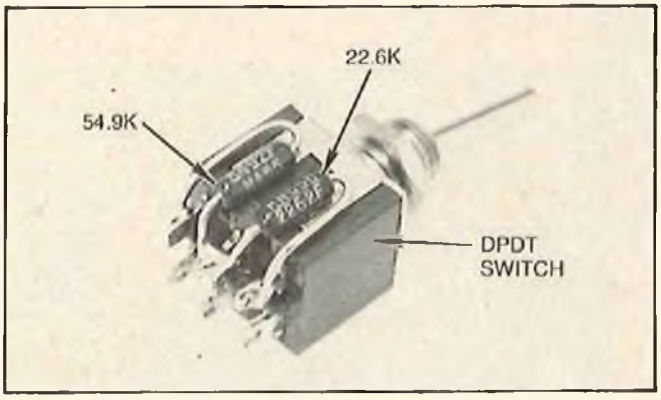
Mount the terminal block to case using #4 x 1/2" sheet metal screws. Red terminal goes to left. Mount the 3 conductor jack with the solder lugs facing down.





Step 5.

Solder the 22.6K and 54.9K precision resistors to the DPDT switch as shown.



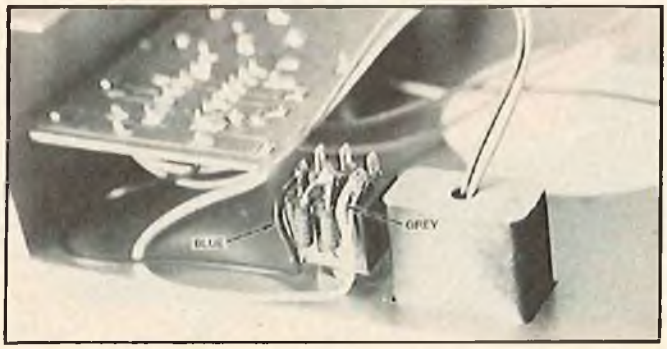
Step 6.

Remove R2 (100Ω, brown, black, brown) from board and replace with a 220Ω (red, red, brown). See overlay. Remove R12 (22.6K precision resistor) and solder 3" blue and grey wires in appropriate holes. See overlay.

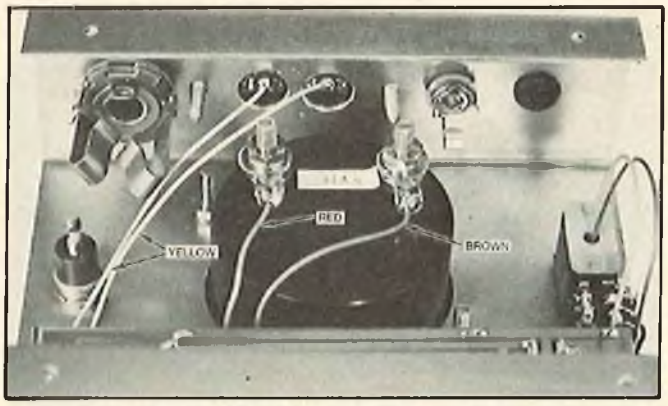
Step 7.

Replace orange and violet wires from reference cell holder in board and re-mount board. Be careful not to place any undue strain on the L.E.D.'s, as they are fragile.

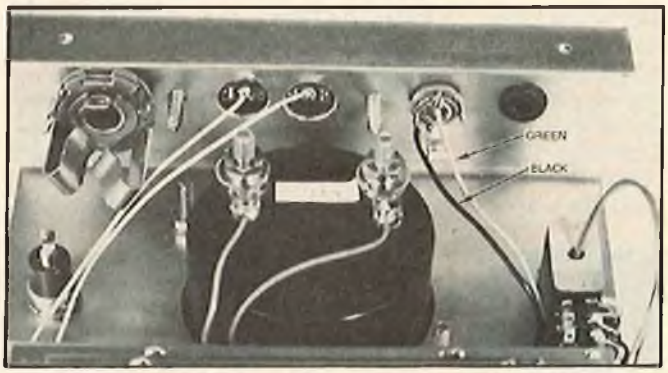
Step 8.
Mount switch as shown. Solder blue and grey wires to switch as shown.



Step 9.
Re-install meter. Solder red and brown wires back on meter. Solder yellow wires to terminal block on back of case. Either wire may go on either terminal.



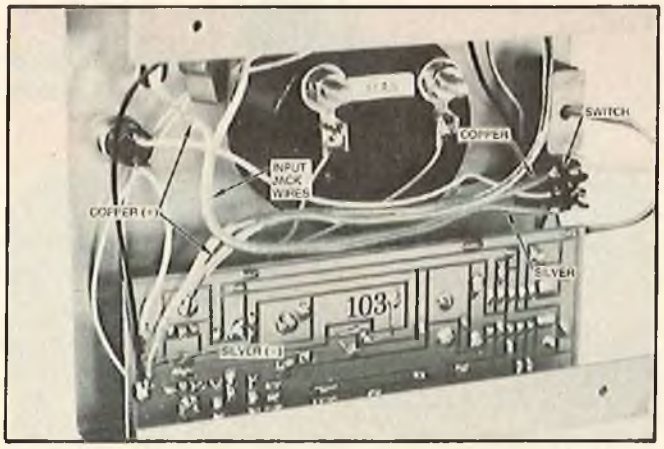
Step 10.
Solder green and black wires back onto small output jack. There was a mistake in the original article! Solder the black wire where it originally went. Solder the green wire on the middle terminal instead of the right hand terminal.



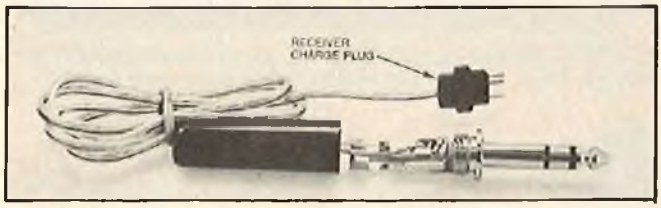
If you prefer, a complete kit of parts may be obtained by sending $12.45 ($10.95 plus $1.50 postage and handling; postal money orders or bank drafts save time) to D & D Electronics Specialists, Dept. 105, P.O. Box 2102, 163 Oppossum Drive, Lake Havasu City, Arizona 86403; phone (602) 855-3526.

Complete service is available from: Chuck Moses R/C Electronics, 2817 E. Lincoln, Anaheim, California 92806; phone (714) 630-5061.

Step 11.
Install wires from input jack to switches and board as shown. Re-install 12V battery wires as shown.



Step 12.
Solder the leads from the Rx charge plug to one of the 3 conductor plugs as shown.



Step 13.
Solder the leads from the Tx charge plug to the other 3 conductor plugs as shown. Make sure of the polarity! The negative lead (usually silver) goes to the shell of the plug. The positive goes to the tip for Rx and ring for Tx. Use a voltmeter to identify the positive and negative wires!

Step 14.
Carefully pry up the outside cover of the meter to remove it. Remove the meter face by unscrewing the two Phillips head screws and sliding it out toward the back. Peel off the old scale and stick on the new one. The index crosses should correspond with the top left and right corners of the scale plate. Trim off excess with X-Acto knife and re-mount the scale.

Step 15.
Install bottom on case, plug in reference cell and unit is now ready for use. □

A PT-19 leads the way to Horn's Point on Maryland's Eastern Shore for the Annual Potomac Aero Squadron Fly-In.

Never heard of Horn's Point or Silver Hill? Read on for a close look at some outstanding (full) scale airplanes in off-beat settings.

Fleet Biplane is a symphony of struts, wires, and fabric. No starter, even on this big radial, just "prop and hope".

Waco bipe with some outstanding company on the flight line at Horn's Point.

Ohio has the Air Force Museum, Wisconsin is the home of the EAA Museum, Texas is homebase for the Confederate Air Force and there are dozens of other exciting collections of aircraft throughout the U.S., but Maryland has Horn's Point and Silver Hill.

Never heard of Horn's Point or Silver Hill? Keep reading.

Horn's Point is a private airport built on the former estate of Francis duPont (of dynamite and nylon fame), near Cambridge on Maryland's Eastern Shore. It now belongs to the University of Maryland and through the Dorchester (County) Heritage Museum, Horn's Point hosts the annual Potomac Aero Squadron Fly-In each May which offers scale modelers an opportunity to see, photograph, measure, and occasionally even fly in aircraft ranging from Aeronca C-3's and Tiger Moths through Ryan Military Trainers and Rearwin Speedsters to PT-19's, Staggerwing Beeches, Stinsons, Stearmans, Howards, a sprinkling of home-builts: VP-1's, Breezys, Skybolts, Pitts, and more. It's unreal!

For this scale modeler, it was disasterous. Harold Ruark and I planned to spend the entire weekend getting ideas for models and arranging for use of the waterfront, turf-covered airstrip for a modelport for our club, the Mid Atlantic Radio Kontrol Society (MARKS). Well, we got some ideas for models and acquired permission for the MARKS to fly there, but I got a near terminal case of airplane fever. This is the kind of thing that sends you promptly to the doctor — for a flight physical after ten years abstinence from full scale aviation activity. Unfortunately I passed the physical and resumed full-scale flying with a vigor I had neither the time nor the money to support.

Across the Chesapeake Bay is the Smithsonian Institute's Silver Hill, Maryland, support facility for the National Air and Space Museum. Here in the main building is an outstanding collection of original (unrestored) vintage aircraft.

Later on, I found my way to the nearby Salisbury, Maryland, Chapter of EAA, (I should have been looking for a chapter of AA: Aeronautics Anonymous!) and learned that many aeromodelers are also full-scale pilots who carry their aeromodeling skills to the garage for construction of "big" airplanes like long time RC'er, Paul Ennis' Flybaby and my plans to (someday) construct a Volmer VJ-22 homebuilt (custom built?) two-place amphibian.

Our EAA Chapter is an active one and a group bus trip to Silver Hill, Maryland, brings us to another scale-modeler's paradise just outside Washington, D.C.

Silver Hill, Maryland, is the home of the support facility for the Smithsonian Institute's National Aeronautic and

MARYLAND SCALE MODELERS PARADISE

by Hoble Steele

Judge Bill West said this Aeronca C-3 won Best-Of-Era at the Horn's Point, Maryland, Fly-In because it was the plane which first carried airmail into Dorchester County.

This highly polished Ryan is an example of exceptional workmanship and a beautiful flyer.

The venerable J-3 Cub still brings a lump to the throat of those whose first taste or glimpse of flying was well before jets had been developed.

This home (custom) built Volksplane VP-1 was constructed by a woman – outstanding workmanship – almost as good as World Champion model of VP-1.

Space Museum. Within its 28 acres, are 25 buildings, which house 156 of the 265 aircraft the museum owns. The Museum displays 65 aircraft in Washington and 44 aircraft are on loan to other institutes.

Silver Hill employs 28 craftsmen who restore about 4 aircraft per year, typically spending 3,000 to 5,000 man hours per aircraft restoration. Each aircraft will endure 20 to 25 years in restored condition before re-restoration is necessary. Their functions are sixfold: restoration, preservation, storage, parts control, periodic maintenance, and artifact installation.

The Air and Space Museum actually began in 1948 in Illinois, but during the

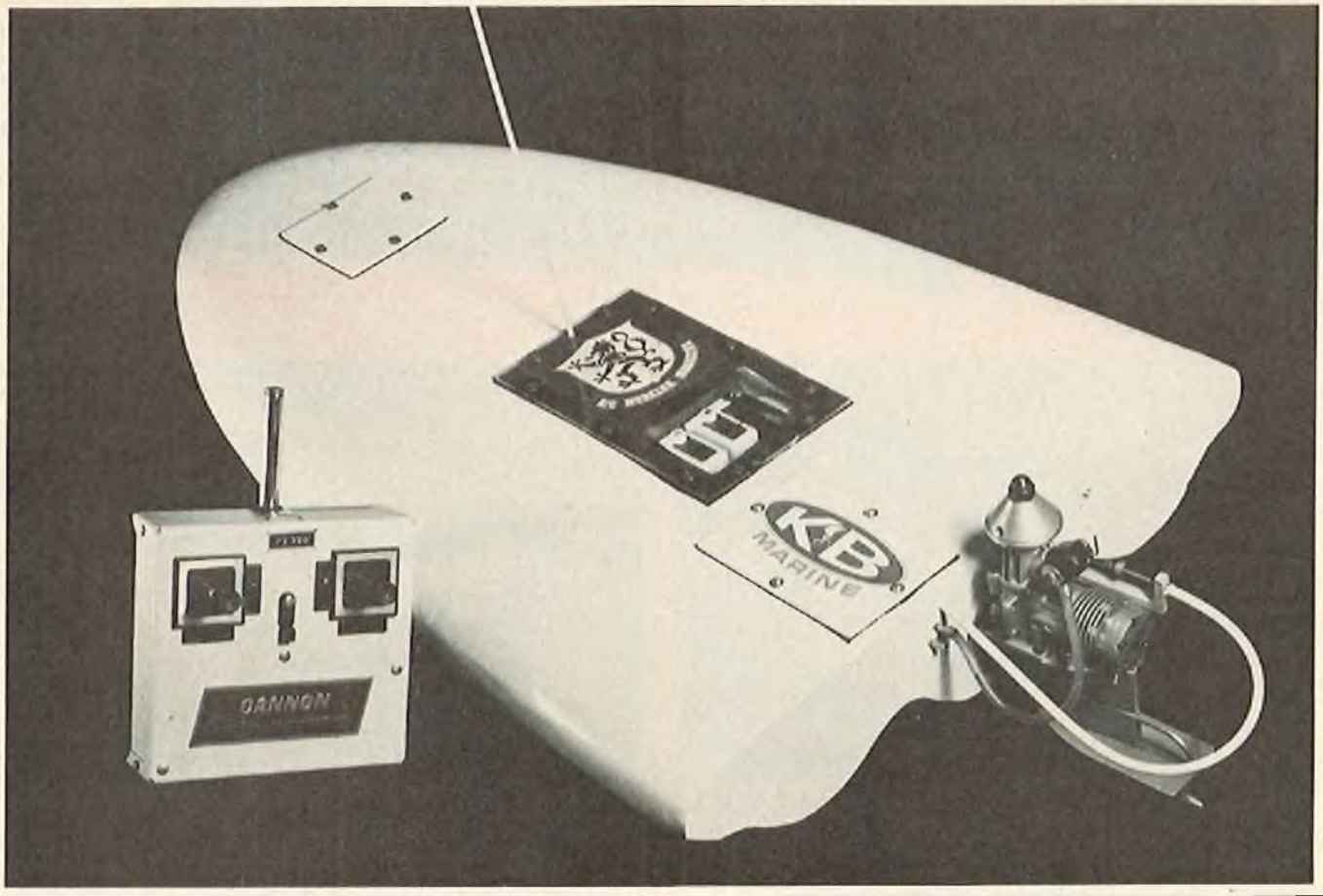
Staggerwing Beech, with top wing set aft of bottom wing, is a beautiful scale subject.

Korean conflict many planes were reactivated, cannabalized, or simply bulldozed aside during the war effort.

Until 1974, most aircraft were stored outside, deteriorating in the elements until Congress appropriated the money to provide the 25 buildings now housing the Silver Hill facilities.

We were permitted inside only 3 of the 28 buildings, but what we saw was truly remarkable as the photographs indicate. Most aircraft are in original condition and a joy to behold.

Maryland, the Free State, has a world of outstanding scale model subjects, free for the lookin' - - - some would say it's a scale modeler's paradise. □



CANNONITIS

Cannonitis is an outboard powered foam boat, made from one half of a child's paddle board. The design for this boat was actually conceived three years ago, but at the time there were no outboards of sufficient displacement available.

Bill Cannon, President of Cannon Electronics, and I were discussing model boating on the phone early last year when I casually mentioned my almost forgotten idea of a paddle board outboard conversion. Bill thought it was a good idea and suggested that I should give it a try. Bill's gentle nudge, and the fact that I am really sold on his fine radios, prompted me to name the boat "Cannonitis!"

Cannonitis is so simple to build, that almost anyone from eight to eighty can assemble a competitive boat. The cost of this boat is a drop in the bucket when compared to a conventional plywood or fiberglass inboard. The generous area of the hull will accept paint jobs from mild to wild, and anything in-between.

Cannonitis is also a dream to handle on the water. It is a very forgiving craft, and even a novice will quickly feel at ease, especially if he starts at half throttle. It will perform "S" Turns and Figure Eights effortlessly, and an obstacle course is a piece of cake for this boat.

If you are only into model airplanes, you might consider introducing members of your family to radio control with this boat. It makes a nice first R/C model construction project. It also makes a fine trainer for rudder and throttle controls, and can teach orientation without the danger of crashing.

Cannonitis was first shown in the Cannon Electronics booth at the WRAM show in White Plains, New York this past February. Judging from the response of those who examined it, I now feel that the outboard class is like a sleeping giant, and the combination of the K & B outboard and Cannonitis might just give that giant a bad case of insomnia!

For the technically minded, this boat offers positive flotation and vibration dampening, due to its foam construction. The hull is an inverted airfoil which keeps it on the water in spite of its light weight. The finished weight of this boat is a shade over three pounds. The center pod is 3/8" lower than the outer two pods and, when at speed, only the rear portion of the center pod touches the water. There is a ballast hatch on the nose of the boat and it is a simple matter to adjust the balance for the prevailing water surface conditions on any given day.

Modelers have become accustomed to K & B engines being ahead of the times, but they deserve a special award for this engine. The K & B 3.5cc outboard is a remarkable engineering achievement, and a classic in its own time. This engine will surely be prized by future engine collectors. John Brodbeck, President of K & B, has provided the modelling fraternity with what I consider to be one of the most significant advancements in model power since the Ray Arden Glow-plug.

Before plunging into the construction stages, I would like to mention a few objectives you will be trying to meet when your boat is finished. Keeping these in mind, it will be easier for you to understand why you are performing certain operations.

The ideal attitude for this boat when running at speed, will require the deck to be parallel to the water surface. The thrust line of the propellor should also be parallel to the deck and water surface.

These parallels will assure maximum forward thrust. To obtain these parallels, the transom must be squared to the deck. There is a ballast compartment in the nose of the boat to allow trim changes to help you achieve the parallels, but the transom being squared to the deck will be a primary consideration while building your boat.

Try to get a smooth joint between the plywood transom and the foam hull. This joint being smooth will assure you maximum speed.

The radio hatch should be carefully fitted and sealed to prevent water damage to your radio equipment. I usually leave a small lip for the plywood hatch to rest on and provide a good water-tight epoxy seal.

The transom-to-hull joint can be substantially strengthened by using dowels. Drill three holes in the transom and insert the dowels with epoxy. This is optional and should be done after the engine and fuel tank have been positioned.

Your steering servo will take a beating when starting the engine with an electric starter, if you forget to block the engine. The starter will spin the flywheel in a clockwise motion, and it will jerk the engine to the left. It happened to me, and thanks to the Cannon servo construction, I didn't loose any servo gear teeth, but I wouldn't want to make a habit of it.

Construction

The first item you will have to obtain is a paddle board. These boards are manufactured by the General Foam Plastic Corporation, 3321 East Princess Anne Rd., Norfolk, Virginia 23502. General Foam calls this particular board the "Surf-Rider" Model G-1221. These boards can be found in the Spring and Summer in several chain stores, such as K-Mart, or Penneys.

To begin construction it will be necessary to cut the board in half. This will provide you with two hulls. Measure your board from tip to tip and, using a felt tip pen, mark the center. Draw a line at the mark across the width of the board. Try to make this line as straight as possible, and it will save you a lot of sanding later.

Cut the board in half. I find that a hand-held hacksaw blade works fine, or a hot wire. You can easily check to see how straight your cut was by laying one hull on the other. If the rear of the hulls match, the cut was true. If the two hulls do not match, no sweat. The next operation will get you back in order.

Measure across the rear of the hull and mark the center. Eyeball from your center transom mark to the forward tip of the hull. This line will be your main point of reference for all future measurements, so mark it with your felt pen.

To true the transom, it will be necessary to build a sanding board. Butt two pieces of medium sandpaper together on a flat surface. I use spray-type contact cement on a piece of plywood, but you can also use thumb tacks. Using a square or draftman's triangle, check the angle between the reference line and the rear of the hull. If the angle is off, sand the hull from side to side until square.

After the rear of the hull has been squared from side to side, check the angle of the rear, vertically, to the deck. Sand back and forth until square.

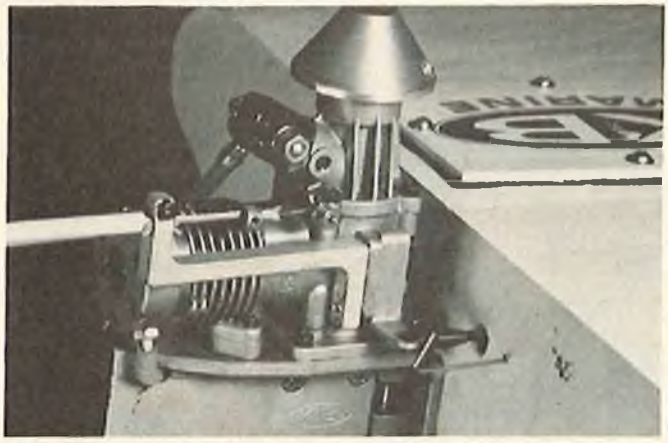
Now make your transom. Trace around the end of the hull on a piece of 3/16" plywood. Cut out your transom. I use an electric jigsaw, with a coping saw blade.

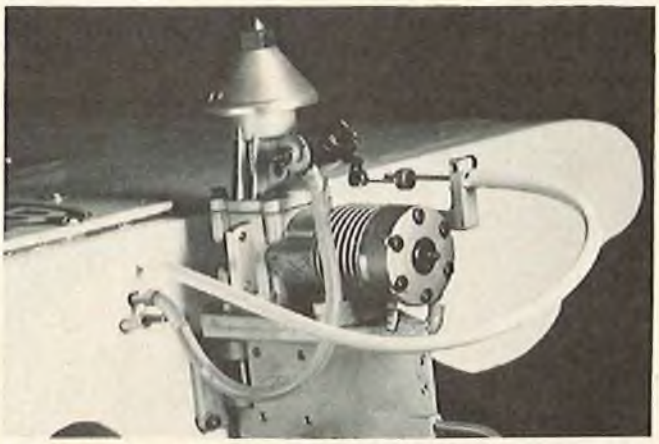
For maximum bond of the transom to the foam hull, it helps if you rough up the mating surfaces. You can use an electric drill, a grinder, file, or your teeth, but the roughness will provide many facets for the epoxy to cling to. Smooth surfaces may let go under stress.

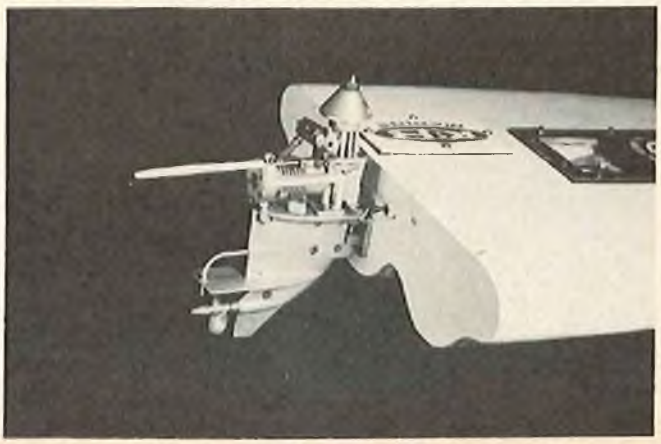
Epoxy the transom to the hull. Use regular epoxy for this step. It may take longer to set up, but it seems to provide a better bond than 5-minute epoxy. Don't try to rush this step, as the transom joint

If you've been intrigued by the 3.5cc K & B outboard engine, the Cannonitis is the project for you. This boat, cut from a foam paddle board, can be built in a weekend, serves as an excellent trainer, yet can virtually out-perform anything in the Outboard Class in speed and maneuverability.

By Dan Vincent

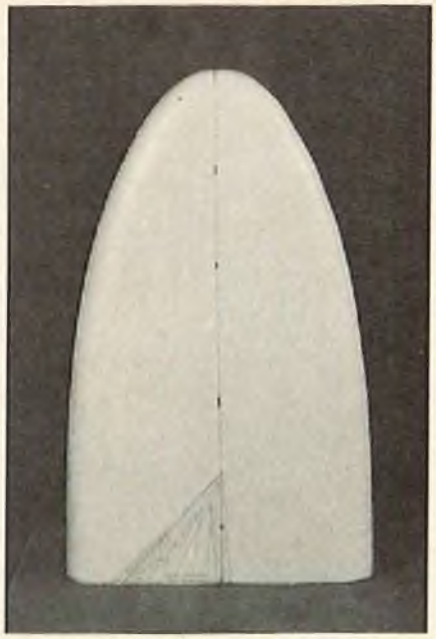




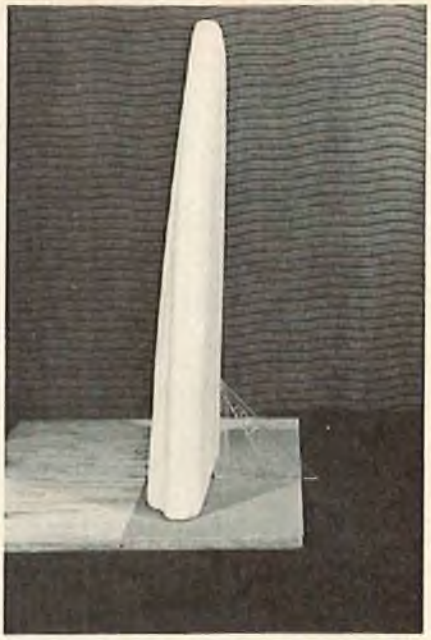


ABOVE: The K & B 3.5cc outboard marine engine mounted to the plywood transom of the Cannonitis. Factory mounted "spinner" makes starting a breeze. ABOVE, RIGHT: Another view of the engine mount showing throttle linkage and fuel lines. RIGHT: Backing the camera up a bit, you can see the overall engine mounting arrangement is simplicity itself.

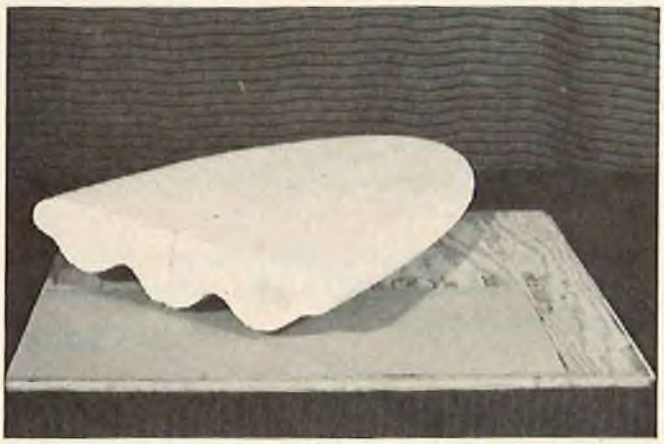
Surf Rider label.



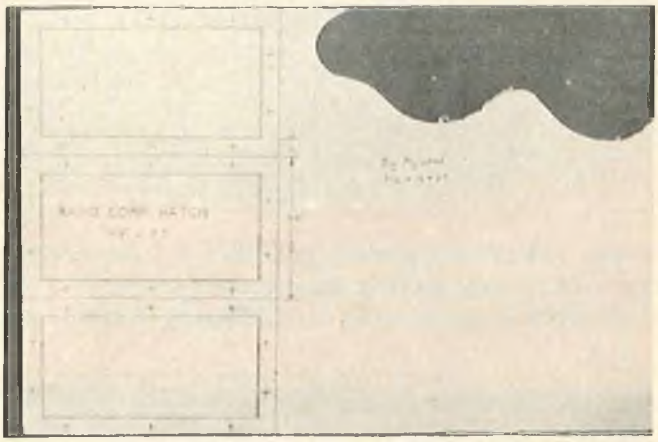
Boat on end w/triangle shows how to square transom side to side.



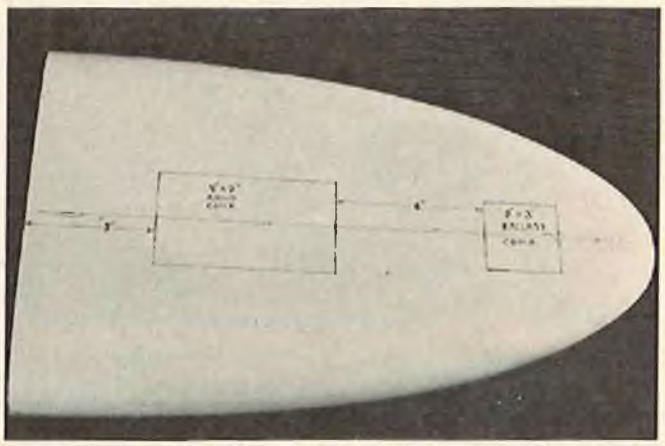
Boat on end with triangle to show how to square transom vertically.



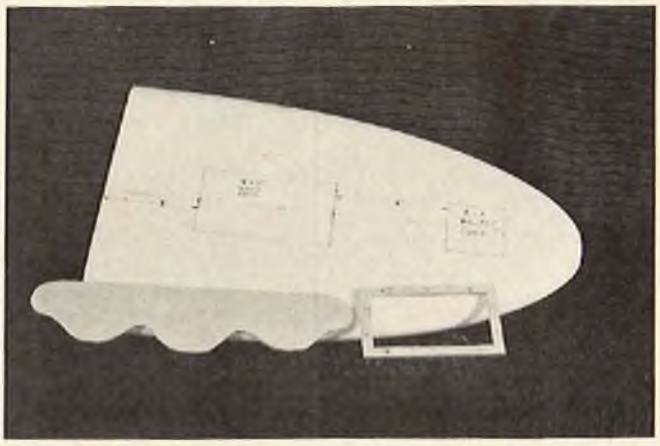
Sanding board with rough hull.



Radio compartment hatch laid out on 3/16 ply.



Top view showing dimensions with felt-tip pen.

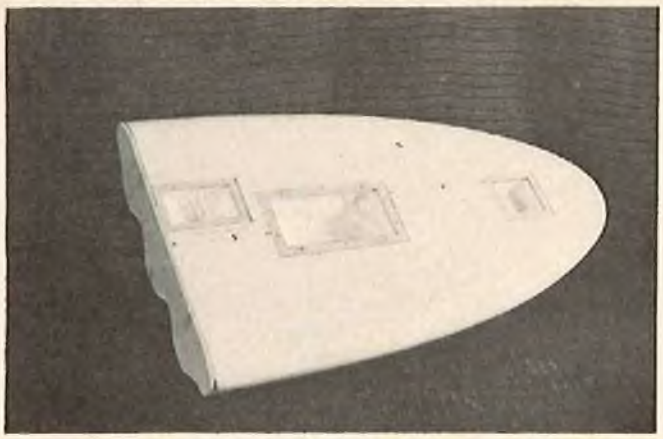


Top view with radio hatch and transom cut out but unmounted.

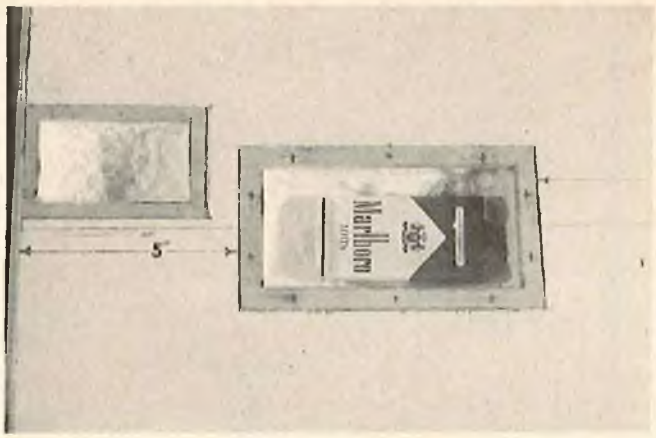
receives the most stress. Masking tape will hold the transom in place while the epoxy is curing.

Measure the deck surface cut-outs and mark them with your felt tip pen. If you leave a lip for the hatch frame to rest on, you will be assured of a good water tight seal when your hatch frames are epoxied to the hull. Use a razor knife to cut the edges of the foam to be removed. Once the edge has been cut, the foam can be dug out of the compartments. A pair of duckbill pliers will quickly remove the unnecessary foam. Be careful not to dig too deep. A straight pin pushed through from the underside will give you a quick reference.

Epoxy your hatch frames in place. You can use 5-minute epoxy here, if you want to keep moving. Consider at this point whether you want your hatch cov-



Top view with ballast, radio and fuel tank hatches in place.



Close-up of radio and fuel tank hatches with cig. pack for size.

View of radio compartment hatch with some sort of weird insignia.

The entire hull cut from the end of a foam paddle board and prepped with StyroMate.

ers to be surface mounted or flush with the deck. I prefer surface mounted hatches, as there are no crevises for water to seep into, but my wife, Dolores, plans to use flush hatch covers on her pink version of this boat which she has named "Daisy Mae". Now I have to get her some daisy decals.

If you cut your hatch covers and drill the mounting holes, you can use the hatch covers as a drilling guide for the hatch frame holes. The covers can be made from 1/8" plywood, but I prefer to use plexiglass for the radio hatch. A clear plastic radio cover allows easy visual checks of the radio equipment. Obtain some rubber gasket material from a hardware or auto parts store. I have, on occasion, used motorcycle inner tubes for gasket material.

Now it's time to sand the hull. I usually start with Dap vinyl spackle to fill any large dents, and use 100, 200, and 400 grade sandpaper, in that order, to sand the hull. After you have sanded the hull until you are satisfied with the overall smoothness, you can paint it with one of the foam type paints available, or you can try for an even better finish.

My first two boats were disasters in the finish department. I had the good fortune to meet Ed Rogala of Midwest Products, and in discussing the problems I had encountered while trying to get a smooth finish on foam, Ed suggested I try Midwest Products' new Styromate process. I followed the directions on the container, and this stuff really works. I plan to use Styromate on any future foam construction projects. It's really good!

If you decide to use the Styromate process, check the smoothness of the hull to see if you are satisfied, before painting. If the hull is satisfactory, go ahead and paint your boat. I have been using "Varathane" brand paint on my boats.

After the paint has dried, mount your K & B outboard engine. Lay a straight edge on the bottom of the center hull pod, and on the bottom of the engine cavitation plate. Mark your holes and drill holes for 4-40 blind nuts. You can remove the foam from the inside of the transom, by using the fuel tank compartment for an easy access point. Mount your engine to pull the blind nuts up tight.

Mount a Sullivan, or equivalent, 4 oz. fuel tank in the tank compartment. If you have a clunk tank, do not use the clunk feature. Bend the tube which will be used to feed the engine, so that it will be picking up fuel from the bottom rear portion of the tank, in relation to the direction of the boats' forward motion.

Mount your servos in the radio compartment. I have been using 3/8" square maple engine bearer stock, epoxied directly to the foam hull, but you can reinforce if you are skeptical. Make sure you have clearance for the servo output arms.

Connect your steering and throttle linkages. I find that a bicycle cable works fine for a throttle linkage. The bicycle cable can handle a very tight radius.

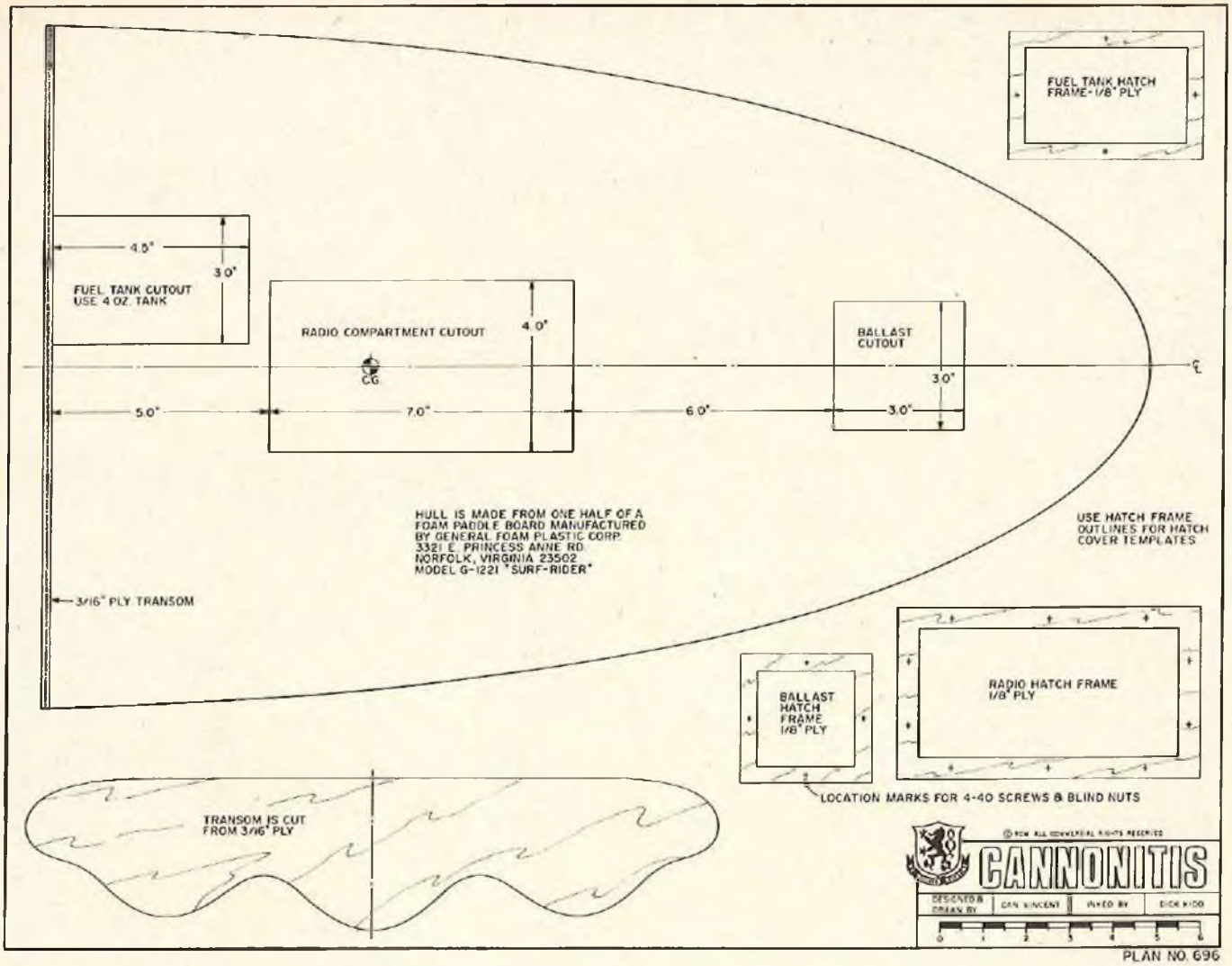
Mount a piece of 1/8" plywood on the servo rails, to provide a firm radio switch mount. Use one of the commercially available remote switch linkages, it will save you a lot of headaches.

If you also use your radio for model airplanes, and do not wish to trim your antenna for use with a music wire whip type, you can get good results by using a NyRod. Push the antenna wire through the center of the NyRod and secure the tip with a small piece of fuel line. Make a loose coil from the excess antenna lead, and store it in the radio compartment.

Install 4-40 blind nuts in the hatch frames, and pull up tight. If you have checked out your servo operation, you can mount your hatch covers. Your boat should be ready to run.

Balance your boat for initial tests at 7" to 7½" forward of the transom. You can add or subtract weight in the ballast compartment until you are satisfied with its performance. □

FULL SIZE PLANS AVAILABLE — SEE PAGE 189

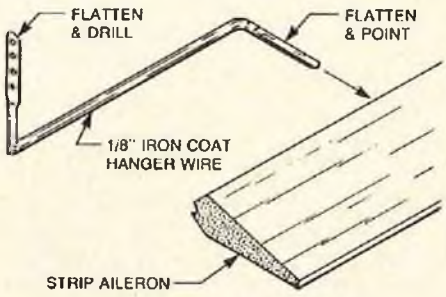


A BETTER WAY

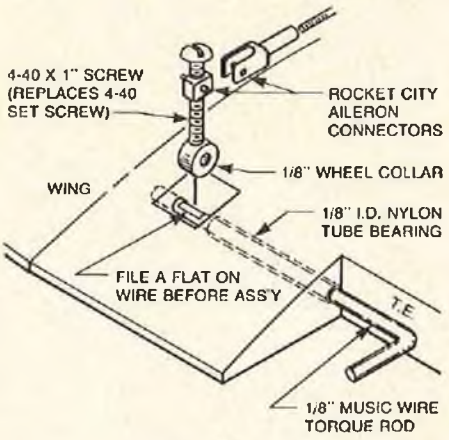
By Frank P. Jepson

Ever install a NyRod or nylon conduit in your airplane prior to finishing only to have it plugged with resin, epoxy, glue, or paint? Next time try packing each end with a small dab of modeling clay. It will protect the conduit from all foreign matter during the balance of construction, yet push out easily and cleanly when you are ready to use it.

I have found that the large diameter coat hanger wire (approximately 1/8" diameter) makes better aileron torque rods than music wire. It is rigid enough to provide flutter free surfaces, yet malleable enough to be workable. For example: you can easily flatten and sharpen the portion of the rod to be inserted into the aileron and you can flatten and drill the vertical portion to accept a standard nylon clevis as shown in the drawing. Additionally, use of this material to join elevators allows you to make minor differential adjustments between elevators by carefully twisting.



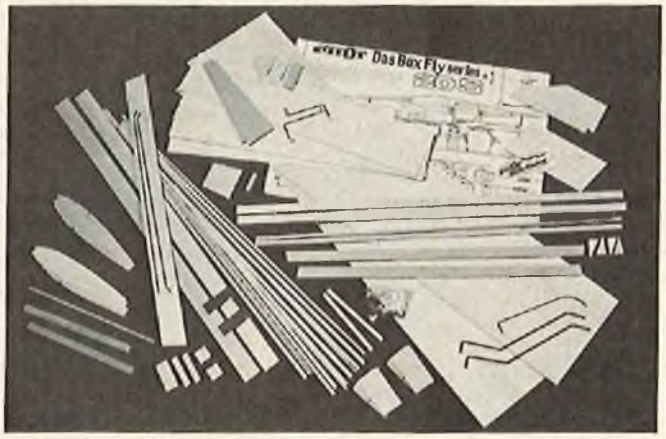
Fiberglassing and finishing wing center sections can be a real pain when attempting to do so with the exposed strip aileron control arm protruding from the upper surface as called for on many designs. The right angle torque rod bend always seems to get in the way and/or gets clobbered with adhesives and paint. You can avoid the problem by installing only the torque rod bearing when building the wing. When the wing has been completely finished, bend your torque rod to the shape shown and file a flat on it at the location of the normal right angle bend. Route out a notch in the wing at the inboard end of the nylon bearing large enough to accept a 1/8" wheel collar. Now, merely assemble the 1" x 4-40 machine screw, aileron clevis fitting and wheel collar in the notch and slide the torque rod through the pre-implanted nylon bearing and into the collar. Tighten the screw and presto, a rigid torque rod assembly free of paint and glue. A drop of Loctite, or epoxy, on the screw threads will provide added insurance.



□

RCM PRODUCT TEST

OK Model Co.
Das Box Fly 20S



IMPRESSIONS	E	G	A	F	P	IMPRESSIONS	E	G	A	F	P
Packaging	●					Pre-Shaped Parts	●				
Plans	●					Parts Match to Plans			NA		
Written Instructions			●			Overall Parts Fit	●				
Quality of Hardwood		●				Ease of Assembly	●				
Quality of Fiberglass			NA			Fidelity to Scale			NA		
Other Materials		●				Flight Performance	●				
Accessories	●					Overall Appeal		●			
Die-Cutting	●										

E=Excellent / G-Good / A-Average / F=Fair / P=Poor

Das Box Fly 20S is a shoulder wing version of a complete series, imported and marketed by World Engines. This series consists of a shoulder wing version, a low wing model, and a biplane addition of the same basic design.

All fuselage parts, in the Das Box Fly 20S kit, are cleanly die-cut from 3mm plywood, except for the balsa tail filler, hardwood motor beams, and landing gear blocks, as well as the pre-cut phenolic motor mount. All bulkheads are tabbed to fit into notches in the fuselage sides, top and bottom, and they fit together very nicely. The wing has a hardwood leading edge and four hardwood spars with pre-shaped balsa trailing edges, ribs, and wing tips. Balsa spar webbing is pre-shaped to fit without trimming and pre-shaped balsa ailerons are also provided. Wing center section planking is also provided in the kit. Five die-cut plywood dihedral braces are used with one acting as the rear of the aileron servo compartment. The rudder, fin and elevator are sheet balsa while the stabilizer is of built-up balsa construction.

As specified in the instructions, five minute epoxy was used throughout on our prototype. Care was taken to remove any excess epoxy and, as a result, the total dry weight was only 58 ounces including radio. With the exception of the wing center section construction, the instructions and drawings included on the plans are very clear and explicit.

The kit with which we were provided contained only one center section rib while the plans and instructions called for two — one on the end of each wing panel. In addition, no mention was made of the plywood dihedral braces or the servo box. We epoxied the dihedral braces to the spars on one wing

to page 135

SPECIFICATIONS

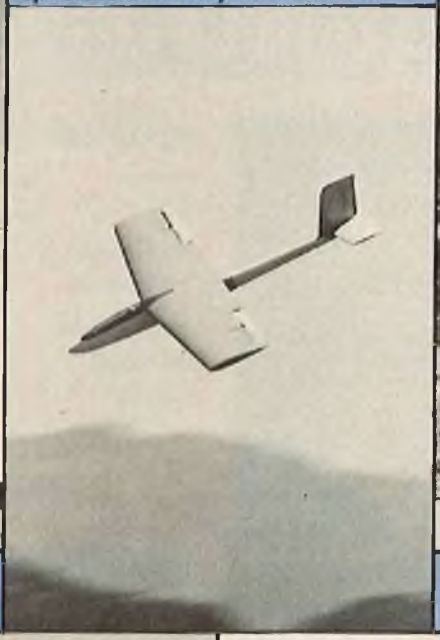
Name	Das Box Fly 20S
Aircraft Type	Sport
Manufactured By	OK Model Co.
Marketed By	World Engines 8960 Rossash Ave. Cincinnatti, Ohio 45236
Mfg. Suggested Retail Price	$29.95
Available From	Mfg. & Retail Outlets
Mfg. Recommended Usage	Basic Trainer
Wing Span	52 Inches
Wing Chord	9⅜ Inches
Total Wing Area	469 Square Inches
Fuselage Length	32½ Inches
Radio Compartment Dimensions	(L) 9¼" x (W) 2⅝" x (H) 2¾"
Wing Location	Shoulder Wing
Airfoil	Symmetrical
Wing Planform	Constant Chord
Dihedral	4 Degrees
Stabilizer Span	19⅛" (Avg.)
Stabilizer Chord (Incl. elev.)	5 Inches
Total Stab Area	97⅜ Square Inches
Stab Airfoil Section	Flat
Stabilizer Location	Mid-Fuselage
Vertical Fin Height	6 Inches
Vertical Fin Width (Incl. rud.)	5¼" (Avg.)
Mfg. Rec. Engine Range	.20-.35
Recommended Fuel Tank Size	6 Ounce
Landing Gear	Conventional
Rec. Number of Channels	3-4
Recommended Control Functions	Rud., Elev., Throt. & Ail.
Basic Materials Used In Construction:	
Fuselage	Ply & Hardwood
Wing	Balsa & Hardwood
Tail Surfaces	Balsa
Hardware Included In Kit	See Text
Plan Size	25" x 37" (1 sheet)
Building Instructions on Plan Sheets	Yes
Instruction Manual	No
Construction Photos	No
Kit Includes	Die-Cut & Shaped Parts
Mfg. Rec. Flying Weight	53-60 Ozs.
Wing loading based on rec. flying wt.	16.2 — 18.4 oz./sq. ft.

RCM PROTOTYPE

Weight, Ready To Fly	58 Ounces
Wing Loading	17.8 oz./sq. ft.
Covering & finishing materials used	Solarfilm, Perfect Paint
Engine Make & Disp.	Fox .36
Muffler Used	Fox
Radio Used	MRC V
Tank Size Used	6 Ounce

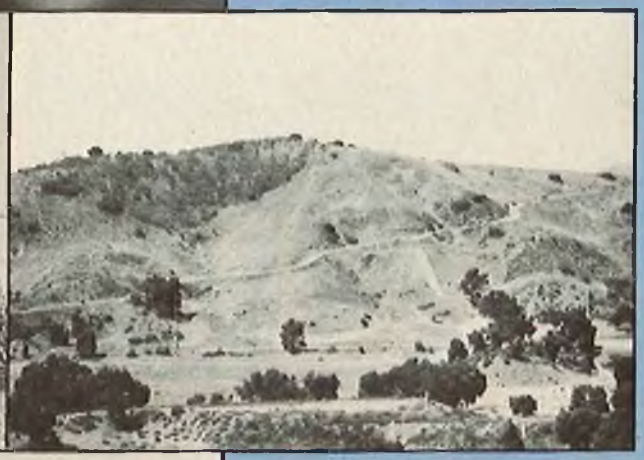
Bill Watson launches his Rubber Ducky.

Bill "Dog Fight Champ" Watson's Rubber Ducky zooms by the spectators as they hit the deck.



Watson's Ducky homes in for a high speed pass.

Just a handful of the many modelers who congregate on top of Snake Hill. Most modelers arrive in the afternoon, after flying at nearby Pierce College.

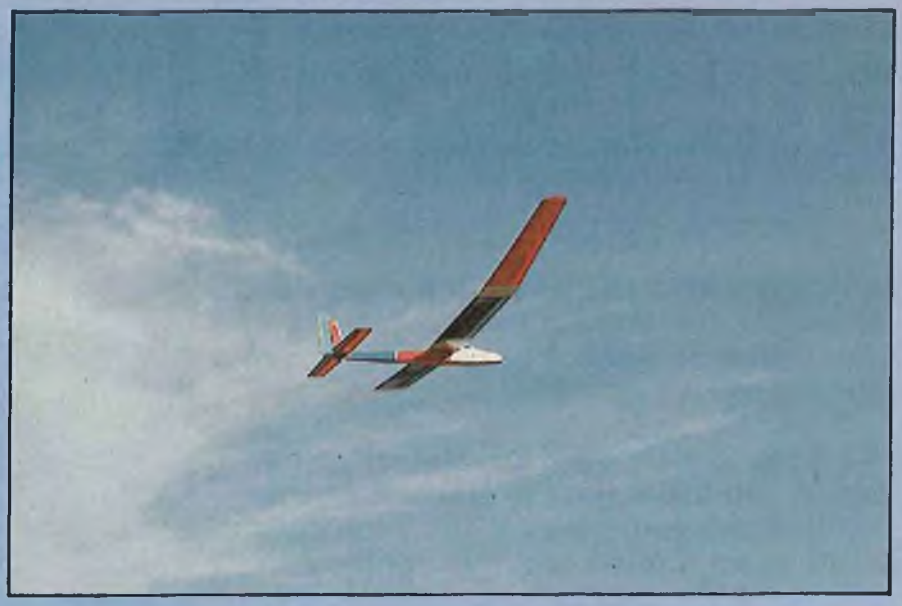


A front view of Snake Hill in the early morning before the troop arrives. Note the dirt road running the length of the hill –beats walking.

Brother David's Zaic Metric is an excellent beginner's ship for slope flying, even though it was intended for thermal flying and Bungee chord launches.

David Rieman concentrates on the flying at hand with the sea breeze blowing his hair.

Wide open spaces behind slope make landings a little less difficult, unlike the turbulent back slopes.



SNAKE HILL

A day of fun slope soaring in California's Malibu Canyon

By Joel Rieman

Midway between the San Fernando Valley, part of Los Angeles, and the sun bleached sands of Malibu, famous for its surf and the blonde sepia-toned beauties decorating its shoreline, there is a southern facing slope infamously known as "Snake Hill". Nestled in the heart of beautiful Malibu canyon, still an undeveloped area, Snake Hill overlooks Las Virgenes Rd., the gateway to the sea for beach-goers. During the summer months, the beach bound crowd crowd this route on their way to the water front.

For a particular group who inhabits Snake Hill during the daylight hours, the sparkling fluid so rich with chloride of sodium (salt) which makes up Malibu and the Pacific Coast, serve only to make possible the sea breeze so necessary for the sustainment of the RC sailplanes that are flown by this group at Snake Hill. The sailplanes are nurtured by the uplifted currents resultant of the impact of the sea breeze upon the canyonous slope. The group of modelers I speak of consist mainly of that creative club of RC soarers, the San Fernando Valley Silent Flyers (VSF); a club noted for the participation of its members in meets throughout the country.

At the crack of dawn on any and every Sunday morning, VSF members scattered about greater Los Angeles, begin picking their slumbrous bodies off the floor. In no time at all, in full realization of his state of consciousness, the RC glider pilot is out the door and headed for Pierce College; the home grounds (flat) of the VSF, where he stakes his place in line for a winch. About noon time, when the thermals are just starting to pick small children off the ground, the majority of these Sunday flyers pack up their gear and head for the local deli. After stuffing their faces with bagels and pickles, they once again hit the road in the form of a caravan headed for, you guessed it, Snake Hill.

In order for humans to land their two feet atop Snake Hill, they must first make their way up the dusty, winding, potholed dunky trail occasionally misreferred to as a dirt road; we should be so lucky! A 4-wheel drive jeep would be the logical transportation for scaling Snake, however, it is not unusual to find a Cadillac or two parked among the VW's and the more appropriate mountain climbing vehicles. The truth is, any vehicle not prone to stalling, can make this not-so-steep grade.

If the sun is shining and the breeze blowing, you can bet that members of VSF and strays alike will flock like birds of a feather (after their deli lunch), to this elevated mound of earth, in order to take advantage of what has got to be one of the top 100 RC glider slopes in California. Torrey Pines it is not, but then again, what slope does compare to the 400' cliffs? Man and dog (and even wife) have enjoyed dependable slope conditions at Snake, as long as the sea breeze is blowing, for displaying aerial splendor, grace and destruction. Mid-air collisions are common at Snake among the veteran hot-doggers ingulfed in their Walter Mitty type fantasies.

The name Snake Hill is little more than folklorish, since snakes have not been seen since modelers began using the hill for a soaring site some six years ago. The only lingering beasts are golf ball sized bumble bees that seem to enjoy a refreshing game of "chase the modeler around the car." You never know when one of these demonic creatures may attack. Of course, if one does, it will probably be after initiating an outside loop.

Members of the RC modeling clan can be found at Snake any day of the week, although the smart modeler will fly during the week to assure himself a clear frequency. However, not everyone is an introvert. If you are an egocentric exhibitionist who loves to show everyone what you think you can do, then Saturday and Sunday are your days. For many people, the weekend is the only time they get a chance to fly. For this reason, most frequencies are in continuous use on the weekends. VSF members being the good guys that they are, limit themselves to about fifteen minutes so as to allow everyone numerous turns to fly.

While spending a pleasant afternoon at Snake, waiting for a chance to get in the air, one might notice one or more aerobatic aircraft doing their thing overhead. Las Virgenes Road is used by

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DICK'S DISCOVERIES

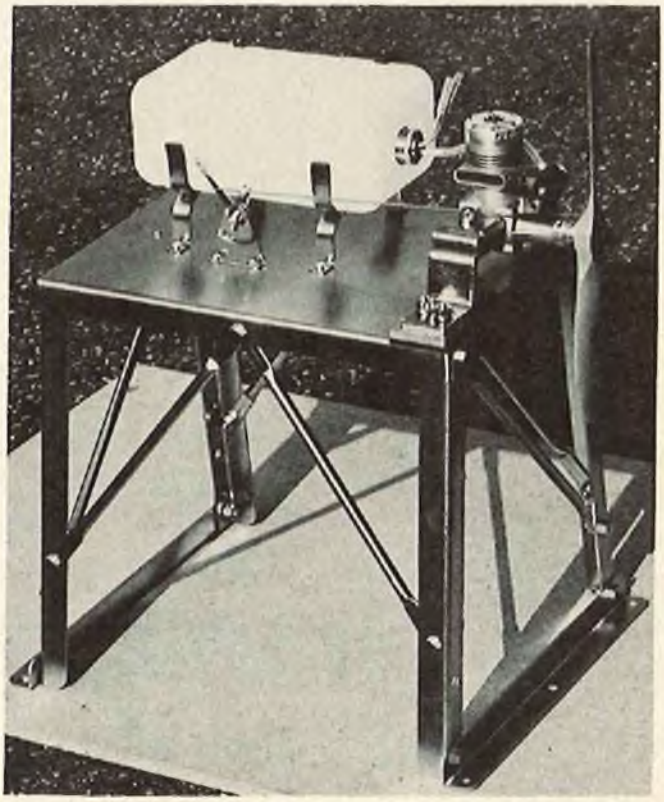
AT LAST, A GOOD ENGINE TEST STAND

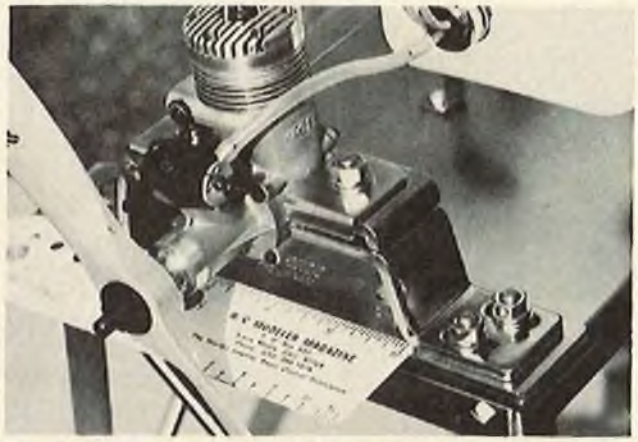
How many of us will take a new engine out of the box, bolt it to our flying machine and get it airborne without having a chance to get acquainted with it?

We know better; we know that we should bench run the engine to learn its characteristics, but sometimes it just isn't convenient so we take-off and hope for the best.

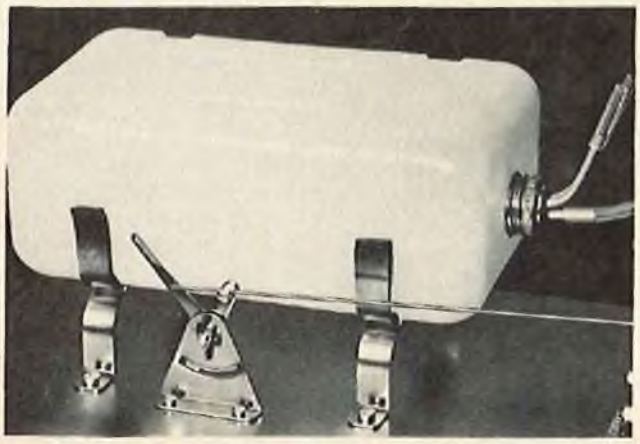
The fellows at Model Rectifier Corporation have fixed it so we can do ourselves a big favor by running our new engine on a dandy test stand that they are now importing.

The test stand is manufactured by IM Products, Inc., well-known for their quality products. The stand is made of heavy gauge steel that has a corrosive resistant chemical finish to prevent rusting. The sturdy, well braced legs can be fastened to a base or work bench.





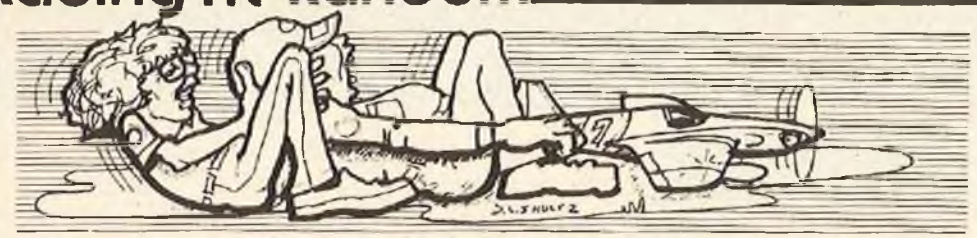
Engine lugs are clamped in position with 6mm bolts. Note safety retainer clip to prevent forward engine movement. RCM scale included in photo for reference to the heavyweight material utilized in stand. Mount is adjustable to fit engines from .09 to .80 cu. in. displacement.



The generous size tank, 1000cc (33.8 oz.), eliminates frequent refills. Tank is held in place by foam padded spring clips for easy removal. Throttle quadrant features adjustable friction lock for extended engine runs. We added an adjustable push-rod connector (not included) to simplify hook-up to various carburetors. Best of all, Clarence Lee can't fuss at us for not bench running our new engines.

Racing At Random

FRED REESE



SUBJECT: 1977 Quarter Midget Pylon Racing
BY: Bob Root, President, Quarter Midget Racing Club (So. Calif.), 1601 Amherst, Tustin, California, 92680.

The following definition of rules pertaining to NATS Quarter Midget Pylon Racing will appear on the official AMA entry form. These can be considered final as defined by the AMA. Please note that the prop, exhaust extractor and hard hat requirements differ from those previously released by us. This was due to a communications breakdown between the volunteer Quarter Midget C.D. (Vince Stagnaro), and NATS R/C Event Director and the AMA, concerning what can and cannot be done with AMA provisional rules for an event run at the NATS.

There has been talk of bringing the rules in question to a vote at the NATS pilots meeting. I strongly oppose this idea as it can't help the event, but it could make 49% of the pilots very unhappy. Let's come prepared to race under the rules as defined and have a good race.

RULES

"The AMA rule book, page 49, will apply, plus the following: The two-mile course will be used with flagmen at Pylon No. 1. The scoring method will be per Formula I. Idle check will be accomplished before take-off — may be required prior to any take-off. Deadstick Landings — 1/2 point loss. Profile Check Canopy — Williams Brothers Pilot Head 1.5" scale must fit inside to a point where he would have proper clearance to see out and fly aircraft; only questionable canopies will be checked. Props — only wood props allowed; prop modification only as per rule book. Exhaust Extractor — tuned pipes will not be allowed. An exhaust extension may be used if it, or any other device used to get the exhaust out of the airplane, has a slit no less than 1/4" wide for its entire length. Mufflers are not required. K & B 500 fuel will be supplied. Hard hats required for pilot and caller; will not be available from management."

I want to thank Vince Stagnaro for trying (although unsuccessfully) to get the questionable Quarter Midget rules defined early. The previously released rules were based on conversations he had with flyers in California, Illinois, Tennessee, New York, and with NMPRA-QM President George Zink. Vince submitted these rules to the NATS R/C Event Director two months ago. However, to conform to AMA philosophy, the entry forms were printed with those rules modified to agree with their provisional unmodified prop rule (in the '77 book but not in '78); the slotted exhaust extractor traditional rule (not in the '77 book but in '78); and a requirement for hard hats (in the '77 book). It is unfortunate that we were not made aware of these changes until now. I hope we can get the final rules out to everyone interested.

It is not my place or desire to discuss the pros and cons of the prop and exhaust extractor rules as they have been argued to death. We will have definite final AMA Quarter Midget rules in the 1978 AMA book. I hope all areas of the country are willing to use them. However, the requirement for hard hats in Quarter Midget (a 2½ pound airplane at 115 mph) but not in Formula I (a 5 pound airplane at 175 mph) leaves me baffled. We either need the safety or we don't. The Formula I flyers have been through this and most hate flying with hard hats with the result that they are not currently required. What's with Quarter Midget?

The NATS Pylon Event C.D. (both Formula I and Quarter Midget), is Mike Atizl. He is well qualified in racing and I'm sure he will run a great race. Mike will be needing a lot of help. Anyone interested in racing who is not competing should come out and help. AMA will furnish free room and 1978 AMA membership dues, and you'll be right in the middle of the action. Forms are available. Contact me if you're interested . . Bob Root □

IMPORTANT NOTICE: The AMA has decided that QM racing, at the Nationals in Riverside, California, this year, will use the same rules as last year regarding exhaust extentions and stock props. That is, slotted exhaust extentions will be required. There will be no prop modification, other than to balance, by changing one blade only as per the 1976-77 AMA rule book.

I took some pictures of the new Prather Little Toni QM at the MACS show this weekend and it really looks good. The deluxe kit is $69.95 and includes a 4 oz. epoxy glass fuselage with molded in canopy; foam wing cores and sheeting; landing gear; wheels and pants; all other wood parts; plans and instructions. The Prather Products Quarter Midget Little Toni is available from your dealer.

Also at the MACS show I saw the new QM Midget Mustang by the Model Merchant. This kit, like their Pogo (LR-1A), is a complete kit featuring pre-sheeted foam wings with shaped tips, ailerons, and tail surfaces. The kit also includes clear canopies, dural gear and plastic wheel pants. Both airplanes use the same wing, which spans 40", and has an area of 306 square inches. The Pogo and Midget Mustang Quarter Midget kits sell for $59.95 from your dealer or the Model Merchant, 2405 Fairview, Plano, Texas 75075.

The Model Merchant also has Ed

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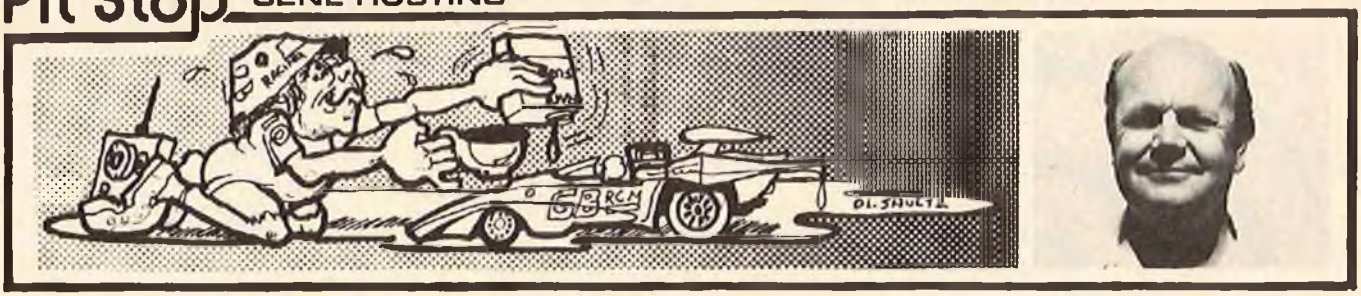
Deluxe kit with wing sheeting, fuselage, landing gear, wheel pants & racing wheels: $69.95.

New Formula One Super Midget Mustang II designed by Ed Rankin from The Model Merchant: $99.95.

Hobby Merchant Quarter Midget Mustang features pre-covered foam wings. Complete kit sells for $59.95.

Pit Stop

GENE HUSTING

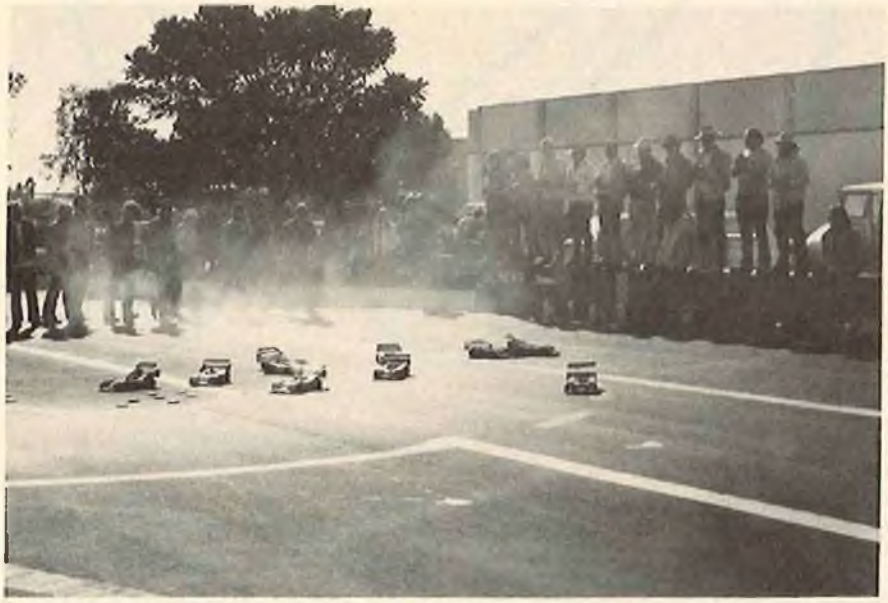


I want to tell you about one of the biggest "Speed Secrets" there is. It's known by all the Expert class drivers and most of the Amateur class drivers. A few Novices know about it, but hardly any Beginners can realize its importance. It does **not** have anything to do with engines. We're not talking about straight line speed now, but **more important**, how quick you can get around the track. And what affects how fast you can get around the track, as much as any other thing, is the **"line"** you take.

I'm sure you've all heard the expressions "He's taking the short way around the track" or the opposite, "He's taking the long way around the track." This is actually referring to which "line" the different drivers take around the track. If you've been driving a long time and you still take the long way around the track, you've picked up some bad habits that are going to be hard to change, but you can do it if you try. If you're a Beginner, now is the time to learn the good habits, so you'll do them naturally during the excitement of racing competition.

To begin with, I want you to completely change your mind about a misconception that most people have. It concerns another familiar saying: "Boy, I really made up time on that last lap." In effect what he's saying is he's really lost time on preceding laps. Let's look at it this way. Suppose you have your engine and chassis tuned to the best of your ability. Then let's suppose we have a computer drive your car around the track. This computer is capable of knowing exactly how much throttle to use and how much steering to use everywhere on the track. This would be an ideal situation. Let's say the computer could turn the course in 16.00 seconds each and every lap for 60 laps in a row. Now we're going to let another computer drive the same car — **you**. Now if you think about it — there is no way that you can "make time." **You can only lose time!!** But don't get excited yet. The fact is — we all lose time driving! Some of us just lose more time than others. So what we want to concentrate on, more than anything else once the race starts, is to lose the least amount of time possible.

If you're a Beginner, you have the best chance to capitalize on this way of thinking, because Beginners waste more time on the track than anyone, so you have the most to gain. Okay — how do you do it? You have to start well before the race begins. Let's assume that you've done a good job assembling your car, and your engine is running good. The next **most important** step is to get your car handling good. I mean good for **you** and not anyone else. You're the one that has to drive the car. It's got to feel good to you. As an example: My oldest son, Brian, was Southern California Novice and Amateur Champions and became an Expert. He has since been married and is off to college. My youngest son, Curtis, was also Southern California Novice and Amateur Champions and a few months ago was moved to Expert class. Curtis has much more natural driving talent than I do, a little more experience and he'll be driving circles around me. But what made it easier for them, was their cars were set up entirely different from mine, when they were in the Novice and Amateur classes. They never had the most horsepower in their class, but rather just enough to get the job done. I'm sure you've all seen the effects of too much horsepower in the hands of a beginner. He generally overshoots every corner (**losing** time — remember?), making it very easy for the slower cars to pass him in every corner. Also, I set up their cars so they had less steering than mine. It was hard for them to spin out, so it was much easier for them to drive, so they lost less **time**. They could drive their main events, lap after lap **consistently**. This is another very **big secret**. You should be able to drive lap after lap with approximately the **same correct line**. Assuming that you have driven long enough to become thoroughly familiar with driving, you should have the feeling that you have complete control of the car and can drive it where you want. If you have the feeling that you're not quite sure where the car is going next — something's wrong!! Correct it. It would take me a whole article and then some on "how to tune your chassis", which we'll do later, but this article we want to concentrate on driving the correct line.



The start of a race can become hectic, especially when there are 10 cars in the field. Concentrate on your car. You'll be able to see other cars around you without taking your eyes off your car. Try not to tangle with any other car because it will cost you time. Don't follow another car around track; he might not be taking correct line.

Figure I shows the correct line for this particular shaped track. The basic idea is that we want to make the corners in as big an arc as possible. It's naturally much easier to go faster in a straight line than it is going around a corner. It's also easier to have more controllable speed in a larger corner than in a tight corner. So we try to make all the corners larger. There are some other factors that enter into this. We have much better braking than acceleration, so our patterns going

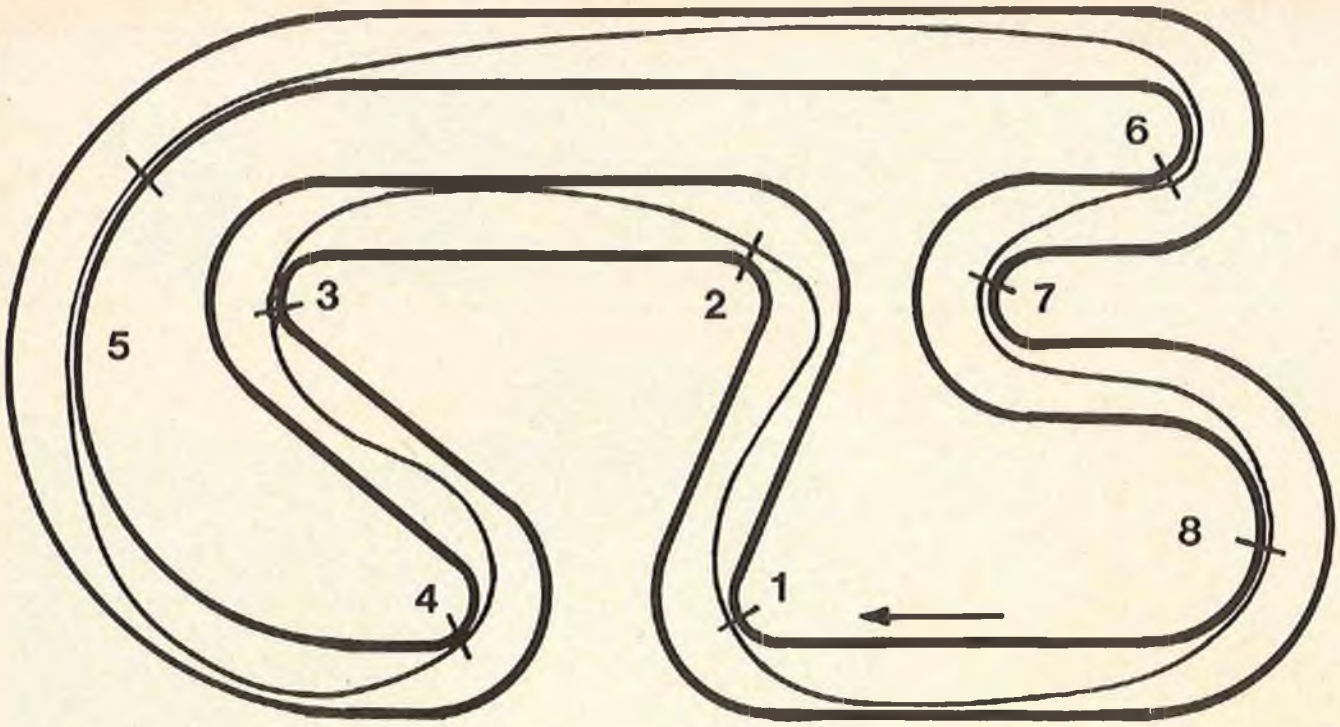


FIGURE 1

into a corner will look a little different than our line coming out of a corner. It also depends on if there's a straightaway after the corner or if there's another corner coming up. All these things, plus many others, affect the line we'll take.

The start/finish line for this track is on the drivers straight, just after you come out of turn 8. The line taken through turn 1 is an example of "opening up" a corner to a larger radius, so you can go "into", "through", and "out of" a corner faster. You'll also notice a short line drawn at turn 1 which is the "apex" of the cars turn, which in this case happens to be the center of the track's turn. Although turn 2 looks the same as turn 1, it's taken a little different because of increased speed at that point and also the fact that on this track there is some permanent boards between turns 2 and 3 on the outside. So it's very important to be lined up correctly for turn 2. We're also a little "wide" on turn 2 to make sure we don't hit the inside corner markers, or "botts

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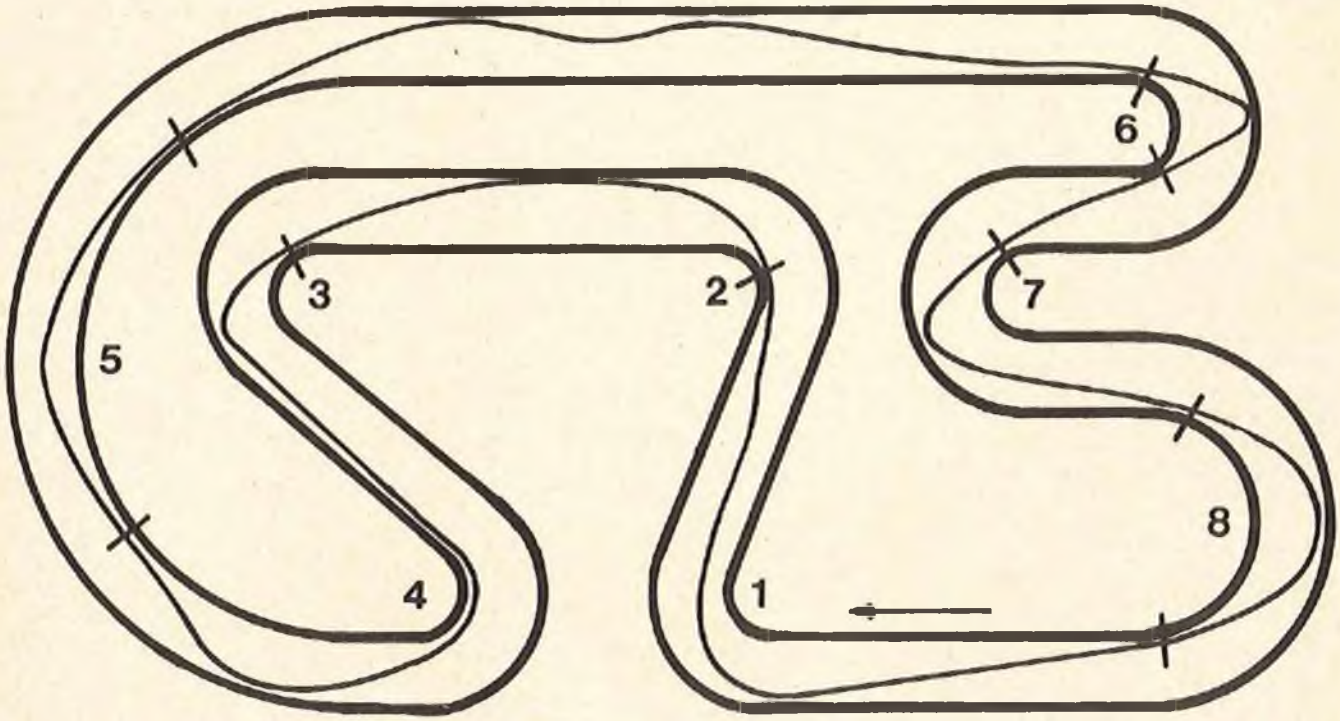

FIGURE 2

MAGIC MULTIPLIER

BY GUS MORFIS

Some problems loom up immediately when you decide to go into flying scale. Deciding on the prototype and what size the model should be are only two of them. After you have made your prototype selection and established your scale, you are left with the problem of making your drawings.

If the drawings you will work from are an even submultiple of the size you want to make your model, you have it made. All you have to do is make your drawing four times as large, or whatever it works out to be in your case. However, if your luck is like mine, your 3-views are 3.7" wingspan and your model's wingspan works out to 59.5", or some other strange combination.

The device I have illustrated is nothing more than a circular slide rule, shorn of all auxiliary functions and complexity. It will permit you to measure something on a small 3-view and read off exactly how big it is on the real plane or how big to make it on your model.

The device is easy to make out of cardboard or thin (1/32" or 1/16") plywood. First, cut on the circular dotted line and separate the outer ring from the center disc. Then glue both pieces to two separate pieces of card stock. Give everything a few coats of clear dope or epoxy to keep it clean. Rivet or screw both discs snugly together so that they

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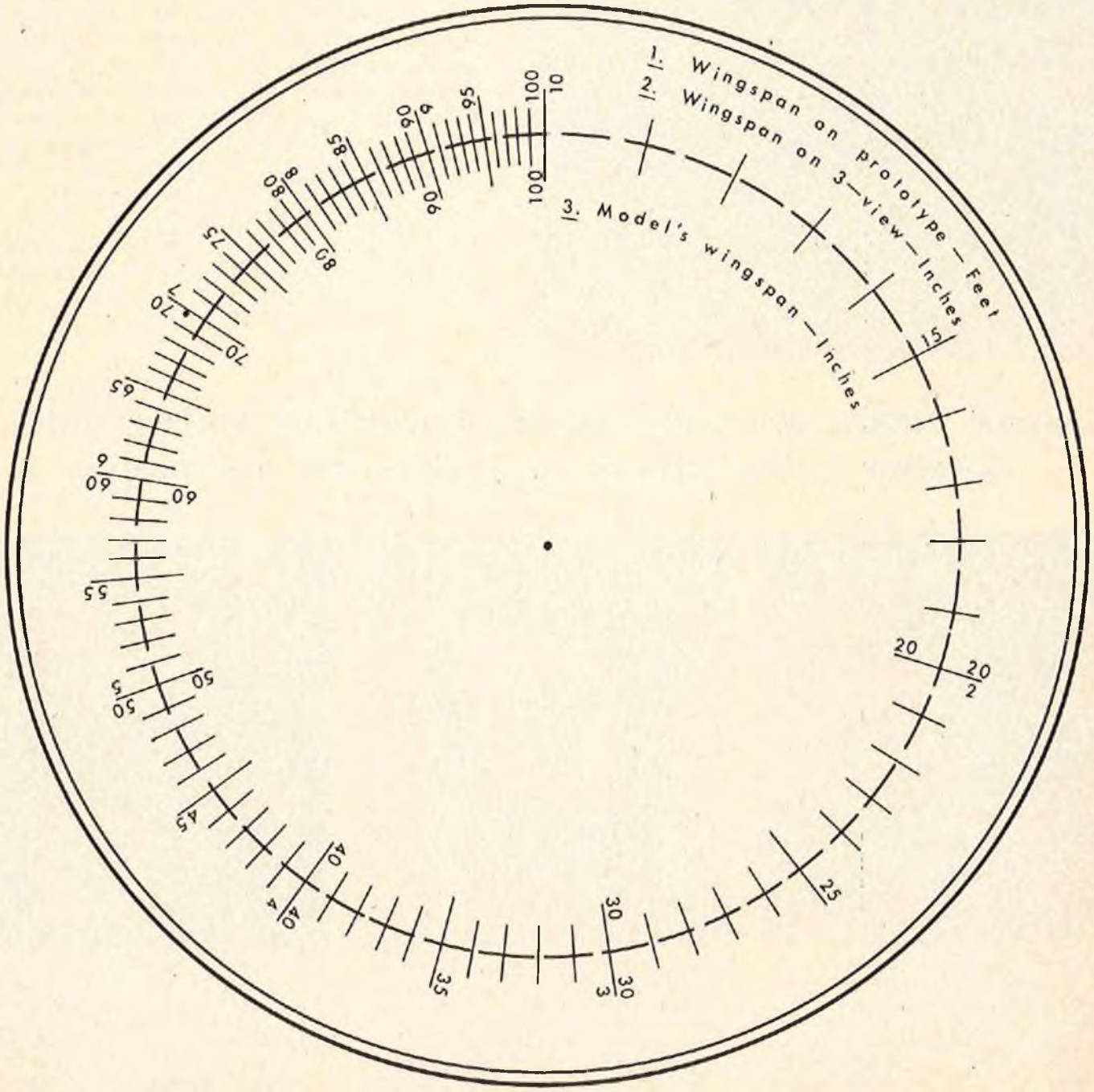
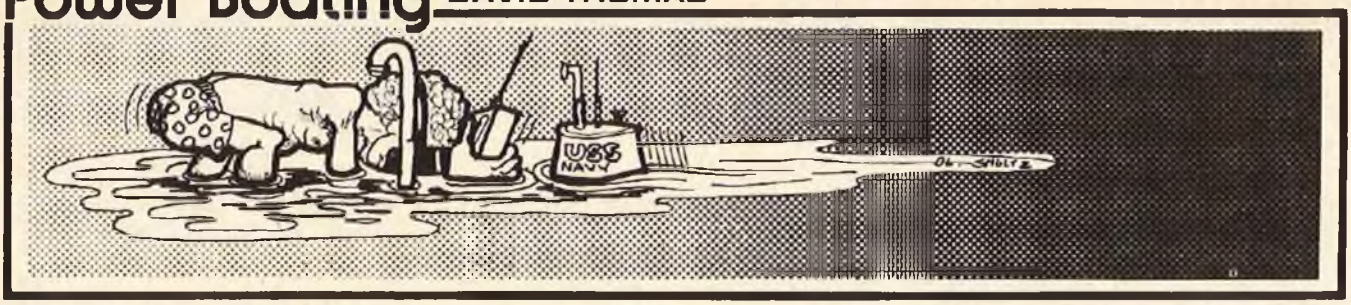


Power Boating

DAVID THOMAS



You may remember that a couple of months ago I mentioned an electric speed controller from Vantec. I said that, at the time, I hadn't had an opportunity to try it out, so I didn't have too much to say about it. Maybe it would be as well to underline the fact that I am more than willing to write about commercial products, but only when I have tried them out myself, so that I know what I am talking about. I figure this is the only honest way to do it.

Anyway, I have now had the chance to give the Vantec speed controller a good wringing-out, and I have to say straight away that it works — and works well. I have used it on two motors: a Kroker Sea Wasp 6 running on 8 volts at about 12 amps, thus some 100 watts; and a Ripmax Bullet on 16 volts and 13 amps, or 200 watts. In addition, I have been experimenting recently with the Sea Wasp in an electric stock car which I made up myself and, in this configuration, it was running at about 130 watts. In all cases, the unit behaved exactly as per the manufacturer's specifications and gave no trouble. If you should buy one, be sure to state the make of radio you use, in order to get the right plug — then it's just a question of plugging in and away you go. However, be careful, as it states in the instructions, the case of the unit is "live", so whatever you do, don't take it apart, especially when it is plugged in, or you will have some expensive repairs to make.

The unit I have is the ET-3 which is the hi-powered version, but without reverse. Vantec does make a second model, incorporating a reverse system, which is ideal for scale models, although I haven't had the opportunity to try one of these. Its power rating is much lower, but adequate for the sort of electric motors needed to drive scale models at scale speeds.

And, since we have started off this month with electrics, let's stay with the subject and take a longer look at them. I won't go over the advantages and disadvantages again and, in any case, they are fairly obvious. What I will try to do, however, is to take a look at techniques.

First of all the motor. There are two basic categories: the small, inexpensive type used for scale boats; and the expensive, hi-powered model used in fast planing hulls. The first type is usually Japanese and there really isn't much to be said about them, particularly since in the job they are used for, it is extremely rare that anyone ever needs to put a higher voltage across them than that recommended by the maker. It is much easier, if a bit more power is needed, to change for a bigger motor in the same range. With the hi-power models, it is a bit different and there are quite a few mod's possible which will permit their use at voltages much higher than that for which they were intended. We won't worry too much about makes — the one in the photos is Japanese sold under license in England, but all electric motors are basically the same, there are just detail constructional differences. The two main American manufacturers of this type are Kroker and Astro-Flight, but there are, of course, many other possibilities. The guy who was Unlimited Electric speed champion for many years used three Bosch electric motors which are normally used to drive the aileron servo mechanisms in full-size aircraft. He had the three coupled in-line, driven by vast banks of nicad 4 a/h cells, at a power input of around 2½ kilowatts! The boat weighed over 40 pounds, and was a really impressive monster. Others have used Honda Starter motors, stripped of their gearing, and there is a current vogue for the fan motors taken from automobile heater systems, the most popular being that from the Volkswagon which will stand up to 24v with no harm. So either you buy a motor made for modeling, or you hunt around and adapt one that you may find . . . just about anywhere! For the moment, let's stick to the commercially made ones.

Right, let's define exactly what we want to do. These motors are used in planing hulls, and we want to get as much power out of them as possible. There is not a great deal that one can do to increase the power-output for a given voltage for any electric motor unless we re-wind it, and then a great deal of knowledge is required. The only thing we can do is to run it at a higher voltage, thus making it turn faster. The trouble is, all motors are sold to work at a certain voltage; the latter being fixed by the maker. However, he has had to protect himself (and the motor) by setting a limit which is well within that which will burn it out. It is very rare that we can't step-up the voltage by about 30% if we carry out a few simple modifications. If we step-up the voltage, not only will we get more rpm but also more heat; since most motors are only 50-70% efficient, most of the rest of the input power is going into the creation of heat. Obviously, more voltage means more and more heat, until we get to the point where the amount of heat created is going to burn out the motor itself. So we have to find a way of dissipating it.

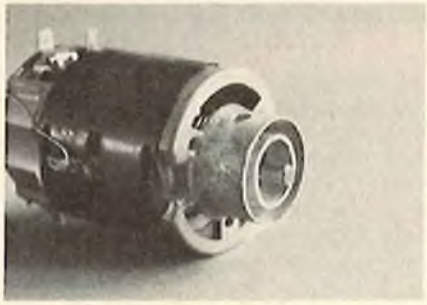
One method is to fit a small fan on the motor shaft which will provide a flow of air over the motor - - - but this is inefficient, and has a drawback. Inefficient, because it does not cool those parts which get the hottest, and the drawback is that the fan uses some of the power that would otherwise be going to the prop. In addition, since the boat in question is a planing hull, and since the speeds will presumably be such that there is a risk of the boat overturning under certain circumstances, it is advisable to have a sealed hull. We can't do this if we want a flow of cooling air. So, for these reasons, I am pretty much against a fan in really fast boats.

The alternative is water-cooling, and this is where the fun begins. This method will not take any of the power away from the prop but, obviously, it is somewhat more difficult to carry out than the simple measure of fitting a fan to the shaft. It is undoubtedly much more efficient and, for this simple reason, the trouble taken is worth the while. (Some of the Kroker range of motors come with built-in cooling of this type.)

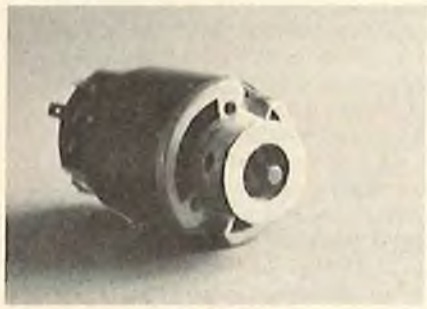
The next thing is to decide on what parts of the motor to cool; since it is not possible, as with a gas engine, to cool the whole thing. Well, take it from me, the essential areas are the two bearings and the brush gear, since it is the commutator and the brush gear that get the hottest. (In this connection, there is a much better transfer of heat from the commutator to the body casing in a motor with ordinary bearings than in one using ball-races.) So, all we have to do is to figure out a way of cooling these areas.

I must say right away that I do not pretend that this article is a blue-print for water-cooling of electric motors — it is destined, rather, to give you all an idea of how to go about it. The most important thing is to sit down quietly with your motor, take a long, long look at it, and then

Inner tube of coupling end. Water jacket glued in place over boss on end plate.



Second tube epoxied in place. Note pre-drilled holes for water inlet and outlet pipes.

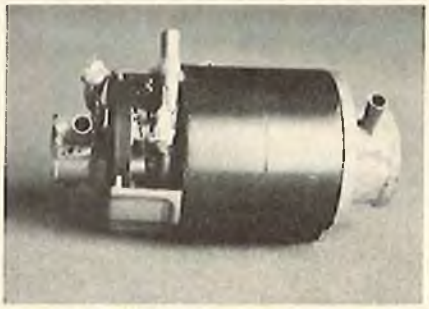


Jacket with end plate in position.

Completed water jacket.

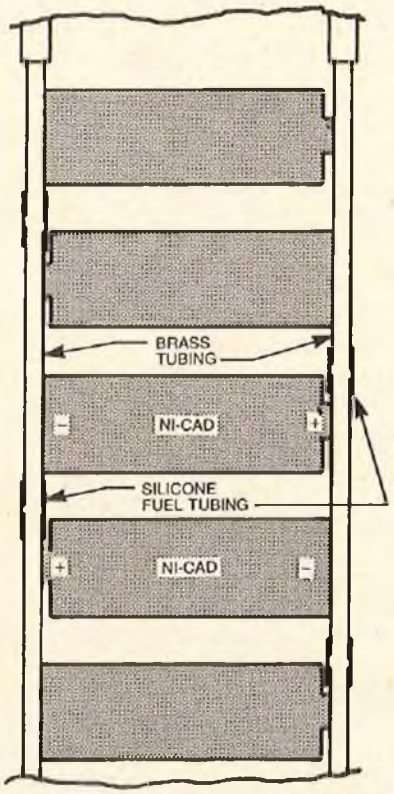
Brush plate end w/jacket tube in place; again with pre-drilled holes.

Completed brush end w/jacket.



One of the two brass tubes soldered to the brush housing. The silicone fuel tubing is out of sight inside the motor casing – but MUST be put on both brass tubes BEFORE soldering, otherwise it will never go on!

try and work out a plan. Having worked it out, put it away in the back of your mind for a couple of days, and let it simmer. Chances are, quite without realizing it, your brain will work on it and come up



NOTE: BE EXTREMELY CAREFUL NOT TO BLOCK VENT HOLE IN TOP OF CELL WHEN SOLDERING BRASS TUBES IN PLACE.

WATER COOLING NI-CADS

The glass-fibre mount used.

Underneath of hollow motor mount, showing where cooling water will flow. Note the inlet and outlet tubes.

The completely water-cooled motor and mount. The motor is held in place with a metal strap, heavy gauge aluminum plates and self-tapping screws.

with an alternative, or a way of improving the original plan. Either that, or it will pick out the snags in your idea. If you work out a plan and then go right ahead, you may ruin a good and, perhaps, expensive motor.

Okay, to help you with a few ideas, here's how I went about cooling my Bullet. Let's consider the output shaft bearing; the one that will have the coupling on it because this is the tricky part. On the Bullet there is a small circular boss on the end-plate, so the first thing I did was to hunt around in the scrap metal box and find a piece of aluminum tube that was a tight fit over this boss. Then I worked out how long I could have this tube and still leave myself enough room to do up the grub-screws that hold the coupling on the shaft. Another hunt around the scrap box — that's a useful institution, and one that no modeler should be without (you have to have the instincts of a magpie to build up a real good one), supplied me with another piece of tubing. This one was bigger in

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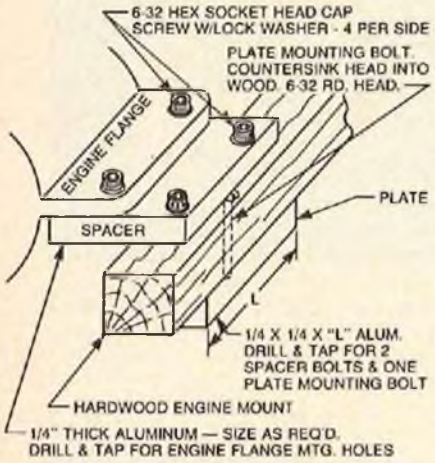
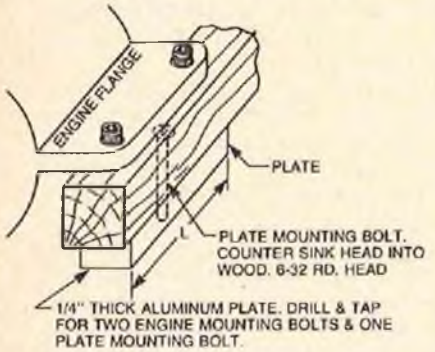
FOR WHAT IT'S WORTH

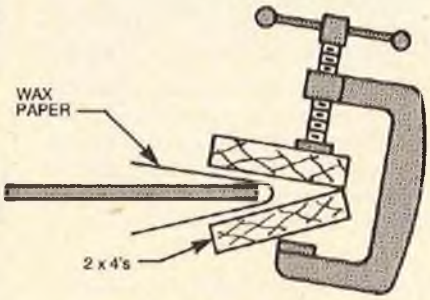
The use of blind mounting nuts for mounting motors and components becomes very frustrating when these tee-nuts break, or become loose, and the bolt cannot be removed or tightened. An alternate substitute for the tee-nut is shown in the two sketches made by Jack Voegler of Battle Creek, Michigan. Which alternate to use is dependent upon the spacing between your hardwood motor mounts. Another advantage of this mount is that it is lightweight and you have the capability of torquing the bolts extremely tight as required by the larger engines. The total weight is usually less than the commercial mounts and the method really locks the motor permanently into the airframe. Yet, the engine can be easily removed when necessary or the mounting hardware can be replaced. It is also very inexpensive and the aluminum can be obtained at a hardware store. The bar stock that Jack used was 1/4" x 1¼" x 4'.





William H. Altenhofen of Richfield, Minnesota, points out that shelf paper makes an excellent masking tape for finishing airplanes. Contact brand sometimes leaves an adhesive residue, however, Bill found that Kwik Kover II brand seems to work quite well. Bill has not found it necessary to seal the edges with either clear dope or epoxy paint.

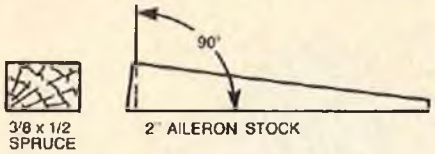
If you're into cardboard aircraft, here's a method of making tapered trailing edges for cardboard wings, as suggested by Bernard Ryan of Bellingham, Washington. As shown in the sketch, begin by putting white glue on the trailing edge. Next place two pieces of 2" x 4" wooden stock half on and half off the trailing edge. Now add a C-clamp approximately 1/3 of the length of 2 x 4's. Squeeze down tightly with the C-clamp and allow to dry overnight. The result will be a nicely tapered trailing edge on your cardboard wing, instead of the blunt section resulting from simply gluing the two pieces of fluted cardboard together.

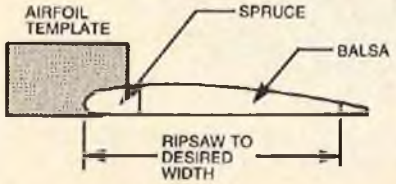


When mixing finishing resins such as K & B or Hobby Poxy, you usually have to measure the amount of resin into a measuring cup then pour into a plastic tray or bowl then add the hardener. When you're done, you then have to pry and/or scrape the dried resin out of your tray. William Hatcher of LaPorte, Indiana, writes that his wife recently had a Tupperware party and he was looking at the catalog and saw that they had a liquid and dry measuring cup that was graduated in ounces. Bill thought that this cup would be ideal for mixing and using resin from one container. When his cup came, he first marked one ounce segments on it, since it's graduated every two ounces. He mixed some K & B for his B24 Liberator and used the resin from the cup. The large base keeps it from tipping over with the brush in it, and when you're done, let it sit and harden in the cup. Then take a screwdriver and lightly pry up and, you will find, the hardened resin slips out along with a film of resin that has dried on the sides as one piece. It cleans up completely and is ready to mix some more. You'll find when using the Tupperware measuring cup that there are no chips of old resin that have to be scraped out of the cup. Just simply mix and use it again. You'll also find that the dried measured side is great for measuring micro-balloons in the exact quantities needed.

How many times have you wanted some method to clean the base of a paint brush? More often than not, you wind up with only half a brush, due to the paint that is never removed from the base of the bristles. As suggested by Terry Tedesco of Omaha, Nebraska, all that is needed is a steel wire brush. It won't harm the bristles! Stroke the bristles from the base of the brush to the tip only. Use the thinner that was used to clean the brush when combing the bristles with the wire brush. Try it — it works!

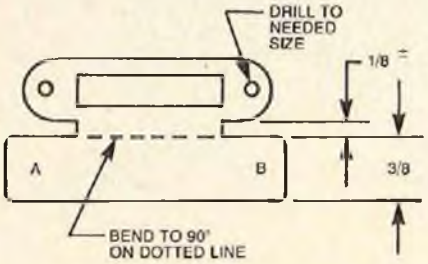
If you're tired of paying $7.00 to $15.00 for a set of helicopter rotor blades, which break all too frequently, here's a method suggested by Thomas K. Waller of Bronx, New York. First, in order to use this idea, a table saw is required. Looking at the sketch you will see that the leading edge of the rotor blades consist of 3/8" x 1/2" spruce strips and a 2" wide length of aileron stock. Be sure to choose straight stock when you are going through the wood at your local hobby shop. The spruce strip is about 35 cents each, while the aileron stock is approximately 85 cents. To rip-cut the aileron stock to a 90° angle on the leading edge, use a fine tooth plywood blade in your table saw and the rip fence. Next, rip-saw the leading edge of the aileron stock so that the 3/8" x 1/2" spruce strip can be glued to it. Tom uses a straight flat board covered with Saran Wrap or MonoKote backing sheet to clamp the pieces while the Elmers glue dries. Pinning prevents lateral movements since the wet glue acts as a lubricant. Be sure to allow to dry for 24 hours. After it is dry, cut to the desired length and width before sanding to airfoil shape. Use an airfoil template while sanding to ensure a constant shape from one end of the blade to another. Epoxy two 1/16" plywood inserts in the top and bottom of the blade butt, the width of the cord. You'll find that you can turn out many sets of blades in one evening sessions while saving a considerable amount over the cost of comercially available helicopter blades.





FOR WHAT IT'S WORTH

For those who like to use a Du-Bro Muff-l-aire muffler, but find that it allows fuel to spray in all directions, may find the following idea from Michael Vinciguerra of Akron, Ohio, helpful. From a piece of aluminum sheet, about .026" thick, lay out a pattern to conform to the shape of one of the baffles and add the tap extension, as shown in the sketch. Tabs A and B are shaped to conform to the curve of the baffle ends. After attaching to the muffler, the spray will now be directed in a downward direction.



Tony Recht of Santa Monica, California, points out that everyone knows that letters, numbers, insignias, etc., really add that finishing touch to any model. And yet, for most of us when the plane is ready for those "finishing touches," we're overcome by an urge to go flying! As Tony points out, he hates cutting out those letters and numbers and the results have always been somewhat disappointing. As a consequence, he has been using pre-cut vinyl pressure sensitive letters and numbers. There are many brands and colors and sizes in virtually any type style awaiting your discovery at the local art, craft or stationery store. Simply lay a straight strip of masking tape for a guide and carefully remove the letters or numbers from the backing sheet. Place the edge of the letter, or number, against the tape edge, aligning it at a proper right angle to the tape so all the letters are evenly spaced, and then press them on. You'll find that you have professional looking results with a minimum amount of effort.

Have you ever set your bottle of Hot Stuff or Zap aside for the night, only to come back the next day to find that the non-clogged Teflon tube has clogged up completely? Well here is a suggestion from John Monasterio of Omaha, Nebraska. Instead of cussing and yelling while you try to unclog the Teflon applicator, you can simply poke a length of thin wire, such as #18 gauge copper wire, through the tube and it will clear immediately. As a precautionary measure, you can leave a length of it in the tube while it's stored and pull it out prior to use.

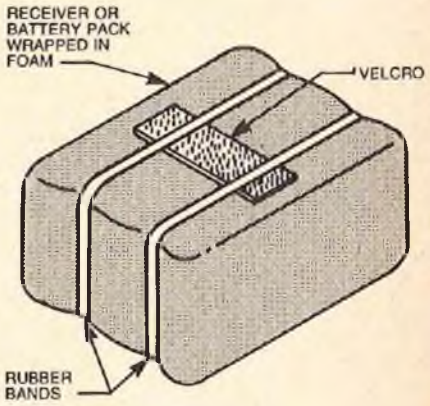
Norman Weiler of Lansing, Michigan, found the winds really blowing and gusting at a recent sailplane contest. The problem was how to hold his glider down while he was waiting his turn to fly. The solution was to hook a large rubber band around a large nail or spike which is pushed into the ground, and then stretch the rubber around the nose of his sailplane. The glider would still rock around but very gently. The same idea could be used for power ships by simply putting rubber bands around two nails and stretching up over each wheel.

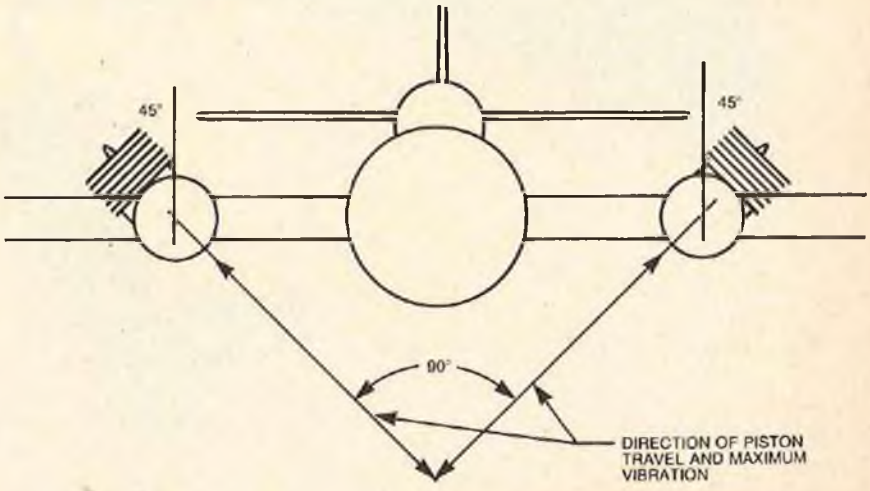
For those who have both a Gel-Cell and a DAE Power Panel, you will find that the Gel-Cell may be charged directly through the starter output on the Power Panel. Just install two banana jacks on the charger; red on the positive, and black on the negative, and plug in the starter output on the Power Panel. This eliminates the need to remove the battery for charging and the battery can now be built into the bottom of the field box. This idea was submitted by TSGT Kenyon L. Frey, APO New York.

Nick Ziroli of Smithtown, New York, suggests an improved method of installing engines in a twin engine aircraft. When the cylinders are mounted parallel to each other, all types of vibration occurs as the pistons go in and out of synchronization. Nick has found it much better to mount the engines with the cylinders at a 90° angle to each other. In this way, the pistons are never traveling in the same direction. It does not matter at what speed each engine is run, since they will not resonate to any large extent. Nick has used this method on several demonstration VTO models and has had absolutely no vibration problems at all.

To keep your different size wheel collars separated in your field box, try putting a twist tie from a garbage bag through the collars. This will keep the wheel collar sizes separated while they are all in the same container. In order to identify the different sizes, cut a small identification plate from a plastic coffee can top. Drill a hole or, with a punch, put a hole in the plate so it will go onto the twist tie. Then write the size of the wheel collar on your plastic identification plate. This idea was submitted by Leo Rydzewski of Johnson City, New York.

Velcro hook and loop fasteners make an excellent fastening material for securing your receiver and battery pack that have been wrapped in foam. Simply wrap the receiver and battery pack as usual, then place a couple of rubber bands around the foam. Next, secure the loop half of the Velcro with rubber bands wrapped around the battery or receiver, and epoxy the hook half to the fuselage in the desired location. This method will hold your receiver very securely, but will allow quick removal when necessary. This idea was submitted by Morris Finneburgh of Dallas, Texas. □





STICK WITH ELECTRICITY

The Merits of an Electric Glue Gun

By Philip S. Kantor D.M.D.

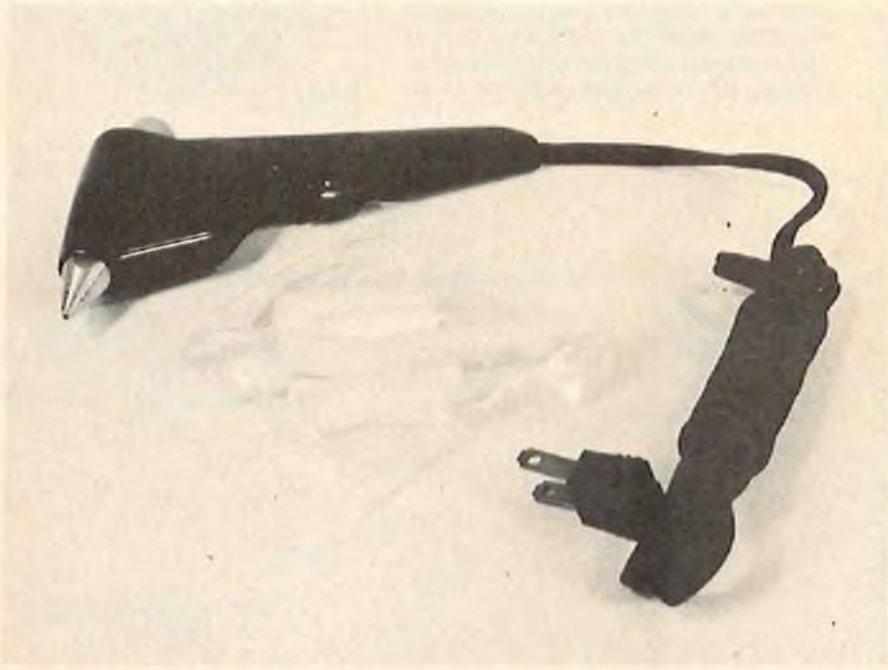
Are you looking for a way to eliminate pins, clamps and waiting from your construction? An electric glue gun may provide the answer. Electric glue has been around for a while but has found a low level of acceptance. I feel this is due to so few people trying it and, therefore, not knowing what they're missing.

Electric glue is an indispensable tool in my workshop. I use it in conjunction with another kind of glue, although it can be used as a primary bonding agent in a lot of cases. Electric glue takes only sixty seconds to set up. For this reason, building is not hampered by the waiting time that is required for the slower setting glue.

Although 5-minute epoxy is fast, it's not used in the same way. Epoxy is more costly and has to be mixed as needed, whereas, electric glue is always ready to go. The following paragraphs are just a few examples of ways to use electric glue.

Laminating doublers can be a problem. The pieces have to be pinned or clamped and then set aside, untouched, to dry. A bigger problem has been warpage of the parts, especially with the water based glues. By applying the regular glues, but leaving the corners and a center area for electric glue, I've solved both problems. The pieces are bonded on contact and warpage is prevented.

Cutting parts that have exact duplicates is easier with electric glue. I use this method for fuselages and ribs all the time. Just laminate the pieces of wood together with *tiny* amounts of glue. Usually three or four dots of glue will hold the pieces together. Apply the template to the top piece and cut out as usual. After that is done, the parts are separated. You now have duplicate parts. Just be careful and don't underestimate the strength of electric glue.

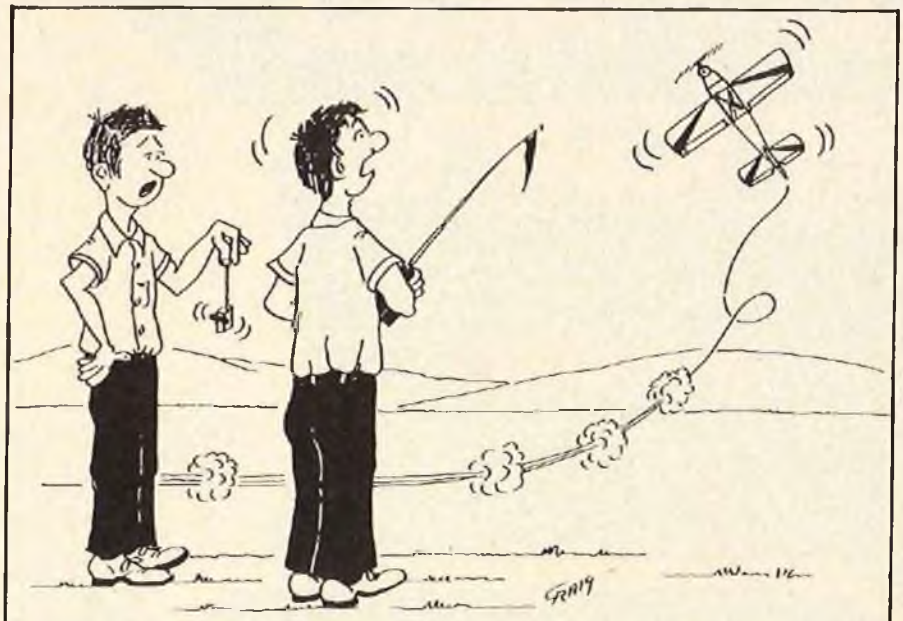


Frameworks of all types are easier to build with electric glue. Places that are difficult to clamp, or pieces that are too hard to pin together, can be handled easily with hot glue. By applying the electric glue and holding in place momentarily, there's no need for clamps or pins. It's usually faster to just hold a part than having to clamp or pin it. Parts can be located temporarily with hot glue. By reheating a joint, parts can be separated quite easily. Actually, with a little practice, you can learn to apply just enough to enable you to merely pull the parts apart, if done carefully.

I hope to have stirred up enough interest to at least make you think about trying one. Electricity does many things for us all, and this is another example. Electric glue will bond hard or soft woods, metal, some plastics (not foam) and just about anything that's not oily. I use the cheapest gun available and get excellent results. Keep your initial attempts centered on small items and you'll quickly develop a feel for this tool.

□

THINGS THEY DON'T TELL YOU



"I sure appreciate you test flying my new airplane . . . by the way, was this servo supposed to go in the wing?"

BY NEIL ALLEN

There have been several articles printed in magazines about how to get started in the hobby. Well, I am going to add my advice on this, but I am also going to talk to the intermediate flyers, who are progressing along the road to expert.

Naturally, one of the best things you can do is join a club, but even then the advice you are given, although well-meant, may be erratic, as the wisest head doesn't always speak the loudest!

The most important single piece of advice is to progress in sensible steps. Most of us can restrain the urge to build a scale four motored B17 long enough to build one trainer, but the trouble often comes in the next choice of model. You will find radio modeling easier and more fun if you follow the old saying "moderation in all things." This means a carefully thought-out combination of plane and engine each time.

Almost all R/C crashes are unnecessary, and they always cause a big setback to the flier, especially early on when you have no back-up plane.

BASIC

In the part to follow, I am assuming that you have an instructor to teach you how to fly. If you don't, then it is possible to teach yourself, but you must accept crashes initially as quite common. If you have to learn without help, a small 2-channel slope soaring glider (e.g. Graupner Dandy) is probably best, launched off any local ridge. The other alternative is an .049 powered 2-channel trainer, flown without wheels, over the longest grass you can find. Both planes must be carefully built, free of warps, and the balance point exactly as per plan.

For a trainer, my preference is to stay fairly small. The RCM .19 Trainer, Headmaster, Tauri, Falcon .56 and many others, are ideal with a .19 to .25 motor. The .40 to .60 sized trainers are very similar in the air to learn with, but when they crash, the results are far more devastating, with radio and engine damage more common.

The problem with small planes is that they can struggle to take-off on a rougher grass field. This would mean hand-launching, which is less convenient, and more likely to cause a crash.

Quite a good solution, apart from simply using more nitro in your fuel, is to buy a .23 or .25 motor for a .19 size plane and, if it is a little fast, then throttle back more for cruising. Throttling back is a good idea anyway, on most trainers, as it helps to make things happen slower. But do please avoid a bad mis-match of plane and engine, such as a .40 in a .19 plane!

Most people learn with rudder, elevator and motor aircraft, leaving ailerons for later. However, you can jump a step here and start with an aileron trainer. The problem is that they have less dihedral, and don't recover after a turn by themselves. You have to give opposite aileron to level the wings and stop the turn. If you are fortunate enough to be taught with a buddy box, then this is not much of a problem.

Note that when flying rudder/elevator planes, you connect the rudder servo to the aileron socket of your receiver, so that your actions in flying can be easily transferred to an aileron plane.

The choice of a second plane depends on how successful the flying of the first one was. If all went well, and you are progressing well, then an aileron trainer is called for. It can be a bit faster — perhaps a .40 size motor this time, or stay with the motor from your trainer.

My own basic trainer had a Fox .19 in it. I found it very powerful, very reasonably priced, but hard to start. I suppose that an electric starter, which is something you will probably get anyway, would have solved this problem. After I had finished learning to fly, it had a piece of mounting lug broken off, and was worn out from dirt going through it, so it hasn't been used since. However, my next engine was an HP40 and, although a more expensive investment, has been used in many planes since then.

When you go up a stage, the most important difference between an advanced plane and a basic, is the airspeed. A basic trainer probably flies at around 40 mph, so your next step would be flying about 60 mph, then about 80 mph. My second plane was a Strikemaster with an HP40 and, although it is a

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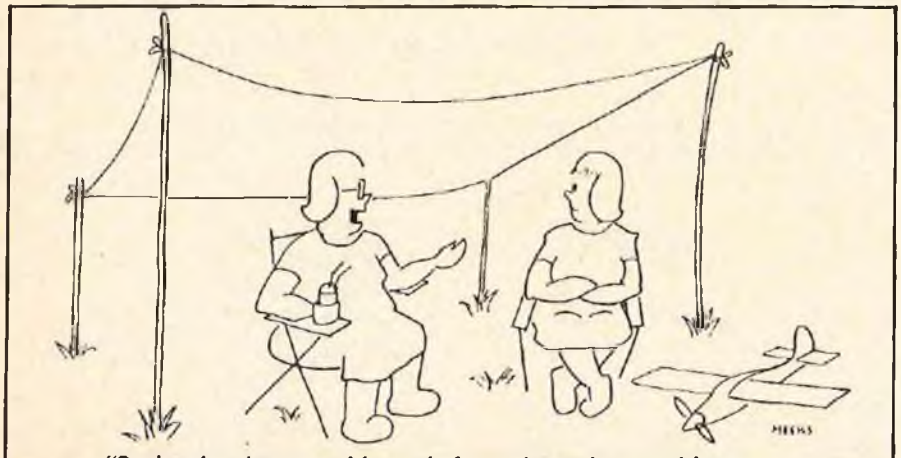
ABOUT R/C FLYING



"Spring is when an old man's fancy turns to smashing up what took all Winter to build."

SHOWCASE '77

from page 102/98

NORTH AMERICAN CONTROL MIXER

North American Model Enterprises, Inc., 7639 Grapevine Highway, Ft. Worth, Texas 76118, has produced a truly superior mechanical control mixer assembly. It is tough, rigid, and precise, featuring smooth linear operation. It is designed for use in V-tail gliders, for elevons (flying wings and deltas), flaperons (with full span ailerons), for dive brakes-split rudder, and other uses not yet invented. Suggested retail price is $3.95 at your local dealer. Add $1.00 for handling and postage for ordering direct. Dealer inquiries are invited.

VINTAGE DECAL REPRODUCTION

Larry L. Vance, 5066 Cindy Way, Las Vegas, Nevada 89102, is reproducing vintage decals of first class quality. They have been designed by one of the finest artists available and reproduced by one of the largest and most well-known decal manufacturers on the West Coast. These sheets will be sold at a cost of three for $5.00 postpaid. Each sheet includes decals such as Forster, Champion Spark Plug, Dennymite, Texaco, O & R, and Cyclone in various sizes. A completely different set is also currently being produced and will be available shortly. □

THINGS THEY DON'T TELL YOU . . .

from page 95

powerful Schnuerle ported motor, the aircraft has a large, thick wing, which makes it slow enough to be very easy to fly. A small, thin-winged design, like a Quickie 500, with a hot .40, would be a disaster at this stage of learning.

My third choice of plane was where I went "off the rails." I had learned so easily with my first two, and could even go through a rough FAI pattern, that I was sure that a .60 pattern plane would be no problem. Unfortunately, the plane I chose had a thin wing and, with a new Webra Speed .60, it was way ahead of my reactions in the sky. To make it worse, I had trouble setting the carburetor, and a rash of deadstick landings gave the plane an exciting, but brief, life. The dealer, whose advice I had ignored for that plane, put me right after that with a nice, slow Superstar design for my .60, and my problems were over. Incidentally, if you have carb problems on a .60, then I suggest using the Perry for the Webra Blackhead in place of the regular carb, it is more consistent, and very easy to set.

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One of the main differences between pattern planes and more basic planes is the low wing. The stability in the air is not the problem; it is simply the vulnerability to damage of the wing mounted wheels, and the fact that the wing tips are closer to the ground, so there is more chance of a tip "digging in" on landing approach. The solution for a pattern trainer would be a plane with a thick, symmetrical shoulder mounted wing, and a fuselage mounted landing gear. Perhaps the Prather Panther is the nearest to this concept for a .60, and the Strikemaster for a .40.

Another problem in learning R/C, that applies at all stages, is "getting your eye in." Controlling a model is a hand-to-eye co-ordination skill, and it wears off quickly. If you fly on Saturday, and again on Sunday, you can carry on learning from where you left off the previous day. But if you only fly every Sunday, you will take one or two flights (ten to twenty minutes in the air) just to get back to where you were. I am sure that this has caused countless "incidents", especially with the first flight of a new plane. This is often the first flight of the pilot as well for a week or two, and he doesn't have the reflexes to fly an out of trim model. If you don't have another model at the field, then try and persuade a friend to let you take over his sport plane for awhile, even if you just circulate high up, and don't do any landings with it.

PATTERN FLYING

(a) Flying Speed: The most important feature of any pattern design is the speed at which it will fly. Obviously there are plenty of other important design factors but, if you are building a design that someone else has successfully flown, then these are generally taken care of. What you have to consider is how the plane will suit you, and the speed in the air with your own combination of engine, fuel, etc., is of vital importance.

A beginner to pattern type planes must start with a slow flying plane, even if this is achieved by using a ship that would normally be fast, but fit a less powerful motor than usual.

Note that Wolfgang Matt won the World Championships with a slow flying plane that would be ideal as a pattern trainer. You don't ever have to go to fast planes, but maybe you should try one later. They make rolls easier, as less corrections are required.

I have compiled a chart (Figure 1) giving an idea of the factors involved in making a plane fly slow or fast. Some are obviously more effective than others, but it will act as a guide. Also, I cannot give a complete list of engines, silencers, etc.,

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rated against each other. Maybe someone with more experience than mine could help us all by publishing a list of, say, twenty popular pattern designs, classified roughly by speed.

Please remember that you have a lot of control over a fast plane with your throttle. Most pattern planes will fly well on half throttle, since this is about 70% power and you can keep full power for take-off.

The other way this gives you a choice of speeds is in the way you do your Split-S at the end of each maneuver. If you half roll, then close the throttle and do the half loop, then open up again when you are leveled out, you will not build up the high speed you would if you kept the throttle full open.

(b) Retracts: Retractable wheels are fitted to pattern planes 20% because they increase the airspeed, and 80% because they look prettier in flight (to the judges especially, you hope!). People claim other reasons, such as decreased sensitivity to gusts, to which an aerodynamacist would give a very raised eyebrow.

Actually, the speed difference is not that much, as most comparisons have been done with the same plane, wheels up and down. This is not a fair test, as when the wheels are down, they leave huge wheel wells exposed, which fixed U/C planes don't have.

SLOWER	MEDIUM	FASTER
1. **Fuel:** Straight (no nitro)	5 to 10% nitro	up to 30% nitro
2. **Aircraft:** Atlas, Superstar (Thick wings and tail)	Blue Angel	Mach 1, Phoenix (Thin Wings)
3. **Wheels:** Fixed U/C	—	Retracts
4. **Prop:** Nylon props, and lower pitch (11/6 or 12/6)		11/7¾ or 7½, wood or fibreglass
5. **Motor:** Loop scaveged, e.g. Webra Blackhead	Schnuerle or ported e.g. Webra Speed	Webra Speed plus Perry pump & carb & tuned pipe
6. **Silencer:** Quiet designs, e.g. OS703, Minivox	HP or Webra Standard type	Open front, or Mac's closed front.
7. **Weight:** Over 8 pounds (note: this situation is reversed for landing speed)	7 to 8 lbs.	Under 7 pounds

FIGURE 1

I feel that until you get near Nationals winning standard, you should stay with fixed gear. If the urge to see retracts working in the air is too strong, then build a scale job to show them off.

All brands of retracts require maintenance, and more of this than the rest of the plane put together. This takes time and, until you have two spare pattern planes ready to fly, you shouldn't spend time maintaining an unnecessary part.

If you haven't used retracts before, and don't belive me, let me tell you some of the things that can go wrong.

The gas type (Rhom, Sonic) have plenty of power and nothing to stall, but the gas tubes can blow off the connectors, or "O" rings can leak. The metal pipes can come off the cylinder, or your can of gas can leak out on the way to the field. Also, small screws must be secured with Loctite.

The mechanical types need adjusting of pushrods from time to time, and if you have a hard landing, and don't notice a leg bent back, you are in trouble. When you try and retract in flight, it will not fit in its wheel well, and either your servo will strip its gears, or stall. This is the reason for a separate battery pack, otherwise this could flatten your receiver battery.

All types of retracts can be more easily and more expensively damaged in a rough landing. There is one advantage, though — if your engine cuts suddenly,

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and you have to land in rough ground, you can land wheels up with less damage.

If you think the drag of a fixed U/C plane is too high, then either use an extra 5% nitro in your fuel, use smaller streamlined wheels, or even put a 2-wheel U/C on your next model, which will reduce drag by one third!

(c) General: Pattern fliers take a lot of pride in building elaborate models, and finishing them off well. However, this gives the false impression that all these little extras are necessary to fly properly.

Actually, a pattern plane can be thrown together with the same number of parts as an Ugly Stick, in the same building time, without much effect on flight performance. A foam wing, covered with cardboard, 1/2" sheet tail, and a box fuselage version of an existing pattern design, makes an excellent flying plane - - - all you need until you start to score eight out of ten for your maneuvers in contests.

Don't forget that you don't have to use a .60 motor to fly pattern, there are some excellent .40 planes around, and even a .19 plane could probably do the job. However, the motor must be fairly powerful, with a good, reliable idle.

SCALE

Scale models have a reputation for being hard to fly, and they often deserve it. They look great in the air, and on the ground, but flying them is not always pleasant. The designs obviously vary widely, but in general, the ones which fly the best are models of modern lightplanes (Cessna, etc.)

The problem areas are:

(a) Weight: If you take most sport planes and increase their weight by 50% (as the details in scale models often do), then the landings and take-offs will be faster and trickier, the flight performance poorer, and the undercarriage would have trouble surviving a hard landing.

These problems are often there with scale models, plus such things as lower engine performance due to large cowlings, etc.

(b) Tip Stalling: This is what turns many attractive full-size planes into terrible models. It is due to "scale effect", which works like this:

If you have a full size plane with 10 foot wing root chord (width), and 5 foot tip chord, the lift at the tips is 50% of that at the root, and the stalling angle is about the same. If you have a model with a 10 inch root chord, and a 5 inch tip chord, the lift at the tips is about 30% of that at the root, and the tip may stall at a lower angle of attack. Thus when the model

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stalls, one wing tip loses lift first, and the model flips over on its back.

The way to minimize this is to use plenty of washout, and perhaps change airfoil from root to tip. Even then, you should make your landings and take-offs long, flat and fast.

Moving the C.G. forward can cure it, but if it is a taildragger, you are restricted in this if you want to keep the wheels near their scale position.

(c) Landing Gear: The problem here is the "taildragger", as tricycle gear planes are easy. The scale position for the wheels is often rather far back, and you either have to put it further forward, or accept a more tail-heavy plane.

The U/C legs are always much longer than a model needs, and this means more "leverage" to cause a nose-over.

Torque effects seem to be worse on a WW II fighter type model than on a similar sized sport model. The throttle must be opened gently, with full up elevator to stop a nose-over. As the throttle is opened, full right rudder is usually needed, but as soon as the throttle is full open, the rudder must be neutralized. All this time, while you are juggling rudder and throttle, you must also have released the elevator to neutral to let the tail come up, then pull back gently to lift off. It is all too easy to stagger into the air at too slow a speed, through keeping the elevator up too much.

Armed with this information, you can consider critically a scale design before building it. For example, Dave Platt's T28 rates very high in flying capabilities; with tricycle U/C, washout, and a moderate wing taper. The worst design I have seen used for a scale model is the DH 88 Cornet racer — it has pointed wings, twin engines, and tailwheel gear, and the builder said it was impossible to slow down safely more than half throttle!

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POWER BOATING

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diameter than the first, which I cut off slightly longer. Finally, I cut a cover out of a sheet of thin aluminum to fit over the two tubes. In the outer tube I drilled two holes at 180° to take the water inlet and outlet pipes, which were made of brass tube. Next I stuck the whole thing together, using a good quality epoxy glue, since the heat generated is not sufficient to soften this. The smaller tube was first

glued to the boss (if there isn't one on your motor, don't worry, get the end of the tube well and truly squared off and glue it on to the end-plate, concentric with the shaft). Next, the longer tube was stuck in a similar manner, concentric to the smaller one. At this point, it is obvious that the aluminum cover, if fitted to the outer tube, is not going to touch the inner, so it has to be slightly dished. I solved this easily by putting the cover on a lead block and tapping it gently with a round-nosed hammer. That was then glued in place and, finally, the inlet and outlet tubes. And there you are — the front end of the motor is done. Not too bad, was it?

The other end is similar, except that this time there is no coupling to worry about and the shaft usually ends just beyond the bearing. So all we need is the inner aluminum tube, a disc cover, and the inlet and outlet tubes; the whole thing is just stuck in place over the bearing which is watertight if it is a plain bearing. If your motor has ball-races, then you will just have to use the same method as for the front end. (And in case any of you distrust the idea of the bearing being watertight, then don't. I have a motor which has run for a year like this, with no troubles.)

Okay, that's the bearings fixed, now let's take a look at the brush gear. This is a little bit different and depends a lot on the motor in question. The Kroker motors use a small piece of tube soldered to the screw-caps which hold the brush spring in place, and this seems to work satisfactorily. I sat and thought for a long time in the case of the Bullet, before coming up with a solution. The trouble is that the brush gear housings of brass are set into a plastic plate, so the cooling has to be really efficient and on the brush side of the plate to prevent the heat actually getting to the plate and melting it. (It must be pointed out that the Bullet is a bit of an exception, with regard to the arbitrary motor categories I mentioned at the beginning, since it is a low cost, hi-power motor.) Anyway, after a lot of skull-scratching, I came up with the following idea: There is plenty of room inside the motor to fit a piece of 4mm diameter brass tubing, soldered across the brush housings, without touching the working part. But of course, this is not good since the tube would be a direct short circuit across the battery. And then, suddenly, the light dawned! All I had to do was to cut a piece out of the middle of the tube and replace it with a bit of silicone fuel tubing to break the electrical circuit.

First of all, I annealed a length of brass tubing by heating it red hot and then letting it cool down by itself completely. (That last bit is important, unless you have asbestos fingers! And don't laugh, you'd be surprised how many really clever guys have gotten badly burnt in

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that way — does that make me a really clever guy, or just dumb?) The next job was to bend the tube in my fingers into a nice curve. This is necessary to keep it clear of the commutator. Having done this, I cut a 1cm length out of the middle of it and joined it up with a length of fuel tubing of the appropriate diameter.

The next job was to clean up all the metal, put it in place, and mark where the tubes touched the housings. I then took it out and tinned it and, at the same time, I tinned the housings. Finally, I put everything back in place and ran the iron over the areas where the brass tubes touched the housings, running in an extra bit of solder at the same time, to get the biggest heat-transfer surface possible. I left enough of the brass tubes sticking out to take the water-cooling tubing from the front water-jacket, and that was it.

It is not really necessary to bend the brass tube and then cut it — the job could be done as well by using short, straight lengths; but in this particular motor, it was the best way of getting a nice, smooth run in the fuel tubing without provoking any kinks. I used a fairly big-bore tubing to get as much water over the heated area in a given time as possible.

There is not a lot more we can do to the motor itself, except to make sure that it is fitted to the hull as rigidly as possible to prevent vibrations. I use a glass-fibre mounting that I copied originally from a kit I came across in England. This is a hollow mounting and the motor fits exactly into it, being held down by a metal strap and a couple of bolts. However, the hollow mounting got me thinking — why shouldn't I go a stage further and run the cooling water through it; so providing some degree of cooling for the outer casing of the motor at little extra cost in work? No sooner said than done, as can be seen from the photos. I can't state categorically that this is necessary, but since Ray Kroker sells water-cooled mounts for his motors, and he knows a lot more about it than I do, again, why not? I figure I can't lose.

We now have to turn our attention to the power-pack, which as I have said before, is usually a block of nicads since these represent the best power-to-weight ratio and also allows fast charging. These will get quite warm, especially at high discharge rates, and it is a big advantage to use some method of cooling for them, too. However, I should point out that this is necessary only with really powerful motors in excess of 500

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watts, for example. Another advantage is that if they are cooled, there is no need to wait for them to cool down before a fast recharge.

The method is extremely simple and again makes use of brass tube, preferably in 4mm diameter. The tubes are used to solder two cells together, and silicone tubing is employed as the liaison with the next pair to avoid electric nonsenses. There seems to be no problem with the water conducting electricity, though I must say I would hesitate to use this system in conjunction with salt water!

The actual soldering of nicads merits a few words. These are sealed cells and, as far as possible, care must be taken to avoid heating them. This is obviously unavoidable when soldering, but there is a trick to limit heating to some extent. The tube, or if you don't need cooling, the bracing rod (which should be at least 2mm in diameter to avoid losses through resistance) should be pre-tinned. The original solder tags are removed carefully from the cells; they are much too thin and will generate resistance. The cells should be completely discharged before the operation, to avoid damage due to accidental short circuits. (This is pretty important since the short circuit current can be up around 80 amps which is not inconsiderable.) Incidentally, here's a short story — One day I had four 1.2 a/h nicads used as an R/C supply in my pocket, along with my penknife. As I was walking through town, I smelled something funny and couldn't figure out what it was. I soon found out- - - the hard way! Yep, my pants were on fire! The knife had bridged the cells in my pocket. Nasty that! Get everything ready then, using the biggest soldering iron you can lay your hands on (75 watts minimum), solder the pack together as per the diagram, letting the iron touch the cells just long enough to make the solder flow. The theory is that the bigger the iron, the greater the local heat transfer, which will melt the solder before the rest of the cell gets a chance to warm up. Using a small iron, the whole cell will get hot through absorption before it gets hot enough locally to melt the solder. The tubes can then be linked up using silicone fuel tubing.

One last word: When the power-pack is connected to the motor, use the heaviest gauge electric wiring you can because the smaller it is, the greater will be the resistance losses.

Well, I guess that's about it for this month. Back to the workshop where I am working on a series of propeller experiments. If anything ever comes of them, I'll describe them in a future column. □

MAGIC MULTIPLIER

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can turn, but not too easily, and you are done.

The device is really quite easy to use. To convert a 3-view drawing directly into dimensions in inches which you can use on your model plan, use rings No. 2 & 3. First measure the wingspan on your 3-view and locate it on ring 2. Then rotate the disc around to where your model's wingspan (on ring 2) comes opposite to it. Now all you have to do is measure anything off your 3-view and read across to get your model's actual dimension for the corresponding part.

You must keep two things in mind, and these will require explanation if you are not familiar with the opeartion of a slide rule. **First:** All dimensions, whether scaled off the 3-view, built into the model, or actually on the prototype airplane must be taken in decimal parts. Thus an airplane whose span is 36 feet, 4 inches is 36.3 and a 3-view drawing of 4½" length is read off as 4.5. **Second:** (And indirectly contradicting my previous statement.) Ignore all decimal points when setting things onto the device. For example, 7", 7' and 70' are all the same to the slide rule. You must keep in mind what decimal values you have set in.

Ring 1 is basically the same as Ring 2, except that you enter prototype dimensions directly on it which are read off as model dimensions. You can also use this same set-up to read off the airplanes actual dimensions on Ring 2 as you enter them on Ring 1.

You can also use this device as a circular slide rule, but we won't get into the details of all the different functions of a circular slide rule here. Check out a book about the slide rule and its uses from your library. You will get much more information from it than we could give you in an article in this magazine where we are pressed for space. ❑

PIT STOP

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dots" which will send us straight into the boards. This particular track has super traction, so before we get to turn 2, we'll turn hard left and "punch it" (full throttle) right through turn 2.

Turn 3 is much tighter, so we'll brake just at the start of turn 3, turn hard left again, go half throttle around the apex, and then full throttle towards turn 4.

Turn 4 is also very tight, so rather than try to hug the inside of the sweeper (turn 5 — a large sweeping turn), we can keep our speed up by exiting turn 4 a little wide and then moving the apex of turn 5 well past the center, which allows us to punch through turn 5 and get a flying start down the straightaway.

Turn 6 at the end of the straight is very tight. We'll be running 50 mph, have to brake in a fraction of a second to about 8 mph before the apex, then we just have time to punch it, and it's time to brake for turn 7. It's half throttle through turn 7, full throttle towards turn 8, brake, then punch hard from the apex of turn 8 and drift outside on the drivers straight. Easy, wasn't it? The idea is to practice using these lines so you'll be able to do it instinctively in the excitement of competition.

Now, let's look at Figure 2. It looks like I just dreamt up a weird line doesn't it, but you'd be surprised at how many drivers wander around the track like this. Let's see where this driver is losing time. Coming out of turn 1, he's punched all the way to the apex of turn 2, but then he has to almost stop (lost time) coming out of turn 2 to keep from hitting the boards. He then punches through to the apex of turn 3 and brakes to almost a stop (lost time) and then punches toward turn 4, but he's lined up on the **inside** heading for turn 4 so he has to brake real hard (lost time) to be able to get through turn 4. He then punches and goes too wide (lost time) over corrects and heads to-

wards the inside (lost time) over corrects and goes too wide (lost time) and finally makes it to the straightaway.

Ah — the straightaway! This is the highlight of the track for everyone who has ever raced an R/C car! It's amazing how many people figure they're going to "make time" once they get to the straightaway. But it takes the least amount of talent to drive the straightaway than any other part of the track — think about it. Did you notice that "S" line I put in the straightaway? Doesn't seem possible that someone would drive a straight that way does it? But if you want to improve your driving, spend a little time standing at the end of the straightaway and watch the different lines down the "straightaway." You won't believe it — even watching it.

One of the hardest things for a Beginner to do is to back off the throttle, especially at the end of the straightaway. Actually, this is probably true with all the driver classes. All that time they supposedly "made" on the straightaway, they immediately **lost**, plus another second, by overshooting the end of the straightaway. This then, causes immediate panic braking, usually ending up in a "spinout" **losing** another couple seconds. But it's okay, they're going to make up "time" by overshooting turns 7 and 8. Sound familiar?

I hope now you can understand why I want you to get this notion of "making time" out of your head and rather concentrate on areas where you might be "losing time." I know there's a lot of areas that I can improve my driving to save time. How many areas can you improve your driving on, to **save time**?□

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Rankin's new Formula One Super Midget Mustang II. The kit features a special laminar flow wing, with twist for tighter turning, contoured canopy for undisturbed airflow over the fuselage, and minimum dimensions. The lightweight fuselage, cowl and wheel pants, are epoxy glass with engine compartment ducting and reinforcement included. Plywood wing skins are included for the foam cores as well as a full depth spar. A new concept dural landing gear features simple mounting with minimum stress on the wing. The complete kit is available through your dealer or the Model Merchant for $99.95.

New from Kustom Kraftsmanship for 1/2A racing, is a pressurized engine backplate with an internal ball-check valve to prevent inadvertant crankcase flooding when refueling. Part number is 173B and sells for $4.50 from your dealer, or Kustom Kraftsmanship, P.O. Box 2699, Laguna Hills, California, 92653. Write for their catalog of engine accessories and custom engines.

I just started flying Formula One at the end of last year and have flown the first race of this season and I really like it. After flying Quarter Midget and 1/2A since 1971, it is a real thrill, yet not half as hard as I thought it might be. The engine noise is deafening and ear protection must be worn. The speeds seem

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RACING AT RANDOM

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incredible when viewed from the pits, yet the actual time per lap, is about the same as Quarter Midget, since the airplane is traveling a longer distance. The airplanes themselves, fly very well, and are smoother to fly than the smaller racers, so once you adjust to the noise and the fear of fear itself, it really becomes fun. The most important thing is being prepared and knowing your engine and airplane so you do not miss heats over little things. Set up a routine after each heat of cleaning off the airplane, check the prop for nicks or cracks, replace the glow plug, check the wheels and wheel pants to be sure they are not loose, yet are free rolling, check fuel lines for holes and refuel. Also check for any loose parts, as engine vibration can do strange things. Plug the fuel line to the carburetor and pressure tap to prevent engine flooding during the wait for the next heat and leave the cheek cowl off as a reminder, then wrap the engine with a clean rag to keep dirt out. Leave the cowl off and fuel lines disconnected, until you reach the ready line, which still gives you several minutes to hook up the fuel lines and replace the cowl. Check your transmitter to see that the fuel shut-off is open. The engines start easily when they are not flooded and your battery is fresh. When you do reach the flight line, set-up quickly so that you are ready when the starter says "start", which can give you a few extra seconds in case something does go wrong. I will try to imprint that last paragraph on my brain, as next weekend is the big race at Bakersfield, and I have been trying to get two airplanes ready. I'll tell you about it next month. □

SNAKE HILL

from page 81

aerobatic pilots as a reference line for practicing aerobatic maneuvers. This is all very legal since the area above Malibu canyon and Snake Hill is a designated aerobatic practice area for pilots from Los Angeles area airports. Where else can you kick back between flights and watch a free air show?

Snake's location off of Mulholland Drive and its nearness to Las Virgenes Road, make it inevitible that passersby below catch a glimpse of the action. Curious, maybe even a bit interested, about the fools on the hill and their toy airplanes, many of these diurnal travelers end up taking the unforgiving drive to the top for a closer look at the goings on. Once at the top, the spectators begin

oohing and aahing and asking the typical questions; you know the ones. In as nice a way as can be expected, while taking your attention from the flying at hand, you answer their questions. Who knows? One of these interested souls may even take to the sport. And did you ever try to fly and fight off a busload of camp Fun Timers? We just have to grit our teeth and bare it; or do we?

The slope itself is arranged in a wide bowl configuration with models being launched and flown from the center facing due South. The breeze usually blows at a more or less 90° angle to the face of the slope, resulting in the best possible lift. If the wind happens to be northerly (from the north), it is possible to do a 180 and fly off the back side; that is if you're daring enough. The back slope has a more gradual decline than the front for a much further distance. The terrain, though not rocky, is very unevenly laid out; as a result, the conditions off the back are usually quite turbulent and, as a rule, reserved for the more experienced flyers and their second best airplanes. When the wind is northerly, it is likely to be due to a Santa Ana condition of high velocity gusts. The smart modeler will avoid the Santa Ana condition and hope for the best the following weekend.

Flying at Snake does not limit the soaring enthusiast in his talents. The thermals that are generated off the face of the slope and the valley below are absolute brick lifters, making it possible for the RC'er to climb his glider to altitudes where it is barely visible. These thermals offer a welcome change of pace to the pilot who becomes bored to death of ridge running. Fortunately, most of us have found that there are more exciting ways to fly on a slope than this, but enjoy thermal soaring as well. Especially when the resident hawks show one where to find the thermals. They can really pick em'!

Another nice thing about flying at a fine slope like Snake, is that it causes modelers to have an insatiable urge for developing new and slightly ludicrous ways to fly an RC glider. This isn't possible in the old cow pasture (who flys in cow pastures?) where there is a constant threat of a mandatory landing. (Of course, there is nothing wrong with this kind of flying.) As long as the wind is blowing at the slope, no such threat exists. How sweet it is! I must not neglect to mention that the slope condition is excellent for training beginning pilots and testing new models.

When the VSF isn't holding a slope race at Snake, anything can happen. A favorite pastime among pilots is dog fighting. After all, what is more enjoyable than seeing your masterpiece of modeling innovations sliced in two and strewn about the canyon? Before evolving to the present state of the art, fifteen foot

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SNAKE HILL

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long paper streamers were attached to the tail section of the two models about to duel. To score, a streamer had to be cut. This was fine and dandy, but required too many landings to replace the streamers. Because of this, the paper streamers were replaced with magnetic recording tape. To score a point using the tape, one would merely have to hit it; but as Bill Watson and Rick Pearson can tell you, this was not usually the case. Bill and Rick are well known at Snake for their aerial antics and are no less than treacherous when it comes to combat; having had seven mid-airs two Sundays in a row. Poor Rick had gone through three airplanes those two weekends, while Bill managed to keep his one intact. It could be that being a licensed sailplane pilot and a hang glider flyer has given Bill an edge. Bill's airplane, a Rubber Ducky, which was designed by Bill and first flown at Snake, was recently introduced on the hobby market by Performance Flight Systems. It is an excellent slope ship. Look for it!

Snake Hill is just one fine example of the many hillsides being used by RC glider clubs throughout the country. If you have not yet had the chance to fly on a on a slope, you should really make an effort to do so, for it offers new dimensions to RC soaring. □

DAS BOX FLY 20S

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····· panel and, when dry, joined the two panels together. Then we cut the center section rib to provide the required front and rear sections. The remaining piece of the rib was split in half length-wise and used to form the sides of the servo box. A piece of scrap balsa was cemented in place between the upper main spar, and the next rearward dihedral brace, to provide support for the top center section planking.

Another modification we made was to use two 1/16" piano wire pins to key the hatch into the front bulkhead, with a rubber band around the hatch and the front wing hold-down dowels, to secure the rear of the hatch.

Although the plans called specifically for an OS .20 engine, we felt that this would not be enough power to do the job from the grass field. This was confirmed in subsequent advertising by World Engines and also by a telephone call to that company. We, therefore, installed a valiant old Fox .36 with a Perry carburetor which was supplied with fuel by a Pylon

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six ounce tank which fit perfectly in the fuel tank compartment.

Our entire aircraft was covered with transparent Solarfilm, using red on the wing and horizontal tail and blue on the fuselage and vertical fin. Perfect Paint was used on the exposed wood at the nose, both for appearance and fuel proofing.

An MRC Mark V radio was used for control using the pre-cut plywood servo tray supplied in the kit, with the servo holes enlarged slightly to take the MRC servos. As an example of the design of this kit, a half bulkhead is supplied to support the rear of the servo tray which is, in turn, supported in the front by a key into the front bulkhead.

Because of the fixed tail skid, the airplane could not be taxied from the pit to the runway. On Take-off, the built-in right thrust was apparently excessive, considering the larger engine used, although it probably would have been exactly right with the specified OS .20 engine. As a result, the airplane had definite right turn characteristics until flying speed had been attained. We also found that, with the larger engine, slight up-trim was required under full power and slight down-trim in a power-off situation. Again, use of the called for less power engine, would have made the engine offsets correct.

We were very pleased with the flight characteristics of the model. Even with a fully throttled engine, and with the airplane in a full stall, aileron control was still positive enough to make controlled turns in either direction. It has excellent low speed capability to the extent that three point dead stick landings are possible with no wing drop. We would suggest that a steerable tail skid or tail wheel be given serious consideration by the builder. We modified the test model by wiring a piece of brass tube to the rear of the fuselage and running the tail wheel wire through it, along the bottom of the rudder, where it was strapped in place. A wheel collar was put on the wire, under the tube, to relieve the strain on the rudder. This made ground handling a breeze.

Despite its intended purpose as a basic trainer, increasing the power and control throws will give the more advanced flier a model which can match his flying skills.

Although we haven't had the occasion to crash test the model for strength, the materials used and the method of construction should certainly make it durable and an excellent airplane for the beginner. In our opinion, it is a good buy at $29.95 and we look forward to trying others in this same series of aircraft. □

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ferent wing sections were used, the NACA 4412, a 64412 laminar section, and the NACA 18. The NACA 18 seems to be the best, provides the most lift with the cleanest drag. The laminar section suffers in lift without the reflex trailing edge, but seems to be cleaner at high speed. The 4412 is too blunt an entry, doesn't seem to be able to get enough weight in it to go faster. Dry wing loading is about 25 ounces per square foot — the oversize stab, which counts for area in the FAI rules, permits this. The airplane weighs 11 pounds — no ballast can be carried. So it flies at the same weight in light or strong winds, and the variable camber section is the compensator."

Now if all that sounds complicated, that's because it is. All you have to do is take a look at the Rube Goldberg mechanism which Ken designed to accomplish all those features, and you'll agree that he really did a lot of hard thinking.

Rick Pearson also did a lot of thinking. Last year he had a fast airplane, but it just wouldn't turn. So what did he do this year? Listen.

"This year, basically, I have ailerons and flaps in a flaperon configuration, an all flying stab, and the ability to change the mode of the flaperons in flight where I can operate with flaps independent of elevator and in flight be able to switch the flaps into a coupled flap and elevator configuration. The plane weighs 10¾ pounds dry, giving an FAI loading of about 20 ounces per square foot." Although his mechanism wasn't as complicated as Ken Kilbourne's, it still required a lot of planning."

Perhaps the most outstanding innovation that appeared this year was the racer designed by Blaine Rawdon. No ailerons — the entire wing surface rotated, with a coupled rudder to assist in the turns. How did he do it? Listen to Blaine:

"I used a pivot point in the wings; the wings pivot on a rigid stable rod; there's a flying fork attached to a pin in the trailing edge of each wing, and the pushrods are taken from that to a sort of balance beam which takes out all symmetrical loads from looping and such. Two servoes are run through an averager or mixer on that balance beam to tilt the balance beam and thereby pitch the wing in the opposite direction. Wing incidence can only be adjusted on the ground."

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Part of the theory behind the rotating wings is that the airfoil is not degraded by aileron action and, therefore, with only small changes in incidence, the drag of the airfoil is only slightly greater during turns compared to the increase created by aileron action. The concept is one of the most promising of all, but further structural development is needed before it will be reliable in strong winds. My guess is that Blaine will have those refinements well under way by the time of next year's trophy races.

Elmer Haynes and his racer with turbulated wing.

Tense scene at pilot line. Note pylon judges monitoring line of sight as Jerry Kralnock makes a turn. John Baxter guides his approaching Peregrine.

Bob Andris, whose Peregrine design in 1970 made a quantum jump in the concept of slope racers, showed up with his new and improved Shark. The tapered wing has a laminar flow airfoil which Bob calculated out for the Reynolds number regime in which the slope racers fly. Nothing unusual about that, but everybody did a doubletake when they looked at his V-tail stab section. The airfoil is the same as the wing, but upside down. Theory? To groove the flight, the C.G. is ahead of the center of pressure of the wing, so a down load is necessary at the stab. Rather than use a symmetrical stab, with a greater differential in incidence between wing and stab, Bob used the inverted airfoil — less drag at the inverted lift angle of the airfoil than would be the case with a symmetrical stab.

Still another theory. Elmer Haynes, with help from an aerodynamicist friend,

showed up with a thin wing that had three turbulators on the upper surface. How effective? Couldn't tell. Elmer had radio problems, and never really got his plane in the groove. But he'll be back.

So you can see that design theory was the real name of the game this year. Too bad the wind didn't give them all a chance to prove out; but that's also the name of the game in slope racing. You can't win if your plane won't stay up. My guess is that next year all the ideas will reappear, but the guys will have lighter models at the bare condition, with the ability to load them up when the wind increases.

Due to the light winds, speeds were not as high this year. Fred Weaver had the fastest time of 1:58, which works out to a little over 40 miles an hour for the course, and a little over 60 at times in the stralghtaway.

All things considered, the South Bay Soaring Society did a first class job of

Gayle Liragis, ranger, Bob De Mattai, contest manager, and Hank Richards, ranger In charge, had difficult job controlling spectators, but kept their cool and controlled the crowd.

adapting to conditions. Races were originally planned to be 8 laps, and 10 on Sunday, but the light winds necessitated curtailing the course to 5 laps. Bob de Mattai, Jack Altern and Curt Christen had their hands full. Even though it was widely publicized that spectators should watch from the beach, they wouldn't stay there. At one time, Hank Richards, the ranger in charge, pointed out that sixty people were on the hill — almost twice as many as there should be. Racing was shut down until some of the spectators — and excess officials — got the message and left. After that, Gayle Liragis, the crowd control ranger, gently told newly arriving spectators the facts, and crowd control was maintained. A tough assignment with so many interesting planes to look at. But with cooperation of club members and the rangers, the ecology of the hill was not degraded, the races went well, and so far as I could tell, except for some disappointed spectators, everyone was happy with the outcome — contestants, officials, and the park ranger staff.

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RCM TROPHY RACES

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Bob Andris and his Shark. Note inverted airfoil on stab.

And that's the mark of a well run event which, in my opinion, certainly applied to the 1977 RCM Trophy Races.

RCM SLOPE SOARING TROPHY RACE RESULTS

1st, Fred Weaver (flying a Jon Lowe design); 2nd, Rick Walters; 3rd, Brian Irvine; 4th, Ken Willard; 5th, Cliff Tanaka; 6th, Blaine Rawdon; 7th, (Tie) Rick Pearson, Don Zacharie, John Baxter and Mike Burke; 8th, (Tie) Carl Chulick, Mike Mitchell; 9th, (Tie) Jerry Krainock, Marvin Qualls; 10th, (Tie) Howard Pyatt, Ken Kilbourne, Eric Andresen, Jerry Arana.

Best Design
(As voted by contestants)

Tie vote for Jon Lowe, Ken Kilbourne, and Carl Chulick.

Fastest Time

Fred Weater, 1 minute, 58 seconds (40.4 mph for 700 ft. course). □

FOCKE-WULF 190D-9

from page 63

.... with Sonic System providing power. The Goldberg servo has plenty of power but the unusual gear configuration and location leads to severe binding and possible servo damage.

Our kit was constructed using Goldberg's new Jet Glue wherever possible. This cyanoacrylic seems to have a bigger "kick" and stronger hold than many similar "glues" on the market. One bottle was sufficient to complete the model.

The first flight was a breeze. With all control throw set as instructed, the D-9 lifted off in less than 75 feet and flew perfectly. The only correction required was a rearward shift of the battery pack to counteract nose heaviness. On the second and third flights, the D-9 performed even better — loops, spins, snap rolls, inverted fly-bys, and four point rolls, were smooth with clean entry and exit. Truly a fun flier with eye appeal. □

ARMCHAIR ACE

from page 61

Thus ended another busy, happy weekend on the Shore. It was laced with frantic serenity and concluded with that good kind of tired when you've done what you ought, pleased a lot of folks in the process, and truly enjoyed yourself.

It was a great weekend and I may have had busier ones, but I can't remember when.

I can't remember a better one, either.

P.S. I've been rambling around here a few months with some amusing and rewarding aeromodeling experiences I've had. If you have a humorous story – especially if it has a lesson in it – write me a note and, if possible, I'll share it with our readers. – Hobie □

NRCHA

from page 59/56

machines to use control rotor paddles. These were rigged to +9° incidence for the very reason we are discussing here.

(2) Increased Control Power

This can be accomplished by increasing the maximum cyclic travel of the paddles by another degree or two, especially in pitch. Although this mod will help by postponing the "control reversal" effect to a higher speed, it is of secondary importance because it does nothing to improve the built-in negative speed stability. The cyclic controls will be "crisper" in hover, but will be less likely to become a wet noodle at higher speeds.

(3) Keep This Recovery Procedure In Mind

If a modeler does find himself in the position of the guy in the first paragraph, and if he can afford the luxury of losing a little altitude, the theory suggests something very clearly. By rapidly dumping collective to — say the mid-range — the direction of the airflow on the paddles will be shifted from on top to beneath the control rotor, and the paddles should immediately "lock on" to provide the desired recover response.

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Yeh, I know, it's been all talk up to now. This bothered me too, and so I decided to find out — prove or disprove, one way or the other. First, I carefully transferred all the goodies from my beautiful Kavan Jet Ranger into a less beautiful (but easier to repair) peoplepod. Sure, I have the courage of my convictions — but let's not be sticky about this!

The next problem was finding someone to test my theories. I have been flying R/C helicopters for slightly more than a year, and am only working on NRCHA Grade Level II. No, I wanted someone who had far more knowledge than I; someone who had perhaps experienced this phenonemon; someone who could be coldly objective. John Minasian, one of several excellent R/C helicopter fliers on the West Coast, listened to my ideas and finally agreed to test them. The program required three flights. The first proved to be a familiarization flight for John, and it also revealed that the machine was aerodynamically too dirty to achieve the high speeds required. So, after a few modifications to reduce the drag, and at John's suggestion, I reduced collective by one half degree and tweaked the engine mixture — we were ready to go again.

The second flight went much better. The helicopter was now capable of considerably higher speeds, although still not quite as fast as with the smoother Jet Ranger molded fuselage. The engine was running well, and John said the machine was handling okay. So, for the third flight, I told him to pull out the stops — and get the answers — will it or won't it?! (Strangely enough, I bit my tongue immediately after saying that.) But John did just that! He started with low speed shallow Eights, and then increased the speed and bank angles until the model was at full power and banking close to 60°. John commented that, at these speeds, the bank angles to the right were steeper than could be tolerated with a standard rigged Kavan Jet Ranger. On the final Eight, the model was fairly high, and as it crossed the center at full power, he eased the nose down into a shallow dive and rolled it into a very steep right bank, as I remember it, close to 70 or 80 degrees.

Suddenly he had no control — he had entered never-never land! Full aft and left cyclic inputs with no response, but he remembered the suggested recover procedure and dumped collective from full up to about hover position. The model dropped 30 to 40 feet and then **immediately** rolled out into a docile left climbing turn!

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NRCHA

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John had done everything I had asked for. He had shown that, with positive speed stability and increased control power, steeper high speed right turns could be tolerated. Furthermore, he had successfully demonstrated the predicted recovery procedure.

It should be re-emphasized here that these flight tests were conducted with a cleaned up training fuselage in place of the fiberglass Jet Ranger body. However, any minor difference you might expect to see with the Jet Ranger body would be one of degree — not principle. Also, it should be noted that no attempt has been made to evaluate the effectiveness of the recovery procedure when using paddles rigged to zero degrees. Sure we like noodles, but not wet ones on the end of a transmitter! □

R/C FORK LIFT TRUCK

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on the shafts, so the line will slide easily since the shafts need not turn. Now clip a battery on the hoist motor and run it all the way up and down and see if the line works properly. If the line tightens up, take it apart and try again. It should work freely.

Here is how the Controller Systems works: The A and B servos work the same. The A servo operates the travel motor forward and reverse, while the B servo is for hoist up and down, so we will use the A servo for the explanation. When the servo is extended, it opens #6 switch and closes #1 switch and the motor runs forward. When the servo is retracted, it closes #6 switch and the motor runs in reverse.

The C servo is a little different. It has three separate switches: #3 switch is the safety light; #4 switch is the travel motor, slow speed; while #5 switch operates the horn. By operating this servo with the trim lever on the transmitter, you can stop on any switch you want. You can switch from high speed to slow speed at will. The horn can only be blown while using the slow speed.

After all is completed, and a little Vaseline on the wheel bearings, you are about ready to operate your first Fork Lift Truck, so give your batteries a good charge — this will give you an hour of operation.

When plugging in the servos, I found the best way was to use the left levers on the transmitter for the hoist and steering, the right for travel, and the trim lever for the safety light, slow speed, and horn.

When you start forward, you will notice that the drive wheel will probably spin a little. It will be necessary to add a

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R/C FORK LIFT TRUCK

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little lead over that wheel. Keep adding lead until you get the best operation. I used over a pound. A few times around the floor, and a little adjusting, and you are ready to go to work.

Make a few pallets and blocks from styrofoam and you are ready to go. The hoist will lift these with no problem. My Fork Lift Truck has been operating countless hours with very little trouble.

If you have a youngster who would like to have his own Fork Lift Truck, you will find on the drawings that, by eliminating the radio and adding batteries, a couple of D.P.S.T. switches, 4 feet of bicycle brake cable for steering, and 6 conductor stranded hook-up wire cable connected to a little control box behind the Truck, you have one heck of a toy. I call this truck the Jr. Fork Lift Truck. It is the same as the other except you leave off the light and horn. Here is the parts list: two D.P.S.T. toggle switches — Radio Shack #275-1545; 1 bicycle brake cable 4 feet long; 24 feet stranded hook-up wire (3 colors); 1 aluminum box (same as hoist gear box); 1 battery box for two D cells.

I hope you have enjoyed reading

about my Fork Lift Truck and decide to build one. It was interesting to build and to operate. When you start showing it around, everyone comments on *Henry* first, then - - - "I don't believe it!"

While I was writing this article, I kept thinking of what I am going to close with. Usually they say something like "Happy Flying" — so what do you say when you write about a Fork Lift Truck?

Well here it is — "Keep Truckin". ☐

RC FLYING AND THE LAW

from page 47

to another AMA member where property damage is involved, e.g., Member Joe lands and runs into Member Bob's plane. If Joe was negligent, and there is *no primary insurance*, the AMA insurance will cover this loss with a $250 deductible; that is, the first $250 of damages must be paid for by Joe. If, however, Bob was *not* an AMA member, no deductible would apply. Strange, but so! This deductible feature does not apply to bodily injuries between AMA members — only property damage. Added recently to AMA insurance is what is known as Accident/Medical Insurance. Suppose Joe Modeler gets his hand slashed by a plane (his or anyone else's)

and it requires medical treatment. For medical services up to $1,000, Joe can seek medical reimbursement for any personal injury he suffers from the AMA carrier. This has no relationship to any underlying or primary coverage and includes such serious injuries as loss or dismemberment to his body or even death; in the event of death, his beneficiary gets the $1,000. Keep in mind that this:

(A) Does not cover property damage (the breaking of the model or its equipment).

(B) Can be the result of injuries inflicted to oneself.

(C) But, again, the model must have been operated in accordance with the AMA Safety Code.

Now for some specifics in question and answer format:

Q. – I belong to a club which is AMA chartered; does this give me AMA insurance protection?

A. — No. The club can, by becoming chartered, obtain AMA insurance. This gives the club — whether incorporated or not — the insurance protection for the club where the club is sued because of some injury or property damage.

Q. – Our chartered club is running a static display. Suppose someone is injured at the show, does AMA insurance cover the club?

A. — Yes. Such non-flying accidents are covered while the club is chartered by AMA, but property (models, equipment) owned by the club is not so insured.

Q. – If I am sued individually and am an AMA member, will AMA insurance pay for my loss time attending the trial?

A. — Yes, to a maximum of $50 per day.

Q. – If my chartered club runs a contest and a spectator is injured and sues the club, its officers and the pilot, what insurance applies?

A. — First, make certain the club event is *sanctioned* and the sanction fee is *paid*; in that event the AMA coverage should be applicable to protect the club and its officers where the accident arose out of any official event activities. The pilot sued individually must defend individually unless he has underlying or primary coverage (homeowner's or tenant's policy) or personal AMA membership.

The advice I would give any R/C modeler is the following:

(1) Check your homeowner's or tenant's policy; make certain its liability limits for off-premises negligence are at the $300,000 level; the cost of this amount over the smaller $100,000 amount of coverage is surprisingly little, often no more than $5 or $10 a year! If your policy limits are significantly less, say in the $20,000 to $50,000 range — look out; in today's economy these limits are *not* realistic. Pay the difference!

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RC FLYING AND THE LAW

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(2) Consider AMA insurance as an "umbrella" for that excess over the limits of your homeowner's or tenant's policy.

(3) Keep the AMA Safety Code at hand and obey it as it applies to your particular modeling activity. A copy of the safety code can be obtained by writing to the AMA at: 806 15th Street, N.W., Washington, D.C. 20005.

(4) If a serious injury or property damage results from your operation of an R/C model, *consult your attorney.* He, in turn, will work with you to notify your insurance carrier (homeowner's or tenant's policy) and the AMA if you are an AMA member. He will also guide you in this matter and protect your interests.

A recent development with respect to AMA insurance took place which may have a significant impact on AMA insurance and, in turn, on AMA dues. In this case, the AMA insurance carrier sued a homeowner's insurance carrier because the homeowner's insurance carrier denied coverage to the model operator (where a serious injury was involved) based upon an exclusion that appears in practically every homeowner's policy, namely excluding any injuries or property damage arising out of the ownership, maintenance, operation or use of any *aircraft.* What the homeowner's insurance carrier was asserting was that a radio controlled model is an "aircraft" within the definition of this exclusion.

To the astonishment of the AMA carrier, the court ruled that the homeowner's carrier was correct; that the radio controlled model was an "aircraft" in the legal definition of that word. That trial court decision is now being appealed.

If the appeal is upheld and not overturned, there will be a whole new "ballgame" with respect to AMA insurance because that means the underlying assumption (that the AMA insurance is secondary or "umbrella" coverage) will fall; homeowner's and tenant's insurance carriers may then all take the same position, namely that a radio controlled aircraft is excluded from their coverage.

What this means is that the AMA coverage becomes the "primary" (the *only*) coverage and if that is the ultimate result, look for a very substantial increase in dues, at least for those R/C modelers who fly aircraft and want to have any insurance whatsoever. It will be months, perhaps a year or two or more before this matter is clarified in terms of all its ramifications.

Meanwhile, if you have any specific questions in this area of radio controlled modeling and the law, write to me at: 315 South Plymouth Court, Chicago, Illinois 60604. □

CESSNA 150

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..... of light blue and silver, then flat black was added to this mixture and the window outlines were shaded.

After a few added details like gas caps, wing tip lights, landing light, rotating beacon; the prototype weighed in at 8¼ lbs. ready to fly.

The hardware items included in the kit were: nylon control horns, hinges, nose gear bearing, steering arm, aluminum main gear, coil spring nose gear, steel RC links, aluminum motor mounts, plastic wheel pants, decal sheet and factory 3-view drawing.

Flight performance of the Cessna 150 is excellent. The small case Super Tigre .60 had ample power to pull the Cessna through the AMA pattern. With the wing loading at 29 oz./sq. ft., the Cessna flew best in a 5 to 10 mph wind. Also at this wing loading it will snap like crazy, so keep a little speed when landing.

In conclusion, the Cessna 150 is a rewarding kit to build and fly. It's flight performance, fidelity to scale, and overall appeal are outstanding, making it an excellent kit for sport scale. One word of caution *"do not"* attempt to hand launch this airplane, unless you wish to put it back into kit form! □

GLOSTER GAMECOCK I

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surfaces are slid onto the joiners and held by the hinges. Do not fix permanently until covering and coloring is complete.

Covering and Finishing: The prototype was nylon covered, tail included. The structure is strong enough for the use of heat-activated film. Two coats of clear dope filled the pores, then the final color dope was applied. Two thin base coats of white were sprayed on, followed by two of silver. A beautiful silky sheen results, due to the white undercoat reflecting the transmitted light back through the silver. Don't just spray silver straight on to the nylon or you will never get it opaque. The roundels were sprayed by successively masking off the various colors, and the squared done likewise. The metal paneling was added after all spray work as follows:

Metal Panels: The metal is thin alloy sheet — I used litho plate, but I believe it is possible to buy adhesive-backed alloy sheet. Before cutting the metal, make paper templates of all panels to be simulated. Now take the inverted vee cabane structure made previously, together with the outer cabane struts. Cut away the top decking to allow the insertion of the cabane assembly and bolt the latter in place. Don't worry about the unsightly holes you've just hacked into your pride

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GLOSTER GAMECOCK I

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and joy — all will be well! Add the wings and interplane struts and check that you can align them up as before. Also check that you can bolt up the outer cabane struts to the wings without straining anything. All okay? Now remove the lot and take the paper template which you made for the decking. By trial and error, slot the template so that the cabane vees will pass through neatly — see photos. To check this, you'll have to engage the vee struts in the slots and lower the lot into place all at once. When satisfied, cut the metal to size and check it for fit as just described. Remove the lot again and smear contact glue around the outer edges of the metal and around the outer perimeter of the area to be covered. Lower away and press the paneling accurately into place. At this stage, you will be able to admire a fuselage with alloy-paneled front decking and slack vee struts. Now smother the cabane/fuselage joints with 24-hour epoxy and loosely bolt the complete "W" assembly in place. Add wings and interplane struts again, and bolt the cabane to the wing. Re-align the wings (you've had plenty of practice by now) and bolt the cabanes on tight. Leave to set. Don't use 5-minute epoxy here, unless you anticipate working like super-duper greased lightning. Give yourself plenty of time to align that cabane. If in doubt, add up the number of hours it's taken you to get so far and compare with 24! Nuff-said?

Leave to set overnight. Then panel the rest of the cowlings. You'll find it easier and strong enough only to use adhesive around the outer edges of the panels.

Well, that took some explaining, but the hints will apply to oodles of other bipes, so if you've always wanted to metal panel a bipe, go to it!

Rigging: The wing bracing is functional on this model, and the anchoring method is strong and effective. Do not use nylon clevises. Do ensure that the metal clevises used for the flying wires are of the Kavan silver link type — the pin passes through both sides of the clevis. The cheaper single-sided metal clevis may be used for the landing wires where the side loads on the pin are not so critical. Although the wires are functional, their job is only to support th wing in flight — not to hold incidences or hold the model together (the nuts, bolts and elastic bands do this). With the model at rest, only the slightest tension is required — sufficient to remove any excessive droop. Do not try to take warps out with the rigging — too much tension coupled with flight loads might pull the pins from even the best quality clevises. Are clevises strong enough? Well, it was a glorious day for the 1974 Grantham and D.M.F.C. Scale competition. I landed the model after its competition flight, had it judged, and set about dismantling it for transport. I then discovered (having flown the model through three rolls, two loops, one split S, one flick roll, an Immelman and two stall turns) that both bolts were missing from the left-hand side of the cabane. In the pre-flight rush, I had forgotten to put them in. At least I proved the worth of the rigging attachments! I also won the competition!

When dismantling for transport, merely unclip the clevises, unclip the aileron links, unscrew the cabane bolts

and the lower wing interplane strut bolts. The top wing will then lift off complete with bracing wires. Assembling or dismantling takes less than ten minutes, and provided you don't shift the radio gear, you'll find that the trim will never vary from week to week. One tip — keep the 8 bolts you use to assemble the plane in a little plastic box all to themselves. Then you'll *know* whether you've ommitted any bolts during assembly!

FLYING

Dig out your favorite piece of lead and use some of it to coax the C.G. to the required position. Then double check. There is a story relating to the C.G. of this model. I calculated (probably erroneously) the C.G. location and the position so evaluated was 3/4" behind the present one. Great! No lead was necessary at this stage. At the field, I cranked her up and off she went — just like a lift. Within three seconds she was higher than a house and bucking like a wild bronco! Besides having the C.G. too far to the rear, the tail did not have enough positive incidence. Laterally, she was stable, which is a great feature of the ship. Cutting the motor, I guided the ship down a switchback path and ended the flight with a glorious cartwheel due to "landing" about 5' too high at long range. Only minor damage resulted - - - broken prop, dented wing tip and a sprained joint at the top right aileron root. 1½ pounds of lead moved the C.G. forward just over an inch, and further flights were like sweet music. Landings, though, were pretty awful — the model usually ending the landing run with a nose-over, sometimes onto its back. Obviously, the forward limit of the C.G. was decided by the wheel position, so I had to change tail incidence. On succeeding flights, I removed lead and increased tail incidence. There is now 1 pound of lead up front and I can usually keep her on her feet with the scale U/C as detailed. However, for first flights, make an extra long pair of rear U/C legs, say an inch longer than scale, maybe even more. I haven't done this, but it should solve landing problems. The Gamecock cost the RAF a lot of money in busted props, so if you enter a competition, make the flight judges aware of this! Since you shouldn't need that noseweight, you shouldn't have any real problems. Strangely enough, I don't go through many props at all — I've only broken four in 2½ years!

Now to your first flights. Use maximum power for take-off; this shortens ground roll and lengthens model life. The elevators are fully effective with the engine at full blast, so you can let the tail rise quickly and fly her off easily. Slight right rudder will keep her straight. Once airborne, perform a wide *left* hand circuit to gain height, then trim her for straight and level flight. Cruising power is about 1/2 throttle. Now practice turning. Left turns are easy - - - just like any pattern ship, but right turns require the use of a little co-ordinated right rudder. The torque, slipstream and adverse yaw effect of the ailerons seem to gang up to make the ship reluctant to turn right, and at first the effect "feels" queer. I do mean feel. Putting on about 10 degrees of right bank and pulling a little up elevator just doesn't turn her. Feed in some rudder and around she goes nice as you please. Perhaps she'd be better turning on rudder-elevator? The adverse yaw effect is well-known in full-size flying circles, but I've never met it on a model

before. Any inherent turn either way should be trimmed out with aileron, not rudder.

Aerobatics with the Gamecock are a joy to behold. The sun glistens on the silver dope — the squadron markings are gaily flaunted like banners, the wires sing as she performs almost any evolution you wish.

Now for the landing. Throttle back and note how slowly she loses height. The square circuit needs to be surprisingly large and the final turn onto the glide path will be quite a long distance away. At touch-down, flare out, and as she touches, give a blip on the throttle to force the tail down. Keep a small amount of power on to maintain airflow over the tail, keep up elevator to force the skid onto the deck and she'll soon slow up.

The procedure just outlined is not really complicated, but don't tangle your fingers up with the sticks! The model is very forgiving at all flight regimes. At the 1975 Nats, there was a 15-20 kt. wind blowing. When coming in to land, I got her to the edge of the circle and the wind gusted and stopped her in mid-air! She was hovering 4' up! I opened the throttle and up she went — vertically. I closed the throttle and she remained there. Gradually, by co-ordinating throttle and elevator, I coaxed her down, vertically, but missed the circle. Yep! She sure is stable. The whole evolution lasted less than 15 seconds, but seemed like a lifetime. It please the crowds, though!

Just one more hint. Ever had difficulties starting inverted engines? While waiting for my competition flight, this is what I do. I remove the plug and squirt neat fuel up into the head and up through the carb. I then crank the engine to free her and clean out all the accumulated oil and juice. I sometimes even poke a rolled tissue up the plug hole to soak up the liquid. Then I squirt the plug, and get all the oil off that, finally connecting the battery to "burn" it clean. Just before my flight, I tank up and screw the plug in.

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1977 NRCHA NATIONALS

PLACE
Greenville Municipal Airport
Rt. 58W., 3 mi. from Greenville

DATE
August 20,21, 1977

TIME:
8 A.M. Saturday, 9 A.M. Sunday
Pre-registration Appreciated

CONTEST DIRECTOR
William Curtis
R.D. #2, Greenville, Pennsylvania 16125
Phone Day — (412) 588-4120 — Phone Night — (412) 588-8720

ENTRY FEE: $15.00

PRIZES
Trophies and entry fee will be divided among top three in both classes.

CLASSES:
Sportsman, Masters: Both classes will be run outdoors.

Qualifying Round
Saturday AM, all contestants will be required to fly the three Sportsman maneuvers. The top thirty contestants of which ten will be Masters will continue through the remainder of the contest. A special award for the highest score in the qualifying round.

All manuevers are precision hovering. There will be no aerobatics. Let's give something new a try. This contest will be the first ever run where there will be no judging or racing the clock. All maneuvers will be set up in progressively harder tasks. Either you do the required tasks or no points, no in-betweens.

This years's contest has been designed by some of the most experienced helicopter pilots in the world. All of the maneuvers will be available before the contest on request. Why not plan now to attend the world's most prestigious R.C. Helicopter Contest.

Gyros: As in the past these will **NOT** be permitted. I found out recently that a few of these devices have, in the past, secretly made it into this contest. This year there will be people watching during all flying. If one is observed working in a model, that model will be barred from the rest of the contest.

MEMBERSHIP APPLICATION

NATIONAL RC HELICOPTER ASSOCIATION
R / C MODELER MAGAZINE
P.O. Box 487
Sierra Madre, California 91024

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NAME _____ AMA # _____

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CITY _____

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PLEASE FILL OUT THE ABOVE AND ENCLOSE $4.00 FOR ANNUAL DUES —

FOREIGN DUES $5.00

☐ Renew My Membership ☐ New Member

GLOSTER GAMECOCK I

from page 162/40

When called, I get to the starting point, turn the prop to open the shaft valve and squirt a jet of fuel up the carb and flick six times to distribute the fuel. I connect up the battery and one flick starts her. This never fails and always impresses, since the judges only see one prime, seven flicks and the model the right way up all the time! With a warm engine, just prime and flick, connect up and she'll fire. Full-size engine mechanics used to "drain the bottom cylinder" of radials before starting up, so I do the same.

CONCLUSION

I hope you've enjoyed the foregoing, and I hope I've covered everything which will enable the reader to make a successful model of one of the most appealing aircraft ever to be flown by the Royal Air Force. If I seem to have dwelt on bad points, that's because I've done a lot of flying with the model, and I want to give you the benefit of my experiences. It might even help you when designing your own scale bipe. (How about a Schuckert DIV? That's even more stubby than the Gamecock!)

I'm not a masochist, but if the model was devoid of idiosyncrasies, it just wouldn't be as interesting! Don't you agree? ☐

QUICKER 500

from page 37

. . . . smaller engine. We were very surprised and pleased with the ground handling and take-off characteristics, even with this arrangement.

Once off the ground, after about a 40 foot roll, we were very pleased with the flight characteristics. All controls were positive and reacted rapidly without any jitters. In fact, on the first flight, even though slightly out of trim, loops, Immelmans, slow rolls and inverted flight, were attempted and accomplished. We even tried pylon turns and found no tendency to mush, slide or come untracked. Slow flight characteristics were excellent, with no marked tendency to drop a wing from a stall. We enjoyed the responsiveness and ease of control so much that we forgot about the need for fuel and wound up with a dead stick land-

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QUICKER 500

from page 164/37

ing. Because of the flat glide and good penetration, we overshot the approach and had to make a low, slow, 45 degree change of direction to land on another runway. Thanks to the positive slow speed control built into this model, no problems were encountered and, in fact, the landing was slow enough that there was no nose-over.

Although we hesitate to recommend this as a first trainer, we feel that even a relatively inexperienced flyer would have no trouble either building or flying the model.

From the response with the small engine, we feel that installation of a good K & B .40 would result in a highly competitive racer. Even if racing is not intended, the Quicker 500 will make a good sport and fun fly model. □

E-Z II

from page 35/32

then sand both of these frames lightly all over. Now join the sides together, first at the front, using the 1/4" sheet floor and the two frames F1 and F2. Next, cement the frames together at the rear using frame F3, and then fill in all the remaining cross pieces and sheet items. Now sand this assembly all over lightly after

which you can make and attach the nose block and the wing rails.

This completes the basic fuselage, but don't begin any covering yet, as the next task is to cement the tailplane into place, followed by the fin.

The cockpit cover-radio hatch, as shown on the plans, is probably more elaborate than it needs to be and, if required, a piece of 1/4" sheet cut to the fuselage outline can be substituted. However, the hatch, as drawn, provides a small amount of scale appearance and helps disguise some of the angularity of the fuselage. Begin construction by making the base plate H3 from 3/32" sheet, and cementing on the two triangular pieces H1 and H2. Sand the edges of the base slightly to the contours of the triangles to provide a little more gluing area, then cement the 1/16" "roof" pieces (H4) into place. Sand away all the sharp edges, then cut the cockpit sides to the final shape.

TAIL PIECES:

Begin with the horizontal tail and, in particular, the stabilizer (that's the front bit). Use good quality 1/4" square for the longer pieces - - - softer stock can be used for the cross members. Now for the back piece, or elevator. Here it's important to select a tough piece of wood for the front spar, as this piece has to transmit the control load from the "horn side" to the other side. Make certain also

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E-Z II

from page 167/32

that the back spar of the stabilizer and the front spar of the elevator are straight, otherwise the hinges will not operate freely. The fin and rudder are built in a similar manner and the above comments regarding wood strengths apply here also.

Once all these pieces have been built, sand the leading and trailing edges and the tips to a semi-circular shape, then sand lightly all over. Now to assemble these items on the fuselage, and again we begin with the stabilizer. Before finally cementing this into place make sure that its alignment is correct and, if not, sand the fuselage longerons lightly until it is. When satisfied, glue the stab into place.

Next comes the fin, which is not placed in the center of the horizontal, but slightly to the right of center. Although this may look at a little odd, it does permit the rudder control to operate a little better. If you intend to use MonoKote or Solarfilm as a covering material, it's now time to cover these pieces, plus the rudder and elevator. When the covering is completed, attach the elevator, using your pet style of hinges, then hang on the rudder. Before the rudder is finally fitted, make sure that the elevator has ample clearance and operates freely. Attach the control horns now, and hook up the push rods, and the tail section is complete.

RADIO INSTALLATION:

This will, of course, depend on what type of radio you intend to install. On the prototype, we used two separate servos for elevator and rudder; these being positioned in the fuselage under the wing. The battery pack and the receiver were placed in the nose region together with the necessary nose weights. If, however, you have the two channel brick type radio, try putting everything in the

nose compartment, and this will probably save a little weight. The plans show the installation we used on the prototype.

OPTIONAL POWER POD:

RCM's prototype, built by Don Dewey, shows an optional power pod that can be installed and easily removed whenever desired. The photographs are self-explanatory and illustrate how the pod simply bolts on to a plywood tab on a plywood center rib. If desired, the front hole could be enlarged to a slightly curved vertical slot so that the engine thrust could be easily adjusted at the field. Another option would be to simply strap on a D & R Power Pod, designed for .049 engines, and available at most hobby shops. Either way, the power pod can be removed for Hi-Start or slope soaring.

FLYING:

No, we're not quite ready to go off flying just yet, first we need to do a little balancing. Install the radio gear in the correct location, put on the wings, and check the location of the Center of Gravity. It will probably be too far back (it always is), so tape some lead weight to the nose just behind F1 until the balance occurs at the point shown on the plans. Now remove the radio and the wings, then epoxy the weight to F1. When this epoxy is set, and not before, re-install the radio, and it's off to the flying site. Our prototype flew well with the C.G. as shown, but individual models may require more or less lead, so don't be afraid to experiment.

We also discovered that some right trim was required, and eventually traced this to a slight warp in the wings which was then ironed out.

EPILOGUE

We'd hoped to report at this time that Lisa was now an expert R/C flyer, but due to the perversities of nature, 't'aint so. Since the model was completed we've had a record string of rainy weekends, and on the rare days when flying was possible, the wind has been

so light that any training sessions were out of the question. However, sufficient flying has been done with the model to thoroughly check out its flying characteristics, and now it's a simple matter of waiting for Mother Nature to get with it so our training can begin. □

SOARING

from page 30

match ends in a tie, the challenger is deemed to have lost.

If you think you should be up higher, challenge someone. The ladder is a perpetual contest, and a constant scramble is a good way to sharpen your skills for the contest seasons.

•

David Cook of the Rocky Mountain Soaring Association, has put together a description of our fine sport/hobby and I want to pass it on to you:

A sailplane, searching, testing, then hurtling away from earth in an unseen curent of air; drifting, turning, weaving, then speeding back through a final pattern to that hard to find spot. This is our sport, or Valhalla, so to speak. We spend spare days flying and most of our evenings building and repairing the occasional mistakes. In no other hobby or sport do I find the array of skills and knowledge required to keep a sailplane in the air. From a knowledge of adhesives to airfoils, to wood and weather; from building a perfectly flat wing to stretching the limits of visibility. We who build sailplanes have a difficult challenge and we take it; to improve our planes, our skills, and ourselves.

We do all this through hours of free flying, meetings, research and contests in which we match our newfound skills to those of friends. Our contests, like most other factors in this sport, have to be tried, then improved, experimenting again and again, ever improving. So we

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SOARING

from page 172/30

have developed our rules by which we run our contests today. The goal is to develop a contest that pits skill against skill; whether it is the best launch, the ability to find green, or the best landing.

•

Craft-Air has incorporated a design change in their later model Windrifter kits. If you have an earlier model kit to assemble that does not have the latest mod's, Tom Williams recommends that you incorporate them into your sailplane.

The necessity of fiberglassing the outside of the fuselage has been eliminated by adding plywood doublers on the inside and outside of the fuselage sides from the nose block to the center of the wing.

There's also been added an external ply doubler on the fuselage bottom, from the nose block to the center of the wing. Additional ply doublers are located from the fuselage joiner area, rearward to the center of the fin. This eliminates the whiplash effect. The net result is Windrifter performance, in a trainer type aircraft.

•

Pete Bechtel of Windspiel Models, has just received some new scale sailplanes and expanded accessory line from Wanitschek. They sound very exciting, and if you are interested, drop Pete a request and a self addressed stamped envelope, and he will send you some information on the new scale sailplanes available.

•

In those water ballast tanks on your new sailplane, try conserving the world's most precious compound - - - use wine!

•

Good Lift □

SUNDAY FLIER

from page 25/24

on the builder, so it will be comparatively light. If a .40 is used, it'll be fully cowled, and a .60 will have the glow plug hanging out. Jack spent some time at Chino to check the full scale, so he figures to be very close to scale — certainly an excellent job for the Stand-Off enthusiast. Jack plans a new retract system, which can also be used on other models where the gear retracts backwards. The whole outfit should be ready by sometime this summer.

In addition to the Corsair, Jack had a special version of his B-24 on display — not finished, nor will it be until sometime in 1978. If you saw it, you'd know why. It's intended for the 1978 AMA Scale

event, and it'll be tough to beat.

In the display models, the usual excellent workmanship was evident. There was an excellent scale model of the GBR-1 — "The Flying Barrel" for which Jimmie Doolittle is famous. The model was built by Steve Crow and flown by Jay Replogle. At 2½" to the foot scale, it spans 62½" with a 10" chord. Wing loading is a little over 2 pounds to the square foot and it weighs 9 pounds, powered by a Super Tigre Bluehead .60, and Jay says it's very stable and easy to fly. Very impressive, too, I'll bet.

Steve Crow's very impressive GBR-1.

Probably the most unusual model in the show was one called the "B-2 Missile Carrier" by Leonard Vanzanten of Riverside, California. Spanning 14 feet, with a length of 14 feet, it weighs 48 pounds dry. Power? Listen to this: Six K & B .40 rear intake ducted fans, plus two K & B .15 rear intake ducted fans! Total thrust available is estimated at between 40 and 50 pounds. Carries over a gallon of fuel, and has 5 - - - yes 5 fuel tanks. Four missiles are mounted on missile carriers under the wings, and are fired remotely using a separate transmitter and receiver.

"B2 Missile Carrier" by Leonard Vanzanten with eight ducted fans!

When all engines are running, the noise is deafening up close, unless you use ear plugs. As you can see in the photo, forward control surfaces are mounted, and operate in conjunction with the elevators for pitch control.

It doesn't come right out and say so, but theinterferenceis that it has been flown, since the information sheet says the plane has been modified and once completely re-built. The workmanship on the model is average, if you get up

FIFTEENTH ANNUAL

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VISIT THE AIR FORCE MUSEUM

close, but there's no question about it, it'll attract a lot of attention no matter where it goes. Golly — 8 ducted fans, 2 complete transmitter and receiver systems — wonder if Leonard had to get a second mortgage on his house to pay for all that!

Let me digress for a moment. All you Sunday fliers can appreciate good workmanship, no matter what the subject, and there was a model in the boat section that really impressed me. It was a model of the Reuben E. Lee, a riverboat of the Mark Twain era. It was built by Verne Preston of Lakewood, California, a fifty-five year old assistant superintendent at Knotts Berry Farm. The 5 foot model has a live steam engine with full radio control capability. The scale detail is outstanding, with the paddlewheel fittings, the "gingerbread" on the superstructure, and the gangways with their handrails. It was a real work of art.

Fabulous river boat, the "Reuben E. Lee" by Verne Preston.

In the glider display, there were the usual examples of beautiful construction, and Sid Axelrod and Mike Schlesinger of Top Flite were careful to have their booth right across the aisle. The reason is obvious — you never *saw* so much MonoKote! On one model, especially. It was called the "Superstretched Grand Esprit." Lee Renaud designed it, John Simone built it, and the 20 foot span dominated the whole table. The spoilers were 2 feet

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model to the last. It really climaxed the show, as far as I was concerned, and when I tell you it was a helicopter, you'll know I was impressed, because helicopters are not usually my cup of tea. This one was.

Don Lodge, who works at Lockheed and has access to the detailed information on the Cheyenne AH-56A, spent 6 months designing a scale model, and 15 months building it. It has a 52" main rotor, weighs 11 pounds, is powered by a .61 Webra, and everything about it is Scale, including collective pitch on all rotors, interconnected tail rotor and thrust rotor with the main rotor. Collective pitch on all rotors is separately controllable; the model can be hovered with the thrust rotor set at zero thrust. So far, flight test has only reached the platform and tether stage; free airborne flight is still to come, and it will take every bit of skill that the pilot can muster, with three rotors to control. What a beautiful piece of work — it got my vote for best in show.

And that closes out the show season for 1977.

What can they do to top it in '78? They'll think of something. □

FOR OLD TIME'S SAKE

from page 22

cherished wish, to fly one last time. Please let me finish, then I'll go with you."

The young agent remembered his father's tales of flying the miniature aircraft and he understood. He, too, became enthralled by the spec in the sky. He wished he didn't have to bring the old guy in, but that was his job. He'd ask that they show mercy to the wrinkled old timer. Times sure are tough, he thought, especially for those who had known the times of plenty. □

RADIO SPECTRUM

from page 18/15

FET's offer advantages over transistors in mixer circuits because the FET closely approaches a "square law" curve which minimizes cross modulation products. I think you'll see more and more FET's used in the future.

Years ago, ceramic filters had problems in R/C receivers due to vibration problems, but I believe this is no longer a problem. The ceramic filter receivers usually have wider bandwidth at the 3db points, but have much sharper skirts. The nice thing about them is you don't have to worry about tuning your receiver, because the bandwidth is usually

wide enough to take in the normal crystal tolerances. This kind of answers your question on the modular receivers. If designed right, you should be able to switch modules or even crystals in modules without re-tuning. Whether the performance is as good as tuned IF stages is hard to say, but I would think that it could be even better. I also think the modular receiver idea is a good one if you could keep the size down. We'll continue these discussions in more detail in the future. You could probably write a chapter on each subject. Any volunteers?

Dear Jim,

I recently built an expanded scale voltmeter based on your design from the April '75 issue of RCM. It works great, but now I want to build the field unit for fast charging. Please send me a schematic or tell me what copy of RCM it's in, and I'll try to purchase or borrow a back copy. Thanks for any help you can give.

Keep the Radio Spectrum articles going. I especially like projects to built that associate electronics with R/C flying.

Sincerely,
Bob Brinsfield
APO San Francisco, Calif.

We covered fast charging in the June

1975 article. (Photocopies are available from RCM for $1.00.) There are a number of integrated circuit voltage regulators available now, that will produce the same results with less work. For best results, make your voltage regulator adjustable so you can set the voltage at the batteries instead of at the charger. I suggest everyone read the June 1975 article to try to understand the principles of this technique and also its limitations. It definitely works and can save many a day for the guy who has one and forgot to charge his batteries the night before.

★

See you next month! □

ENGINE CLINIC

from page 12/10

Tigre G-40 or X-40, as these engines are intended for racing purposes. However, any .40 size Perry carburetor could be adapted — the Super Tigre .40-.46 size, for example. If you are after top performance, a .60 size carburetor could be used. This, in turn, would require the use of a Robart Pump. However, do not expect a tick over idle as neither the G-40 or X-40 will do this. They were designed for racing at full throttle and will not idle reliably much below 3500 rpm. Most fellows running boats use an exhaust throt-

tle and a straight through venturi for the intake. The advantage of the exhaust type throttle being that it helps keep the glow plug hot and fire from going out.

The older G-40 engine was of the cross flow type design using S.T.'s patented symmetrical porting where no deflector baffle is used on the piston. The X-40 is of Schnuerle port design and uses an ABC type of piston/sleeve assembly. The X-40 being a more recent design is the better of the two engines.

Dear Mr. Lee:

I wonder if you'd help me with the following? I am building a Citabria from a kit put out by Sig and it calls for an inverted or upside down engine position. I have bought a Super Tigre .46 to use. I have also bought all of the relevant books, e.g., "For What It's Worth" published by R/C Modeler but could find no information about the whys and wherefores of putting in an inverted engine. However, the plans call for the engine to be upside down. Could you let me know of any material I could read on how to do this? I am a beginner in the field and some old timers tell me I should put it in right side up because otherwise I will have trouble getting the engine to idle. However, as mentioned, the plans call for the engine to be upside down, otherwise the cowling and scale appearance would be distorted.

Your help will certainly be appreciated.

Yours Sincerely,
Peter Dawkins
Columbus, Georgia

As a beginner to R/C flying, you are taking on a lot of headaches trying to use an inverted engine for your first model. Until you become familiar with model engine operation you should definitely build a model that uses an upright engine. Inverted engines flood more easily due to any excess fuel running into the glow plug cavity and putting out the fire. This, in turn, makes starting more difficult, a reliable idle harder to achieve, etc. A Ni-cad battery with a micro switch that turns on just above idle speed will help the idle problem, but you still have to be very careful when starting the engine, not to flood it. Many fellows invert the model when starting inverted engines so that the engine is upright. Other than this, there is not much more that can be done.

The "For What It's Worth" book is not going to contain engine information. You will find this in the "R/C Engine" Volumes I and II.

Dear Clarence:

I read and enjoy all of your Engine Clinic columns. I have learned a lot about engines from them and have been able to help myself most of the times when I have a problem.

Now I have a problem that I can't figure out. I have a Taipan .21 TBR

Schneurle that I can't keep a plug in. I have used Fox long, Glow Devil long (the plug that came with the engine which was just a hair shorter than the other long plugs), Hobby Shack Thunderbolt long and a Glow Devil short plug – all with idle bars.

When breaking the engine in on a 9/6 Taipan prop, running the engine on the rich side with no muffler, I had no trouble other than a little hard starting. After the first two or three tanks, I installed it in a plane and ran six or eight tankfuls through it, running a little rich (4 oz. tank). I found that 4 ounces of fuel ran out too fast so I installed a 6 ounce tank and flew a few more flights –still running a little rich. I was having trouble getting a good idle so I installed a Taipan muffler and, after a little adjustment, was able to get a pretty good idle. I then started leaning the engine out and that's when I ran into trouble. When I leaned it so that it would 2-cycle, it would blow the plug at the end of almost every flight. I took the muffler off and still had the same trouble. I tried a couple of rich runs and it was okay, but as soon as I 2-cycled it, out would go the plug at the end of the flight.

I have the engine in a Hobby Shack SST that weighs a little over 4 pounds and am now using a Taipan 9/4 prop as I found that it pulled the plane better than the 9/6. Fuel has been 7% nitro with artificial lubricants and 12% nitro with castor oil, both 22% lubricant. The engine is now very easy to start and very powerful when 2-cycling, but at a-plug-a-flight who can afford it.

I think the problem might be too much compression, but I am reluctant to fool with it until I find out from you because I have to mail away for any and all parts. I would appreciate any help that you can give me on this matter.

Yours truly,
Arthur Morell
Needham, Mass.

I have not run too many Taipan .21's, but those I have were not hard on glow plugs. If the compression ratio were too high this could be the cause, but the Taipan's I have checked were in the medium compression range. I would suspect that you are just plain trying to run the engine too lean. Many fellows seem to think that an engine should be set in a two cycle and flat out scream from beginning to the end of a flight. This is not so. An engine must be set off slightly on the rich side to allow for leaning as the fuel level drops. Your engine should crack slightly rich in a long dive or at the bottom of loops. If it does not, you are running it too lean.

How does the oil on your wing look? If it is black or has any metal particles in the oil, this would be the cause of blowing the plug. Any metal particles due to the rod rubbing excessively on the back cover, or other points of wear, will knock out the plug. If the oil is clear on the wing

and your engine does crack slightly rich at the bottom of loops, etc., then possibly you do have an engine with too high of a compression ratio. The only solution would be to install a head gasket of about .015" thickness. Sometimes two washers under the glow plug will also help. □

CUNNINGHAM ON R/C

from page 7

going to the rear hold-down dowel, I use a piece of 1/16" plywood, 1" wide by 2" long on each side. This extra reinforcement keeps the rubber bands from breaking the wing, which they can, and will, do.

I do not use leading edge sheeting, nor do I feel that it is needed. Another bit of good advice is to make good glue joints all of the time that you are building the wing. I like to glue everything together, and then go over all of the joints with Titebond glue, applied with a small dime store brush. By painting the glue on, you can avoid the unnecessary build-up of squirting it on, and avoid the "puddles" that you have to pop away once the structure is dry.

Wings built in this manner will stand up to lots of flying and still come back for more. In addition, they will really weigh very little more than will wings built the same old way that they were designed some 35 or 40 years ago.

◇

One of the very popular pastimes these days is buying aircraft from other builders or from a building company — or from places such as we have in the Fort Worth/Dallas area, the Aerodrome, which specializes in recycling used aircraft into the hands of new owners. This is great, and enables a lot of us to get our mitts on an aircraft that we might not have time to build, but would sure like to fly. When you construct your own aircraft, you usually know where the bad spots in construction are, or where you screwed up, or at least something about the general construction. But, when you buy a previously owned aircraft (to steal a phrase from the Cadillac used car dealers, they never call them "used cadillacs"), you don't know where the builder fouled up, or where he forgot to beef up the structure after a crash. He knows, but you don't. So, take the time to examine your new possession to be sure that it is air-worthy, before you put it into the sky. Chances are that it is in good shape, and that you can bolt your radio in place, wedge the engine in the snoot and take to the air — but, are you sure? Have you checked?

Let's take a look at some of the places to check. First, let's look at the wing. Is it straight or does it have a warp in it? If it's

warped, can you take it out by heating and bending? I'll bet that you can. Almost any wing can be straightened by applying heat and twisting in the direction opposite to the warp until the new alignment has set in. Foam wings can be easily corrected in this manner.

How about the ailerons? Do they function properly, and do they give enough throw? How about too much throw? With strip ailerons and torque rods, the chances of too much throw will be slim, unless you slide the connectors way down near the hinge line. Ailerons that operate through a bellcrank rigging can have too much throw, and be too sensitive, but chances are that they may be too insensitive. I purchased a previously owned Liberty Sport Bipe a couple of years ago and was told that the owner/builder had trouble flying it. After looking at it, I could see why. The ailerons are a bit small on this aircraft, and the way that the modeler had them set up, they hardly moved at all. I'll bet that when he wanted to bank and turn he had time to light a cigarette and polish his shoes before the aircraft began to make its turn! Make sure that the aileron action is free and doesn't bind. Also, check to see that the hinges are well installed and that they won't pull loose at an embarrassing moment. How do you check? Give 'em a strong steady pull. If they feel as though they are going to pull loose, take the time to put new hinges into the wings of your new aircraft, and make sure that they are pinned in some manner — either with toothpicks, pins, or well placed epoxy or Zap.

Make the same check on the tail feathers that you did with the ailerons. Double check the elevator hinges, and be sure that the control surfaces do not bind at any point. A good way to judge this is to leave the pushrod unattached. Does the elevator drop down to the full deflected position, or does it tend to stay level? If level, you have some binding and need to correct this. The load upon the servo will be mcuh greater if it has to fight a stiff control surface, and the life of the servo will be curtailed.

Make the same check with the rudder. Hold the aircraft up, rotate it 90 degrees, and see if the rudder flops down. If it does, you're in good shape, provided that the hinges are installed well. Check them and correct them just like the ailerons.

Take a look at the control rods - - - are they well made or do they need to be re-worked? How about the firewall - - - is it tightly glued in place, or is it breaking loose from one side or the other? What the heck do you do if the nose section is a bit oil soaked and the firewall needs to be re-epoxied in place? Simple — spray a bit of K2R grease removal material on the firewall and let it dry. Brush away and you will have a dry joint to work with. Your wife probably has some K2R in the cleaning closet.

MEROKE R/C CLUB INC.
ANNUAL PATTERN & SCALE CONTEST
(Open to all A.M.A. Members)

DATE
Sunday, July 24, 1977

LOCATION
Cedar Creek Park, Merrick Rd., Wantagh, N.Y.

For further information, contact:
Contest Director, Mr. Fred Fogelman,
35 Northgate Dr., Syosset, N.Y. 11791
(516-921-7752)

JULY Puzzle Answers

SINGLE

CHANNEL

CONTROL

HORN

TURTLE

DECK

SNAP

RALL

FUEL

TANK

TRICYCLE

GEAR

PIT

TOP

SE

TEMP

ECONOMY

PLUS

MILE

HIGH

MODELS

JUNE Puzzle Winners

Georg A. Bard
A Borrego
W. C. Kennedy
Karren Levine
Vern Schroeder
Bob Suhr
Brian Walker
Karen Benson
Louis E. Haviland
Monique Larreur
Jorge Prieto
M.E. Schuyler
P. Tyler
Walter P. Warren

We did it again! We made the puzzle so difficult that we only had 14 winners. For Question #3 concerning the C.G., we accepted either 10° or 5°. For Question #10 concerning products from Pactra, if your only answer was Solarfilm it was accepted because AeroWeld is a new product that is not well-known yet. The July Puzzle was the last puzzle and we hope you have enjoyed this feature each month. Next month, the July winners will be listed.

The 3 unscrambled puzzle sponsors are:

INDY RC

FUSITE

SEMCO

The idea is to check over the entire aircraft to see if it has any structural damage, or poor construction. Check the dihedral joint of the wing to see if it is strong? How? Simply by bending it over your knee. Exert just a little pressure, don't try and break it, just see if it is firm and strong! By careful checking, you can save yourself some possible problems, and get the most out of your used airplane.

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One last word. When you're up that hour earlier in the morning and really enjoying your work, don't call me, my nose is still in the sack! Good luck, and keep 'em flying, just one more time. □

FROM THE SHOP

from page 2

provide the home for an exciting, functional aerospace museum. Odysseys In Flight has firm committments for display aircraft and material including models from just about everywhere. Soon, the aircraft that we enjoy modeling so much will be gone forever. Museums are the only practical way to preserve them for all. Odysseys In Flight has worked alone for years on this project but are now at the stage where public acceptance of their efforts and aid in funding are essential to their ultimate success. The organization is appealing to the public to support their efforts through donations which are tax deductible. Remember that a large battleship was emplaced as a museum through the donations of school children! Odysseys In Flight, Inc., P.O. Box 229, Wantagh, New York 11793, will gladly respond to any questions concerning the project. James L. Smith is First Vice President of Odysseys In Flight and has been a life-long modeler now active in R/C. Any donations are appreciated and respected. The Board of Advisors of Odysseys In

Flight, Inc., include such dignitaries as Senator Barry M. Goldwater, Cole Palen, Cliff Robertson, Capt. Walter M. Schirra, Jr. USN, Frank Tallman, Commander John J. Pataflo, Jr. USNR, Ret., B/General Joseph J. Foss, USMC (ANG) Ret., Col. Francis S. Gabreski, USAF, Ret., B/Gen. Robert L. Scott, Jr., USAF, Ret., B/Gen. Charles E. Yeager, USAF, Ret., and many many more.

This is a most worthwhile project, a non-profit memorial museum devoted to the advancement of aerospace history and education and a member of the American Association of Museums. We urge you to support Odysseys In Flight, Inc., aboard the Aircraft Carrier U.S.S. Lexington.

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While on the subject of projects which are long overdue, the Seattle Radio Aero Club is requesting the help of the model press in a project wherein they are going to collect, compile, condense and contribute a compendium of corny contest cockpit contortions, which they lovingly call the R/C Fun-Fly Catalog. There must be several hundred different events and variations being used throughout the country and how great it would be if they could be cataloged!

What the SRAC proposes is to ask every R/C club to send them a list of events and rules which have worked for them at their Fun-Flys, including any special equipment required. The Seattle Radio Aero Club will catalog them by method of scoring, such as count, measurement, time, etc., with all their variations. They will then make the book available on a cost (plus maybe a little something for the club) basis.

We hope that you and your club will contribute to this project of the Seattle Radio Aero Club. All correspondence should be addressed to the project manager who is Wayne Nodland, 9909 227th Place, S.W., Edmonds, Washington 98020.

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Until next month . . . □