

RCM



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JUNE 1979

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radio control MODELER

THE WORLD'S LEADING PUBLICATION FOR THE RADIO CONTROL ENTHUSIAST



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You've got the desire to be a Champion.



control buttons and servo reverse switching. And serious fliers can also appreciate our water and dust proof, dual ball bearing S121 servos, modular RF boards and direct servo control.

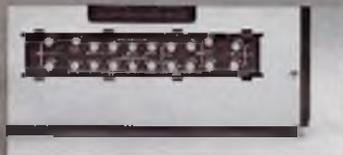
The J-series Futabas are available in 4, 5, 6 and 8 channel systems, plus a



5 channel Helicopter system. Write now for complete technical data, because the sky's not the limit any more.

All J-series systems use quick-change RF modules for band and modulation selection.

Dreams of conquering the skies are what makes a winning pattern flier. But even the best contest competitors know that you've also got to have the right equipment. Futaba's J-series radio control systems are just that. Pure, state-of-the-art electronics with high-performance features like full programming capability, dual mixing circuitry, roll and snap roll



Behind the R1N's back panel are 20 programming control settings, including 2 dual rates and 3 non-linearity functions.



Model 5JH/\$749.95

Model 8JN/\$799.95

We've got your radio.
Futaba.

2065 East Victoria/Compton/CA/90220



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This month's cover

features Las Vegas showgirl, Marquita Osborne, showing off Joe Bridi's Zlin Z-50L on the famous Las Vegas "Strip." Ektachrome transparency by Billy Root.

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From the Shop

DON DEWEY

An R/C Overview

I don't believe that there is anyone reading this editorial who wouldn't agree that R/C has to be the greatest leisure time activity of all. With its combination of shop and field --- indoor and outdoor activities --- you can relax, enjoy, and escape from the problems of day-to-day living with which each of us are confronted.



One of these problems is today's inflated cost of living where the prices of food, housing, clothing, and gasoline has shot so high that the dollar bill is actually worth only 21 cents. In fact, by the time you read this, it may be even less! RCM is completely familiar with these skyrocketing costs as we have been confronted with 6% increases on our labor, paper, and printing every 90 days for the past year and a half and there appears to be no relief in sight in the near future. And, when you look at an \$80,000 printing bill that's going to go up 6% in 90 days and then that figure increase another 6% 90 days after that, you begin to get the picture of increased costs for advertising space as well as cover prices. However, one thing I will promise you --- R/C Modeler Magazine will continue to publish the highest quality and most informative magazine available anywhere in the world to the R/C enthusiast.

And, as we said in the first paragraph, this is the greatest leisure time activity that any individual could possibly enjoy. But, as the words of the song go, "You've got to stop and smell the roses along the way," so let's take a look at the state-of-the-art of R/C as it exists today --- an R/C overview.

Radios

Never in the history of modeling has the degree of sophistication, as well as the variety, of radio control systems been available as they are today. And, they are all excellent systems with virtually all of the functions and features to fill any and all individual requirements. The quality and the reliability of today's R/C systems are outstanding and they even come in a rainbow of colors. And, the best part of all is that, due to the increasing number of R/C enthusiasts and the resultant increase in production on the part of the radio control manufacturers, the cost of the individual radio systems has continually decreased. If you don't believe it, go back to the early 1960's and look at the price tag on the first Space Control proportional system and compare the cost of that early pioneer to one of today's sophisticated and miniaturized systems.

Engines

The performance that was obtainable a few years ago only by the "hop-up" artist is exceeded today by the out-of-the-box sport engines that you can buy right off your dealer's shelf. Technological advances allow the manufacturers to produce high performance competition engines to deliver an almost unbelievable amount of power. In fact, some of us old-timers have difficulty in relating to speeds in excess of 25,000 rpm! But, on the negative side, you "pay your money and takes your choice" --- there is a price tag on those increased rpm's.

Kits

This area of R/C is so staggering it's almost inconceivable. As a matter of fact, if someone had predicted 15 years ago the number of kits we'd have on the market today, I wouldn't have believed it for a moment. There are kits for almost any type, or size model that anyone could desire. And, these kits range from a very primitive nature through sophisticated ready-to-fly

competition ships with every sort of compromise design in-between these two extremes. And, prices run the gamut as well --- an individual can enjoy countless hours of flying his model built from a kit costing less than \$20.00, whereas the same modeler can purchase a kit for which he could spend \$350.00. And, \$20.00 or \$350.00, either model can be destroyed on its first flight attempt or, conversely, provide months, and even years, of relaxation and pleasure.

Clubs

Our best source of information as to what the clubs and their members are doing is from the over 200 club newsletters that we receive each month. And, each of these newsletters is read by Dick Kidd, Dick Tichenor, and/or myself in order that we can keep abreast of your interest and activities. What is becoming increasingly apparent --- although the problem has been gathering momentum for many years --- is in obtaining and retaining flying sites. It is also readily apparent from your newsletters that radio interference is an ever increasing threat to our activities. Hardly a week goes by without hearing of another gadget cluttering up the air. We were recently informed of a personnel paging system in use by a large company near our offices. This one transmits the call signal from Pasadena to the San Francisco area (over 500 miles north of us) where it is amplified and transmitted back to our own area. Being able to function in an atmosphere filled with garbage is indeed a real tribute to the manufacturers of our radio control equipment. Hopefully, the Federal Communications Commission will see fit to allocate some safe air space to us and allow the use of FM.

As for the types of R/C models mentioned most often in your club newsletters, it seems that trainers and Sunday flyer type ships, such as the Falcon 56 II and the Ugly Stik still dominate. Next in popularity is Sport Scale, followed by various classes of racing, and then the pattern competition aircraft.

Thus, as you can see, your newsletters are invaluable in helping us to determine the type of material to be published and the amount of space devoted to any particular category of our sport and hobby. Remember --- when you contribute input to your club newsletter, you're also contributing to the "information bank" available to the commercial magazines who read these newsletters and, as a consequence, determine what you want to see in those periodicals.

Flying Sites

Although we mentioned this in our brief look at local flying clubs, this is, without question, the most serious of all problems associated with the sport and hobby of R/C and of most importance to the individual RC'er. Competition for the use of public land has become critical. Rumor has it that two of the major fields in the Los Angeles area that have been provided by the Los Angeles County Parks and Recreation Department will be taken from us and converted into facilities for the 1984 Olympic Games. This is only a small sample of what is happening across the entire country. When it comes to private property, the owners have very little incentive to risk the liability involved by allowing the use of their property by sport and competition flyers. Then, there is the abuse of that property through vandalism by persons wholly unrelated to the RC'ers using the area. And, those acts of vandalism always seem to occur whenever space is made available to us, be it public or private.

A.M.A.

We have observed the course and action of the Academy of Model Aeronautics and can, at present, only conclude that the vast majority of the membership are apparently satisfied, to which we say "fantastic!" As for myself, I have stated my

to page 185

**BRAND
NEW!**

Hobby Lobby's 12 FOOT TELEMASTER \$159

List price \$199.00

This is one of the most interesting and well-thought-out RC planes you'll ever build and fly. But, at the same time it's also a bit ridiculous. For example: The fuselage is 8 feet long. Each wing half is 6 feet long. The flaps (yes, Virginia, there are flaps) have an area about the same as the entire wing area of a Jr. Telemaster. The barn door ailerons are enormous, but are designed to be operated by only one little tiny servo.

The 12 Foot Telemaster is huge, but at least we made it so it comes apart for "easy" transporting (he said, as he choked back a sardonic laugh)—the wing halves and struts come off; the fin and stab come off; the main landing gear comes off.

The "serious" side of the 12 Foot Telemaster is this: It is intended to be a light wing loading airplane. At a flying weight of 20 pounds (with Evra engine) and a wing and lifting stab total area of 3729 sq. in. (yes, a lifting stab—shades of old-timers!) the wing-stab loading is about 13 oz. per sq. ft.—like a glider! The 12 Foot Telemaster is, therefore, a very, very slow and gentle flying aircraft.

Nearly everything about this kit involved some innovation or copying of full scale aircraft design: The structure is quite like a full scale airplane; The wings were designed to be structurally sound without any covering material and can therefore be covered with inexpensive plastic covering materials; The hardware like the aileron bellcranks had to be specially made; The control surfaces use air boost techniques like full scale airplanes where necessary (the ailerons each have a trailing edge boost tab



that moves in opposition to the aileron's movement); The airplane is designed to accept our aluminum Evra engine shock mount that uses 4 rubber Lord engine mounts as in full scale aircraft. I mention all this to point out that the 12 Foot Telemaster is not just a scaled-up model airplane—it's practically unique.

The gentleman in the photo is Joe Bridi whose company builds the 12 Foot Telemaster kits for Hobby Lobby. The kits are magnificent.

In fact, I think these kits are so excellent that I'll make you this deal; If you get your 12 Foot Telemaster kit and look inside and say: "Hobby Lobby is NUTS—I do not want this much balsa wood, nor do I want this absurd huge albatross of an airplane casting its ecology-upsetting shadow over my flying field", you can give it back to the UPS driver and I will reimburse you the \$159 you paid AND send you a \$5 bill for the trouble you went to just to take a look

The engine for giant RC aircraft!

Hobby Lobby — EVRA 190
\$97.50



Aluminum Engine Mount with Lord Mounts \$19.00

Similar to full scale aircraft engine mounts. Almost totally eliminates vibration to the airframe!

7" Exhaust Stack for Evra 190 \$10.00

Just hacksaw it off where it exits the cowling.

"Fish Scaler" Muffler for Evra 190 \$9.00

Hobby Lobby EVRA 190 Engine \$97.50

List price \$139.95

The Hobby Lobby-Evra 190 is a 2 stroke cycle ignition engine designed specifically for very large RC aircraft. It is 1.9 cu. in. displacement (31 cc.)—roughly 3 times bigger than a .60 engine. We have run 18 to 22 inch props on it at top RPMs of 7000 to 5000. It idles at 1500 to 2000 RPM depending upon the prop used. It runs very economically on regular leaded gasoline mixed 20 to 1 with 2 cycle oil.

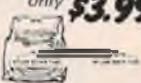
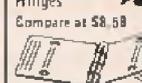
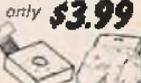
The Hobby Lobby-Evra 190 is a model airplane engine and not a lawn trimmer or chain saw engine: The cantilevered crankshaft does not have a protruding rear shaft; the carburetor is accessibly mounted on the rear of the engine; the engine has conventional beam mounting flanges. We also have a cast aluminum firewall mount available for it.

The Hobby Lobby-Evra 190 was designed to withstand sustained full-power running. It has large cooling fins, 4 ball or needle bearings, and a very strong conrod and crankshaft. Even the extra large prop drive unit and large prop washer were designed with giant RC aircraft in mind.

There is no sensation in RC quite like flying a giant RC plane. Here at last is the engine that was made for these giant aircraft.

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BULK PACKAGE RC Steel Links with 10" Rods 25 Links only \$4.99 Compare at \$12.25 	BULK PACKAGE Flex Cable Pushrod 20 feet nylon tubing 20 feet 1/16" bronze cable only \$3.99 	BULK PACKAGE Wing Fasteners 20 threaded wood blocks 20 3/4-20 nylon bolts Compare at \$6.50 only \$3.99 	7 Fuel Filters only \$3.99 	BULK PACKAGE 10 FEET Surgical Fuel Line Tubing only \$7.99 	BULK PACKAGE Mini Nylon Pop Clevises with 10" Rods 25 Clevises only \$3.99 Compare at \$7.00 	BULK PACKAGE Threaded Ball Links 10 Sets only \$3.99 Compare at \$8.50 	These are lightweight, high quality air inflated wheels on strong molded nylon hubs. We think these are comparable to, or better than wheels that sell for twice the price. We absolutely guarantee that you'll like them. If you don't think they're comparable to wheels that sell for twice the price, return them and we'll give you your \$5.99 back.

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 List price \$54.95 **\$35.99**
 54" span for 4 channels, .35-.49 engine. **ADVANCED TRAINER.**



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 For .15-.19 engine, 52" span, 2 to 4 channels, 2 hour assembly.



Bridi SUN-FLI 4-20
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MINI PATTERN PLANE. 48" span, 4 channels, for .15 to .25 engine.



Bud Nosen AERONCA CHAMP
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9 FOOT SPAN!



Sig KADET
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GREAT TRAINER. For 3 channels, .19 to .30 engine. 57" span.



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15-3/32x4x36	\$11.11
10-1/8x4x36	\$8.88
10-3/16x4x36	\$9.99
10-1/4x3x36	\$7.77

There are three things wrong with this wood: It isn't the speediest on it, it's a little longer than 36". It doesn't have anyone's name stamped on it.

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Hobby Lobby POWER CENTER \$15.88

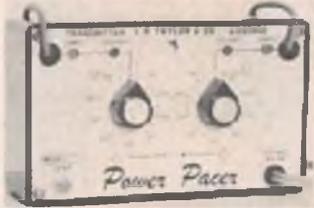
List price \$29.95



L.R. Taylor & Co. **POWER PACER 300**

NEW LOWER PRICE!

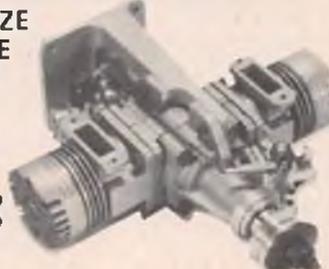
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List \$59.95



Tests, cycles, recharges digital nicads.

OVER~POWER

YOUR .60-SIZE R/C PLANE WITH THE **FOX 20c.c. TWIN**



This has been tried! An average size .60-powered RC plane has been flown with a FOX TWIN with a 12-8 prop. The firewall was moved back and the FOX TWIN added another 16 ounces above the weight of the .60 engine. The CG only moved forward a fraction of an inch.

PERFORMANCE?? Well, you can just imagine what happened: Vertical climb on partial throttle—sustained knife edge flight, Sabre dance 1/2 loop—1/2 roll take offs—on a pattern plane like a Phoenix, the performance would be mind-boggling.

Lots of places have advertised the FOX TWIN, but have you tried to get one? We've got 200 of 'em. Call us for our **LOW, LOW** price and let us send you one today.

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MIG 21 Deluxe	\$129.95	\$94.00	Nutcracker 60	\$ 65.00	\$47.45
F-5 Deluxe	\$129.95	\$94.00	Banshee 60	\$ 65.00	\$47.45
Comet 60	\$ 69.95	\$52.00	P 47 60	\$ 65.00	\$47.45
E-Z Does It Trainer	\$ 69.95	\$52.00	Troublemaker 60	\$ 65.00	\$47.45
Bearcat 60	\$ 65.00	\$47.45	40 Size Kits		
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Kwik Fly 3-60	\$ 65.00	\$47.45	Cutlass 40	\$ 55.00	\$43.00
Kwik Fly 4-60	\$ 65.00	\$47.45	Phoenix 5-40	\$ 55.00	\$43.00
Cutlass Supreme 60	\$ 65.00	\$47.45	Phoenix 5-60	\$ 65.00	\$47.45
Phoenix 5-60	\$ 65.00	\$47.45	ME-109 40	\$ 55.00	\$43.00
Vertigo II	\$ 65.00	\$47.45	Jap Zero 40	\$ 55.00	\$43.00

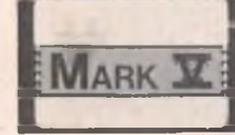
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High Point BALANCER \$19.95

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Coverite for . . . BIG airplanes!



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List \$310 **\$189.00**



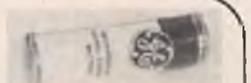
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List \$370 **\$245.00**



EK-Super Pro, 1 stick 7 channel. \$293.00
2 stick **\$279.00**

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Hobby \$3.20 each



This is the high quality G.E. cell that's original equipment in the best radio outfits. Cells have solder tabs.

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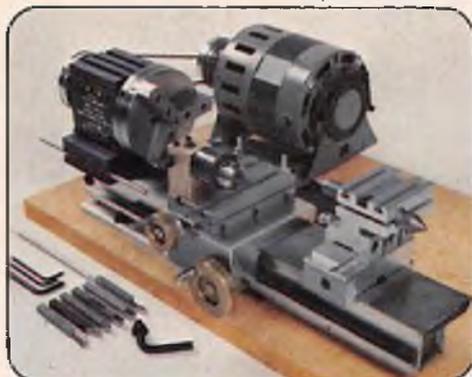
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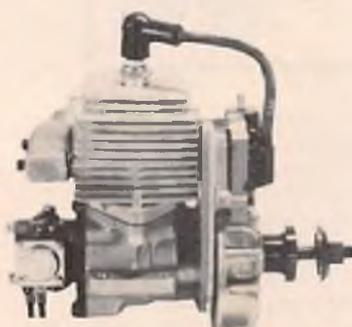
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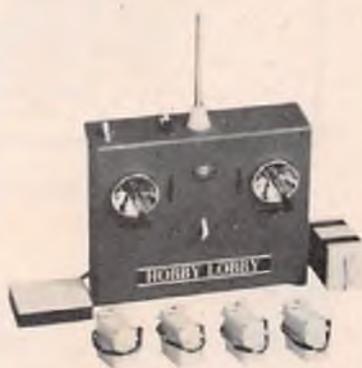
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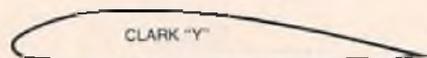
R/C DESIGN MADE EASY PART II

Okay, gang, if you paid attention last month to Part I of this series, you most probably have several questions in your mind, as well as a half finished aircraft, or aircraft design, waiting for the final touches. Let's dig out some more thoughts on simplified design of remote guided miniature aircraft.

To begin where we ended last month, we had investigated the design of a .40 size sport model, and I mentioned that we would go into airfoils, Center of Gravity location, wheel placement, etc., later. Later is now. First, let us look at the broad picture of wing airfoils. They generally fall into three categories for our use. The flat bottom airfoil, the semi-symmetrical airfoil, and the fully symmetrical airfoil. Each has a rather good use for certain types of aircraft. The flat bottom airfoil creates more lift than do the other types. This type of airfoil is best used on small, highly loaded aircraft, trainer types, slow flying sport designs, large aircraft that need to use the wings to fly upon rather than relying only upon engine power, gliders and soaring aircraft, and aircraft designed to lift large payloads. In the past fifteen years the flat bottom airfoil has not been as widely used as it once was but, used correctly, it is a super type of airfoil to use.

Next, is the semi-symmetrical type of airfoil. It has a greater thickness in the top portion of the airfoil than the bottom portion, thus generating more lift when right side up. The semi-symmetrical airfoil can be used on all of the types of aircraft mentioned earlier for the flat bottom type. It gains advantage in that the aircraft will perform inverted maneuvers much better than will the flat bottom type, and will not be apt to "balloon" into the wind when coming out of a turn and into the wind. It is more difficult to construct a wing with a semi-symmetrical airfoil than with a flat bottom type but, with the use of rib tabs, or small blocks under the wing while building, it really isn't too much more difficult.

The third broad category of airfoil is the symmetrical type. This airfoil has equal depth above the chord line, both



FLAT BOTTOM AIRFOIL



SEMI-SYMMETRICAL AIRFOIL



SYMMETRICAL AIRFOIL



top and bottom. It is as its name implies, symmetrical about the center line. This type of airfoil is most often used in full stunt and pattern type aircraft since the actions of the aircraft and lift are the same right side up or up-side down. This type of airfoil may be used for trainer types, provided that positive incidence is built into the wing. By that, I mean that the leading edge of the wing is one or two degrees above the trailing edge. The real drawback to this type of airfoil, when used on a trainer or slow flying aircraft, is that it will stall at a higher flying speed, thus reducing the allowable margin of error for the less than skillful pilot. In the hands of a skillful pilot you cannot tell that there is any problem, but sometimes a less experienced pilot needs all of the help he can get and, for this reason, I like to use the flat, or semi-symmetrical airfoil for most general types of miniature aircraft.

Naturally, in each broad category there are many, many specialized types of airfoils that can be used. If you're a bug on airfoils, visit your local library and read up on them in the full size aircraft design books.

For our use, the Clark Y flat bottom airfoil, and the NACA 2415 semi-symmetrical airfoil are the most popular. Plotting airfoils is quite interesting, and over the years a number

of articles have appeared in RCM on how to plot airfoils. Actually, there is really a rather large margin of error in drawing an airfoil, and many successful designs have been made using "French Curve Airfoils," simply using a long french curve to draw the airfoil to something that looks good to the designer. If you use this method, keep the thickest portion of the airfoil between 33% and 40% back from the leading edge of the wing, and the total thickness of the airfoil from 12% of the wing chord length for a flat bottom; to 15% total thickness for a semi-symmetrical; and to 18% for a fully symmetrical. Experiment a bit, and who knows, you may develop an airfoil that is perfect for your use and your aircraft.

The really important thing about airfoils is the wing that is constructed around the airfoil. It must be warp-free. This is the single most important point in wing construction --- building it warp-free. The second most important point is to build it strong. Nothing is more disappointing to the fledgling designer than to have his dream aircraft descend rapidly to earth with pieces of the wing floating downward --- yuk! A bit of extra beef in the wing in the form of plywood dihedral braces, strong spars, and good glue joints go a long way toward keeping things in one piece. Run those dihedral braces out into the wings, make sure that they are fully bonded to the spars with epoxy glue, and make sure that the wood that you choose for the spars is strong. Don't rely on soft balsa to save your aircraft at some important moment --- find the strongest pieces of wood that you can, especially for the spars.

Let's talk a bit about the leading edge of the wing that you're designing and building. For best all-around flying the leading edge of the airfoil should be rounded, not sharp. A nice large radius leading edge is the best, a sharp pointed leading edge is the pits. Why? Because the sharp leading edge will react to minor elevator changes very quickly and will give you a jumpy flying aircraft, one which will snap and stall much more easily. Back in the middle 1960's the AMA pattern had evolved into one which required a very fast snapping aircraft. To aid in this, wing leading edges were designed to be very sharp --- pattern aircraft of the day could snap and spin

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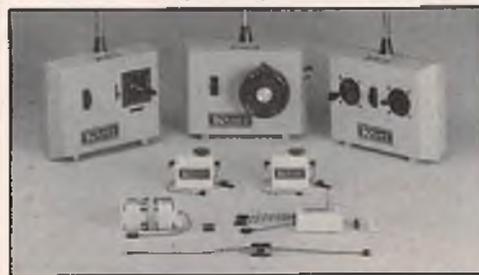
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This past month I received a phone call from John Klotz who manufactures the Klotz line of synthetic motor oils that many of you are familiar with --- especially those who have been mixing their own fuel and using the Klotz Special Formula oil. John wanted to inform me of changes that have been made to their two cycle racing oil that should prove beneficial for our model engine use.

Klotz Special Formula oil was originally formulated for use in motorcycles, go-karts, snowmobiles, etc. I do not know who was originally responsible for giving it a try in model fuel but I first used it myself approximately ten years ago and brought it to the attention of readers of this column at that time. Over the years I have made mention of the oil many times and answered many letters with questions related to the use of the oil. Klotz Special Formula oil has proven to be the most popular synthetic for model use --- mainly due to availability. You can purchase it at many speed shops catering to the drag race crowd, motorcycle shops, go-kart shops, etc. Union Carbide has two excellent synthetics --- MA-731 and MA-2270 --- intended for model fuels but they have not made these available through retail outlets to the general public. They have to be ordered through Union Carbide distributors in bulk quantity. Some years back K & B introduced their X2C synthetic oil and, at the time, sold it in quart bottles through the hobby shops. However, this practice was discontinued and K & B's oil is now only available in their line of fuels. Although there are many synthetic oils on the automotive market, only Klotz, K & B's X2C, and Union Carbide's Ucons, have proven satisfactory for model engine fuels. Most synthetics intended for automotive and motorcycle use are too thin bodied for our use. Oils used in model engines require a heavier bodied oil both for the "cushioning" effect and the ability of the heavier oil to carry away more heat --- one of the functions of the oil in our fuels besides lubrication.

Over the years, Klotz added several other specialized oils to their line of lubricants. Those intended strictly for motorcycle use, snowmobile use, etc.

One oil in particular --- their 2-cycle Racing Oil --- looked like it would have good possibilities for model fuel. However, in actual use it did prove to be a little thin and did not hold up as well as the original "Special Formula" oil. I have mentioned many times in the past few years that when using Klotz oil to be sure to use the original "Special Formula" and not the 2-cycle Racing Oil. However, this has now been changed. Klotz 2-cycle Racing Oil has been reformulated and now contains 25% castor oil. The addition of extra castor oil to the synthetics is something many fellows have been doing all along. The addition of castor oil to the synthetics seems to give the extra protection at high temperature on a lean run and also helps the rust formation problem caused by the nitro methane and alcohol in our fuel. Castor has a better ability to hold down rust build-up than the synthetics.

Strictly from a lubrication standpoint, nothing can beat castor oil in our model fuel. However, as most of you have found out, it has many disadvantages. It is very hard to clean off of the model, makes the engine stiff and hard to start in cold weather, turns to gum if an engine is allowed to set for any length of time, etc. So synthetic oil with some castor added seems to make an ideal lubrication package.

"Good Old Klotz" Special Formula, the original oil has not been changed other than the labeling on the can and is still pure synthetic for those who wish to go that route or use less castor in their fuel. The part number is KL 200 when you go to purchase the oil from your local source. The part number for the 2-cycle Racing Oil with castor added is KL 100. There is no mention of castor oil on the can or label. Klotz has actually been adding the castor to the 2-cycle Racing Oil for about a year now but there is always the possibility that a dealer somewhere may have some of the old stock on hand that does not have the castor added. The labeling on the cans and part number are identical but you can tell the new oil from the old since the new oil has a lithographed picture of one of Klotz's other products --- their Octane Booster on the top of the can. The older oil without the castor added does not. So look for the Octane Booster picture on

the lid when purchasing the oil.

Let's get to the letters this month.

Dear Mr. Lee:

I would like you to know that down here in Puerto Rico RCM Magazine is a part of every modeler's life, and that your column is one of the highlights of the magazine.

Although you try to answer many questions regarding model engines, it is impossible for you to print them all in the magazine. Our club had a problem getting fuel and finally started to make our own. We used your basic formula. The fuel is working fine but we really don't know what we have and would like you to clear the air for us. The formula we are using is five gallons of methanol, six quarts of Klotz Super Techniplate racing oil and one sixteen ounce can of Klotz Racing Additive (nitro).

Could you let me know what percentage nitro we have. Some of the members say we must put in almost 13 ounces of nitro to get a 10% nitro mix. Considering the amount of power we are now getting with the fuel we are now mixing, it seems to me like too much nitro. That would be for every 100 ounces of fuel, 10 oz. nitro, 22 oz. oil, and 68 oz. methanol. Would this be correct? I have been under the impression that some brands of nitro are more powerful than others, therefore, the ounce system would not be right. Please try to clear up this matter for us.

*Sincerely yours,
Joseph Micalizz, President
Demajagua RC Flying Club
Puerto Rico*

First off, when you mix your own fuel it is always better to start with a basic quantity in mind, i.e., 100 ounces, 128 ounces (1 gallon), etc. This way you are less apt to get goofed up with percentages. One of the biggest mistakes fellows make is to start with a five gallon can of alcohol and start adding the oil and nitro methane trying to bring it to a certain percentage of oil and nitro. Usually they end up a long way off from what they think they have. Then I get the letters wanting to know why the engines will not idle, run excessively hot, etc.

Using your example of 100 oz., then
to page 12



For the racer or collector!

Here are two of the most exciting radio-controlled cars you'll ever see! Prototypes were clocked at scale speeds of more than 300 miles per hour! If you want to race—these cars go! And yet, each is so incredibly detailed that a serious collector will instantly recognize them as masterpieces of model-making wizardry.

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Logictrol Super Pro	463.00	284.	4 yes

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ENGINE CLINIC

from page 10

10% nitro would be 10 ounces of nitro, 22% oil would be 22 ounces, and the alcohol would make up the remaining 68 ounces. If working with one gallon (128 ounces), then 10% nitro would be 12.8 ounces, 22% oil would be 28.2 ounces and the balance alcohol. If you wanted to mix five gallons of fuel, then it would just be the one gallon quantity times five.

Your club mix has a total quantity of 26½ quarts or 848 ounces. 2% of 848 would be 17 ounces so by adding 16 ounces of nitro you are ending up with just a hair under 2% nitro. This is assuming that the Klotz Racing Additive is 100% nitro which it may not be. Chances are it has other additives as well as nitro in it to make it compatible with gasoline. I did not ask John Klotz about this when talking with him but would guess that the additive would also contain a small percentage of ether, possibly nitro propane, or other gasoline additives.

There is only one manufacturer of nitro methane in the western world and that is International Minerals Corporation who purchased Commercial Solvents, the original manufacturer, a few years back. So there is only one brand of nitro methane. However, it can be had cut with alcohol and, for safety reasons, many chemical companies handling nitro methane will sell a 70/30 etc., mix. This must be taken into account when mixing fuel. Naturally it is desirable to use straight nitro which is about 98% pure to begin with. Here in the U.S. speed shops catering to the drag racers are the best source of pure nitro. Most chemical companies sell the diluted mixture. Being in Puerto Rico you shouldn't have too much trouble getting pure nitro from one of the speed shops in Florida. Florida has a lot of drag race activity. The "Big Daddy" of drag racing, Don Garlits has his headquarters there.

Dear Mr. Lee:

My April '78 issue of Scale R/C Modeler contains an interesting article on a cooling system for R/C models. The results of the glycol cooling system apparently eliminates the old problem of lean engine runs, because of the more effective liquid cooling system.

It appears to me that the high performance pattern models with their tuned pipes, etc., will soon be liquid cooled, like the full size high performance aircraft, such as the P-51, etc.

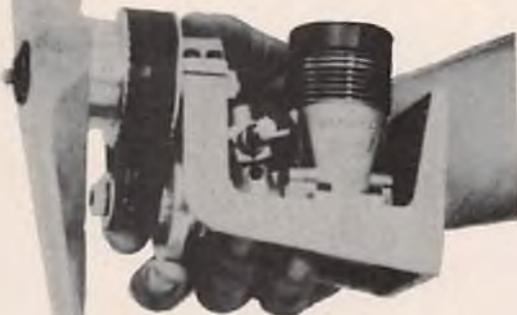
Your expert comments on the future of liquid cooled R/C models would be appreciated.

Sincerely,
Ken Lemke
Yakima, Washington
to page 15

"MORE NEWS"

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We're constantly looking for ways to improve the 60 Maximizer™ and recently began making some subtle changes in the way we machine the main frame. These are very significant changes as they will make mounting the engine in the frame a much easier and more precise job. If anyone has had an alignment problem, please return the main frame assembly to us and we will rework it to the new standards at no cost except \$3.00 for handling and postage (foreign \$6.00 for airmail).



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TOP FLITE

TOP FLITE

from page 12/10

I did not see the article on water cooling you mention in Scale R/C Modeler but I frankly do not think water cooling of model aircraft engines has much of a future. All you are trying to do is complicate simplicity and the end result does not really buy you that much. A cooling radiator might lend itself to some scale ships but I doubt very much if any serious pattern fliers would ever want to hang one on their ship. You also have the coolant supply to contend with which is additional weight. Most pattern ships are already on the heavy side with retracts, extra servos for flap control, mixture, etc. Cooling the engine is not that much of a problem unless the engine is enclosed within the fuselage for some special type of model.

Incidentally, a couple of years ago Johnny Brodbeck Jr., of K & B, got the hot idea of cooling the heads on the Formula I racers by using a marine head and pressurized water tank regulated with a needle valve; the water passes through the head and exits into the slipstream. A six ounce water supply being good for a two minute flight. By cooling the head, detonation was reduced with the high nitro and approximately a 600 rpm gain was seen on the bench. However, in the air getting things adjusted properly was a problem and the complications involved did not seem to justify the end result. I'll stick with air cooling myself, except in boats.

Dear Clarence:

I've been a model builder for many years. I've had wide experience in all types of engines. However, my experiences are limited in the use of the new styles of tuned pipes now becoming popular. I suspect the problem I'm having with my OPS .60 RC has something to do with the pipe combination I'm using - I'm using a Rossi exhaust header and tuned pipe on the engine. The top end performance is something to behold! The rpm is not as strong as my Rossi, but the torque on high end is super - fantastic torque. The rpm doesn't slow down in vertical climbs like most engines I've run. The problem is that when I start the engine and come off idle, the mid-range loads up to the point that if I push the throttle forward with any kind of speed the engine will quit from too much flooding. If I slowly advance the throttle, the engine will clean out and run okay - the longer the idle, the more flooding in the mid-range. The Perry Carb has been adjusted in just about every position. I am using 5% nitro fuel with synthetic lube. I've run the engine with pipe pressure to the tank and without. Still the same problem. The only difference

in pipe tank pressure and none is a needle opening about 1 1/2 turns on the high end setting. The engine really performs best, with minimum problem, with pipe tank pressure. I have adjusted the pipe for length on the ground for maximum rpm with my tack and then shortened it about 1/2" to get peak performance in the air - the combination motor and pipe is super beautiful in the air - torque to burn! But when you idle it back and the longer it idles the more "load up" I get going through the mid-range to full throttle. It tends not to quit in flight due to the "load up" in mid-range but it does not respond instantly. If I could just get the mid-range problem solved I'd have an engine combo that is the best I've ever flown. Help!

*Thank you,
Paul T. Samaras
Lakewood, Colorado*

Paul, you can't have your cake and eat it too. All that horsepower you are talking about has had to come from advanced timing, porting, large transfer port areas, etc. When you increase the top end power, the low end suffers. Loading through the mid-range is characteristic of piped engines. Years ago most engines had exhaust baffles to help the idle and acceleration. With the use of muffler becoming more common, the baffles were removed and loading problems began - after all, that was what the baffle was for. The same thing now prevails with the tuned pipe. Some engines are more tolerant than others depending on the timing, etc. Some of your problem is due to your elevation there in Colorado. The thinner air causes more of a richening tendency through the mid-range. As you probably know, even automobiles adjusted for sea level will not perform properly at your elevation without having the carburetor re-jetted. Increasing the nitro content of your fuel to at least 15% should help the loading problem considerably.

Dear Mr. Lee:

I must tell you how much I enjoy your column and tell you that it is one of the first things I turn to when the magazine comes out each month. I have several questions I hope you can answer for me. They are:

(1) What is the value of the .051 engine over the .049 engine? Is there a real power difference? I realize there is a power difference, but is it significant?

(2) I recently purchased a "Series 75" K & B front rotor .40 R/C engine with Perry Carb but with the Perry Pump. The fact sheet that came with it was helpful, but lacked two important items, at least in my opinion. It neglected to give the rpm and horsepower ratings of the engine. Would you be able to give me the information?

(3) On the above mentioned engine

there are two round openings through the lower portion of the baffle side of the piston that mate with two identical openings in the cylinder sleeve when the piston is in extreme down position, I believe. What is the function of these openings?

Thank you very much for your time and trouble and, most of all, for your expertise, for without people like you and columns like yours, many of us newcomers would probably not get very far in this exciting and enjoyable hobby.

*Again thanks,
SSgt Robert A. Hulett
APO New York*

The difference in power between an .049 and .051 depends on the particular engine. A strong .049 would put out more than an average .051. There isn't that much difference in displacement to make any big difference.

Horsepower ratings can be very deceiving. Most engines develop their maximum horsepower at an rpm considerably higher than the speed at which you run them - an all out racing engine being the exception. Many manufacturers purposely omit horsepower ratings as fellows might read that the engine develops .8 horsepower at 17,000 rpm and then because the engine will not turn the recommended propeller size such as a 10/6 at 17,000 they think there is something wrong with the engine. In the case of a pattern engine it is better to take advantage of the engine's torque characteristics which is what really matters. So it is how fast it turns the recommended prop size that matters.

The round holes in the piston skirt and sleeve just make an easier means for the fuel mixture in the crankcase to transfer to the combustion chamber. They also help get rid of the hot gases trapped inside the piston, in turn helping to cool the piston.

Dear Mr. Lee:

I have a "newcomer's" problem. I have been flying gliders for some time and decided to try powered R/C with a Q-Tee and QRC .049.

The engine was broken in as per instructions, run on a bench rich with Cox Blue Can for six tankfuls and then put into the plane. The plane flew great a few times and then I began to notice the engine running sluggish with power loss.

Also, after some nose-in landings, I had quite a bit of difficulty getting the engine to run consistently - the needle valve setting seemed to have little effect or too much effect. So, I figured that I had (1) dirt in the engine, and (2) varnish build-up.

Even though the engine had only 20 flights on it, I tore it apart, used fine steel wool on the cylinder and just a bit on the

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He was just another Sunday flier. Like you and me. Average builder. His models were reasonably well built, flew all right, and satisfied his desire to participate in our great sport of R/C flying.

He walked into the exhibit area, and slowly made the rounds of the model aircraft, boats, and cars on display. With each successive inspection, his face got a little longer, and his shoulders drooped a bit more. Finally, the strain was too much. He straightened up, squared his shoulders, and announced, through clenched teeth, to no one in particular, "I'm going home and **stomp** on my models!"

I know just how he felt, because I was there, and felt just about the same way.

Where? Where else? It was the 1979 edition of the Westchester Radio Aero Modelers Society annual show at the Westchester County Center in White Plains, New York. I had been invited there to show the latest movies on the U.S. Army/Lockheed Aquila remote piloted vehicle — just about the most sophisticated R/C job that's operational these days. It's totally console controlled now, with programmed flight and way point inputs, but the first flights were with standard sport R/C control, and my friend and associate, Gary Korpi, guiding it through the pattern. The movies were shown to SRO audiences during the show. They seemed to appreciate the fact that our sport is a real contributor to the U.S. military readiness posture.

But when I wasn't showing the movies, I was moseying through the commercial exhibits, finding out what's new, talking with exhibitors and attendees, and also looking at the absolutely fabulous models which were on display in the many categories which the WRAMS provide to modelers so their models can be shown to best advantage.

If you were there --- and over eleven thousand people paid to see the show --- then you know what I'm saying when I tell you it was one of the best shows yet. And, if you weren't, I've got some pictures, with comments, which will help you understand why any average modeler — Sunday Flier if you will —

tends to be both discouraged and motivated when he sees what some of the great modelers in this country are doing.

Lemme try to tell you in words and photos.

The WRAMS, as usual, conned me into being a judge. And, as usual, I did the very best I could. But when the results were in, and winners announced I was a real loser as a judge.

Or was I? The real fact of the matter is that, if you went through the exhibited models one day and picked winners, then, a day later, went through again, you probably would have picked an entirely different set of models.

In other words, how do you decide between first place --- and first place? One instance was a tie. What made the difference? At the risk of being opinionated, I think it was sheer size --- and that factor seemed to be prevalent in many cases. Somehow, I felt that, when a judge couldn't decide which model was the best, he just picked the biggest one.

Maybe that's the way it is these days. If you want to win, first you have to build it good. Then you have to build it big. Good and big --- that's the formula. Good I like. Big I don't fully agree with, although I have to admit that the bigger they are, the more impressive they are to most observers.

No matter. Big or small (comparatively) the models exhibited at the WRAMS show were totally superior in their excellence, and warranted every award they garnered. Here are some of them, with comments I recorded as I inspected them. Incidentally, I learned a lesson last year. After describing a model, I named the builder. Then I got letters asking for details, which I couldn't provide. So, this time, I'm not making the same mistake. Addresses are included, and if you want more information, write to the builder direct.

Let's start off with Stand-Off Scale. The winner in this category was a striking 1/3 scale Pitts Special. Unfortunately, I wasn't able to get the name of the builder because a photographer was shooting pictures as I was passing by. I did get a quick shot during the trophy presentation; here it is:



Now look at the airplane (airplanes?) which placed second, but which I awarded first place in my judging sheet:



This fantastic model is named the Mistel S3a. The lower plane is a J.U. 88, and the piggyback plane is an FW 190. During World War II, the Germans developed this combination for the purpose of a form of stand-off bombing. The FW 190 was fitted with a special nose and warhead, flew to the target area while joined to the J.U. 88, then was released and guided to the target as a gliding bomb.

In this model, built by Maynard Jubert, 50 Olivetti Place, Plattsburg, NY 12901, there are separate radio systems for the two aircraft. Take-off is made with all three engines running, with control by the radio in the J.U. 88. Once aloft, on command, the planes separate, and each is flown individually. It takes two pilots to operate.

Note the intricate cradle structure and release lines. The engineering and design effort must have been very painstaking. In addition, so that I could get the name of the builder, I had to get closer than the specified distance for Stand-Off Scale, and the finish, landing gear struts, wheel well covers were all outstanding. I had already voted it first

to page 19

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GOLD PRESTIGE COLLECTOR'S EDITION

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Price -- 5 cyl. -- \$795.00
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The World's only production, precision radial 5 & 7 cylinder four cycle engine. Quiet-Smooth-High Torque Power for your Scale and 1/4 Scale Ships. No more need for you to be forced to use unsightly chain saw or gear-reduction engines that mar the beauty of your special model!!

SPECIFICATIONS:

	5 cyl.	7 cyl.
Total displacement	15.73cm ³ (.96 cu.in.)	22.13cm ³ 1.35 cu.in.)
Weight	623 grams (22 oz.)	737 grams (26 oz.)
Bore	15.87mm (.625 in.)	15.87mm (.625 in.)
Stroke	16mm (.630 in.)	16mm (.630 in.)
Compression Ratio	9 to 1	9 to 1
RPM	1,000-5,000	1,000-5,000
Length	12.70cm (5 in.) (from prop nut to rear carb.)	
Width	15cm (6 in.)	

DESCRIPTION:

- * Radial-Firewall Mounted-pushrod operated overhead valves-air-cooled-glow engine.
- * Crankcase, cooling fins, pistons and cylinder heads are machined aluminum.
- * Camshaft, crankshaft and cylinder liners are hardened steel. Two cast iron piston rings per cylinder-stainless steel valves with bronze valve guides and seats.
- * The crankshaft is supported by 2 ball bearings and the cam assembly by 2 ball bearings. The master rod rides on needle bearings.

INTRODUCTORY PRICE : 5 cyl. price -- \$685.00 • 7 cyl. price -- \$785.00 • Anodized Black -- Add -- \$ 50.00 • OPTIMAL ON-BOARD IGNITION, including Fast Charger -- \$45.00



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M6000M — Classic beauty. All balsa construction. 96 1/4" wing span, .90-1.25 engine. 1/4 scale. \$129.95

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1/4 Scale Goodyear Pylon Racer, glass/foam kit. 64" wing span, .60-.90 engine. \$147.95



F-7 TIGERCAT

Glass/foam kit, two .40 engines, 65" wing span. Available July '79. \$198.95

CORBIN BABY ACE

All balsa construction 1/4 scale, .60-.90 engine. Available late '79. \$129.95

ANNOUNCING A NEW STAND-OFF SCALE BRIDIKIT --- JEFF TRACEY AND GARRY REUSCH'S FULLY AEROBATIC

CAP 20 L

Epoxy-glass fuselage, cowl and wheel pans. Foam wing and slab. Plug-in wing panels. Scale 3 1/4" = 1 ft. 81" wing span, 4 channels (2 aileron servos), Engine: 1.5-2.4 cu. in.



Other Stand-Off Scale Bridikits include the Brown Racer, Lockheed Sirius, Chipmunk, AT-6 T-28, P-51, Kraft Super Fli, and the Shrike. Coming Soon: Spitfire, Dalotel D-N-165, and Waco.

TRAINER BRIDIKITS

	Eng.	Wing Span	Const.
RCM Trainer .60	.60	60"	balsa
RCM Trainer .40	.40	50"	balsa
RCM Trainer .20	.20	45 1/2"	balsa
RCM Trainer .10	.09	36 3/4"	balsa
RCM Trainer .05	.049	36 3/4"	balsa
RCM Basic Trainer	.19	50"	balsa

SAILPLANES

Soar Birdy	78"	balsa
Big Birdy		balsa

1/4 SCALE BRIDIKITS

Cosmic Wind	.60-.90	64"	glass/foam
Rearwin Speedster	.90-1.25	96 1/4"	balsa
Corbin Baby Ace*	.60-.90		balsa
Dalotel D-N-165*	.90-1.25	78"	balsa

* Available late '79

PATTERN BRIDIKITS

Deception	.60	63"	balsa/foam
UFO	.60	64 1/2"	glass/foam
Dirty Birdy	.60	64"	glass/foam
Dirty Birdy	.60	64"	balsa
Super Kaos	.60	58 1/2"	balsa
Kaos	.60	58 1/2"	balsa

SPORT FLYER BRIDIKITS

	Eng.	Wing Span	Const.
RCM Sportster	.19	50"	balsa
Tweedy Bird	.19	48 3/4"	balsa
15-500	.40	51"	balsa
Quickest 500	.40	50 1/2"	balsa
Quickest 200	.051	31 1/4"	balsa
Sun Fly 4-20	.19	48 3/4"	balsa
Super Kaos	.40	52"	balsa
Dirty Birdy	.40	58"	balsa

BOATS

Chubasco	.40-.60	glass
Chubasco	.21 I/O	glass

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place, so that was not a factor in my decision. Sure, the big Pitts was beautiful, but the Mistrel was fascinating and intricate, as well as authentic in structure and finish. It was close. They both scored the same number of points, but the Pitts received more first place votes — from the other judges.

Interestingly enough, the "Best In Show" award went to another Stand-Off Scale model, Dennis Donohue's Stevens Akro 1/4 Scale. It's the same model that won first in Stand-Off Scale at the Las Vegas Tournament of Champions. But I voted for Jim Funduk's P-38L, a sleek 84½", 16 pound model with two O.S. .60's and Jim's own design retracts, flaps, and landing gear doors. It didn't even come close in the overall voting. I guess I'm just a sucker for P-38's. But take a look at it:



And you should see the cockpit. I didn't get a photo but you can see the ejection seat straps — and the rest is just as authentic. If you want more detail, write Jim at Route 1, Box 32, Hollyridge, North Carolina 28445.

Another great model, first in its class, was Mel Katz's DH 82A Tiger Moth, 78" span, 14 pounds, powered by an .80 Max.



And look at the cockpit detail, and "windscreen."



Are you beginning to see why that modeler threatened to go home and stomp on his models? Not Mel's; his own. Mel lives at 9200 Bustleeten Ave., Philadelphia, PA 19115, in case you want to contact him. Mel, that is; not the frustrated modeler. If you want to write a frustrated modeler, write me, I'm still goggle-eyed.

But wait, there's more. Look at this 1916 BE-2e Reconnaissance Bomber, by Hugo Visconti, 334 147 Place, Whitestone, NY 11357. 80" span, O.S. .60. The prop is hand carved, the entire structure is to scale including pinking strips over the scale ribs. Took Hugo a year to build. Bill Northrop gave it "Best In Show." I nearly did, too.



How about this Fieseler Storch, by George Bussman, 127 Jasmine Ave., W. Seneca, NY 14224.



It's 1/4 Scale, weighs 28½ pounds, powered by a Quadra. The fuselage is all welded steel tubing frame and riveted assembly and the servo wires run inside the fuselage tubing where they are out of sight!

Al Lobaito, 108 Windermere Road, Staten Island, NY 10305, scratch built this Stolps Starlet:



Okay, call me sentimental. It damn near brought tears to my eyes. Just look at those beautiful lines --- and that upholstered pilot's seat. The model spans 6'3", weighs 11 pounds, and is powered by a Webra .91. The control surfaces are cable operated just like the full scale.

Another unusual model, entered in pattern class, was Dick Sarpolus' Jetster.

It didn't win in its class. A conventional pattern design did. But I gave Dick first



place for being innovative enough to depart from the conventional and try something different. It will be interesting to find out how he makes out in future contests. Dick lives at 32 Alameda Court, Shrewsbury, NJ 07701. Oh yes, the ducted fan engine is a K & B 6.5cc, which, according to the note, handles the seven pound model very well.

There were several G.B.'s on exhibit, but the one that stood out to me was Henry Hatfke's Model Y Senior Sportster.



It's exact scale, spans 7½ feet, weighs 15 pounds, powered by a Webra .91 swinging a 15/5 prop. Write Henry at 1038 W. Elmer Rd., Vineland, NJ 08360, if you want to know more.

Biggest model in the show was a scratch-built, One Third Scale (not 1/4 Scale) Fleet by Bob Pickney. Since it was also well built, it was inevitable that it would win in its class.



It has 20 square feet of wing area (doesn't the F.A.I. specify a maximum of 15 for a "model"?), weighs 23 pounds, spans 8', 2", and has a Profi .76 with a prop driver designed by Bob. Proof positive. You wanna win? Build it good and build it big.

So now you can fully understand why that modeler — and I — were both frustrated and motivated by the WRAMS model exhibit.

But don't go away. Look at this:

That's Bill Cannon's hand, holding a dime and two servo amplifiers. The one on the left is in his current "supermini" servo. The one above the dime is his new amplifier for his new, ultra small servo (Micromini?) that's gonna be available next summer, around July or

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MORE THAN 1,000 KADETS PER MONTH ARE SOLD!

In club newsletters across the country, the Kadet continues to be the most recommended trainer for RC novices. But perhaps the biggest boost comes from the word-of-mouth advertising of those who have learned to fly on the Kadet. They tell their flying buddies to get the Kadet and the list of many thousands who have successfully soloed grows longer.

LENGTH: 42"
WING SPAN: 57"
WEIGHT: 4 Lbs.
ENGINES: .19 - .40

**THE IDEAL RC TRAINER
A GREAT SPORT FLYER**



New! AILERON OPTION

The kit now has materials and instructions supplied for the addition of ailerons. Ailerons make the Kadet an even more versatile trainer. The model can still be flown with 2 or 3 channel equipment if desired.

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KIT RC-31
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Handy Printed Fuselage Sides; Build Internal Structure Directly On The Wood
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Torsion Bar Main Gear - Nylon Control Horns
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Die-Cut Balsa And Plywood Parts
Top Quality Balsa And Hardwood

Designed by
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An extra booklet with valuable tips for beginners learning to fly.

ATTENTION: SPORT FLIERS! WHY PAY MORE FOR FUEL? USE THE FINEST AT PRICES BELOW OTHER MAJOR BRANDS

The Sig Fuel Story..

For many years castor oil was considered the best model engine lubricant. Continual increases in the market value of castor oil and the inevitable skyrocketing of model engine fuel costs led to a search for a replacement product. Trials of more economical all-synthetic oil formulas showed mixed results. Engines run cleaner and have low varnish and carbon build-up when using synthetic lubricants. However, synthetics proved to be less forgiving than castor oil when a model engine is run overheated with a carelessly lean needle valve setting.

Extensive testing developed a practical solution - a blend of Klotz Chemical Racing Lubricant and Baker's AA Castor Oil. Klotz is the finest synthetic oil available, developed for use under the severe engine environment stresses of competitive dragster, cycle and boat racing. This blended formula has since been flown by countless thousands of other model builders with uniformly excellent results. We are convinced that this is the best approach to the question since the safety of castor oil under high frictional coefficients has been combined with the clean running qualities of Klotz. The result is long life and high performance at reasonable cost.

Look at these direct price comparisons for quart sizes of sport fuel:

Brand W \$3.75
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Brand Y \$4.35
Brand Z \$5.00

SIG CHAMPION "5"
only \$3.25

CHAMPION "5"
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CF-012 Pint \$1.95
CF-013 Quart \$3.25
CF-014 Gallon ... \$9.95

CHAMPION "10"
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CF-021 Pint \$2.00
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PLAN TO ATTEND SIG'S INTERNATIONAL MINIATURE AEROBATIC CHAMPIONSHIPS FOR AEROBATIC BIPLANES AND MONOPLANES - JUNE 16 & 17, 1979

SIG FIELD Montezuma, Iowa
(1-1/2 Miles South on U.S. Highway 63)

AMA SANCTION #222
NO ENTRY FEE
PRIZES FOR ALL CONTESTANTS

MODIFIED 1977 AMA/IMAC RULES WILL BE USED
120 DEGREE AEROBATIC ZONE

5 EVENTS: CONTEST OPERATION BY DES MOINES MODELAIRES

BIPLANES - SPORTSMAN CLASS*

BIPLANES - ADVANCED CLASS*

ANY BIPLANE MAY ENTER. BUT 10% BONUS FOR SCALE TYPES.

MONOPLANES - SPORTSMAN CLASS*

MONOPLANES - ADVANCED CLASS*

SEE MONOPLANE REQUIREMENTS AT RIGHT

* BELOW 11 LB WITH .61 CU IN ENGINE OR LESS.

SPECIAL ADDED EVENT FOR MAMMOTH SCALE
AEROBATIC MONOPLANES AND BIPLANES COMBINED - OVER 11 LB.. ANY SIZE ENGINE, MUST BE SCALE TYPES.



Full-Size Aerobatic Demonstration
by the SIG MINI AIR FORCE -
SUNDAY NOON!

For More Information, Contact:
Maxey Hester, Contest Director
Box 368, Montezuma, Iowa 50171
PH:515-623-5154, 623-5157 or 623-2194

SPORTSMAN CLASS SEQUENCE

1. INSIDE LOOP
2. ONE ROLL
3. ONE SPIN
4. HALF CUBAN EIGHT
5. IMMELMAN TURN
6. HALF REVERSE CUBAN EIGHT
7. ONE INSIDE SNAP ROLL
8. SQUARE INSIDE LOOP
9. ONE FREE STYLE MANEUVER
10. PRESENTATION

ADVANCED CLASS SEQUENCE

1. 45 DEGREE CLIMBING SNAP ROLL
2. HAMMERHEAD
3. REVERSE SPIN - ONE TURN EACH WAY
4. OUTSIDE LOOP
5. SLOW ROLL
6. INSIDE LOOP - SNAP AT TOP
7. KNIFE EDGE FLIGHT
8. 4 POINT ROLL
9. TWO FREE STYLE MANEUVERS
10. PRESENTATION

Monoplanes must be a stand-off or full-scale copy of an aerobatic aircraft that was designed for and flown in full size competition aerobatic "box". Contestants must furnish proof of the aircraft's identity and connection with full-size aerobatic competition.

* SPECIAL NOTE: Pilots who have placed in the top 10 of the sportsman class at the 1978 SIG contest, are urged to enter in the advanced class this year.

SEND A SELF-ADDRESSED, STAMPED ENVELOPE FOR A COPY OF THE RULES THAT WILL BE USED AT THE CONTEST.

GET INTO THE AIR FAST WITH A KWIK-BILT KIT!



Sig's Time-Saving, Patented "Kwik-Bilt" System Pioneered A Revolutionary Method of Fuselage Construction. The Internal Balsa Profile Carries The Load Of The Engine And Flight Surfaces, Protecting The Molded Plastic Fuselage Shell From Vibration And Fatigue. The Ready-Formed Shell Goes On Effortlessly In A Few Minutes To Produce A Smoothly Finished Component, Complete With Panel Lines And Integral Wing And Tail Fillets. Tail Surfaces Are Sheet Balsa And The Foam Wing Core Is Covered With Balsa Planking, Making These Easy-To-Assemble Structures. The Superb Control Response Of These Competition Proven Designs Deliver Picture Perfect Maneuvers.

SUPER CHIPMUNK

KIT FEATURES OF CHIPMUNK & MUSTANG

SIG Quality Balsa and Plywood
Formed Plastic Fuselage Halves
Precision-Cut Foam Wing Core
Rugged Plastic Cowling
Clear Canopy With Framing
Formed Plastic Wing Tips
Solid Balsa Internal Profile
Sheet Balsa Tail Surfaces
Pre-Bent Torsion-Bar Landing Gear
Decorative Decal Sheet
Step-By-Step Instructions

HARDWARE PACK INCLUDES:
Molded Control Hinges
Molded Nylon Control Horns
Tuf-Steel R/C Links
Double-Coated Servo Mounting Tape



KIT KBRC-2
\$62.50



ENGINE: .61
WING SPAN: 64 In.
WING AREA: 690 Sq. In.
WEIGHT: 7 Lbs.



KIT KBRC-1
\$64.95

Designed by MIKE STOTT

MUSTANG P-51

**KWIK
BILT™**

ENGINES: .60
WING SPAN: 64 In.
WING AREA: 700 Sq. In.
WEIGHT: 7 Lbs.

Designed by MIKE STOTT

* Patent 3699705

CESSNA 150

Molded Plastic Fuselage Sides
Molded Plastic Skin for Aileron
And Flaps With Realistic Crimping
Cessna Factory 3-View Drawing
Formed Plastic Fuselage Halves
Door And Window Detailing
Molded Plastic Engine Cowling
Molded Wheel Pants
Precision-Cut Foam Wing Core
Formed Plastic Wing Tips
Solid Balsa Internal Fuselage Profile

Sheet Balsa Tail Surfaces
Formed Aluminum Main Gear
Strong Coil-Spring Nose Gear
Decorative Decal Sheet
Step-By-Step Instruction Book
Die-Cut Plywood Parts
Sig Quality Balsa
Molded Nylon Control Horns
Molded Plastic Hinges
Tuf-Steel RC Links and Rods
Double Coated Servo Tape
Aluminum Motor Mounts
Nylon Nose Gear Bearing
Nylon Wing Screws
Blind Nuts And Bolts

ENGINES: .50 to .60
WING SPAN: 65 In.
WING AREA: 645 Sq. In.

The Clear Window Kit is optional and is not included in the Cessna 150 kit.



KIT KBRC-4
\$74.95

CESSNA 150 WITH
ACCESSORY WINDOWS INSTALLED

Designed by HANK POHLMANN

RP-WK-404
WINDOW KIT

Windows must be installed before fuselage sides are joined

\$3.95

Yes! We have the fuel additives you've read about in Clarence Lee's RCM ENGINE CLINIC column.

VARFREE ENGINE CLEANER

Engines can be thoroughly cleaned of varnish and carbon by running the engine at a rich setting and slowly adding one or two eyedroppers of VARFREE in the venturi. If engine is very dirty, repeat the process. Engine can be kept clean by adding 2%VARFREE to your fuel.

VF-001 4 Ounce
\$1.25
VF-002 8 Ounce
\$1.89

LUBRICIN N-1

A fuel additive that increases the lubricating qualities of castor oil by increasing the film strength. There is less oil drag within the engine, resulting in higher RPM and more power output. The detergent action keeps the engine clean and extends its life. Use 2% to 3%

LB-001 Pints \$3.39
LB-002 Quarts \$5.59

JUST OFF THE PRESS! SIG'S LATEST CATALOG - NO. 40!

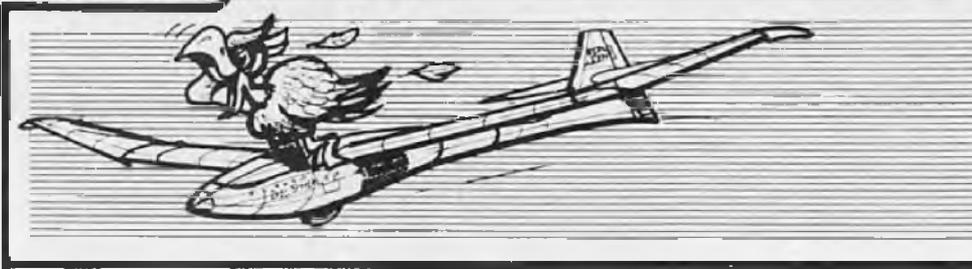
"THE MODEL BUILDER'S WISHBOOK." Every modeling workshop needs a copy of the latest Sig Catalog. The complete line of Sig kits, accessories and supplies is shown, plus practically all other major companies products. Use it as a handy reference tool while designing or building a model. Featured are some helpful hints about construction, painting and other subjects by the Sig Factory Fliers. Get a copy at your friendly local Sig dealer or send \$2.00 to Sig.

TO ORDER KITS AND SUPPLIES: See your dealer first! If he cannot supply you, order direct. Add \$1.00 postage for orders under \$10. Orders over \$10 are postpaid. No C.O.D. Do not send cash. Prices subject to change without notice. Be sure to include complete address and zip code.

SIG MANUFACTURING CO., INC - MONTEZUMA, IA 50171



Soaring AL KINDRICK



The third, and youngest, member of our US FAI soaring team is Steve Work of San Diego. In an interview with Steve he tells us of his brief history as a sailplaner.

He started R/C modeling at the age of twelve — he is now twenty three. Sailplanes were always at the top of the list. His interest in competition took an upswing in 1977 when he joined the U.S.F. Steve has always been an advocate of the F.A.I. program, and was very happy to see it get off the ground in 1976. Due to earlier commitments with the U.S. Navy, he wasn't able to participate in the first team selection program. However, he was able to attend the Denver tourney as a helper for Dave Thornburg. In May of 1977, he was stationed at North Island, San

Diego, maintaining and operating flight simulators and, at that time, he set his sights on the next F.A.I. trial program. Now that Steve is on the team he will be concentrating on putting together a couple of "Hot" Birds of Time as well as spending many hours practicing.

The three alternates to the team, in descending order, are Jack Hiner who flew an Aquilla Grandea; Bill Haga and his Legion-Air 132; and Bob Gill with his Viking.

The team members, Skip, Terry and Steve, the alternates mentioned above, team helper Dave "Gazelle" Thornburg, and Dan Pruss as the team manager, need all the support and financial help they can get. As Ray Marvin, Director of the United States F.A.I. program says, "This program is a team effort, get

behind them." Have you or your club helped financially?

Some of my readers have sent in questions about how to ship models by commercial airlines.

I have the privilege of working with Bob White, World Champion FIA, FIB, and FIC flyer. Bob has traveled all over the world with his models and I am going to pass on some of his comments and suggestions on shipping your models by a commercial air carrier.

Your model box should be constructed of 1/4" marine plywood. The corner gussets and braces should be on the inside leaving the outer surfaces as smooth as possible.

Don't use metal suitcase type handles on the top or sides. When the box is in

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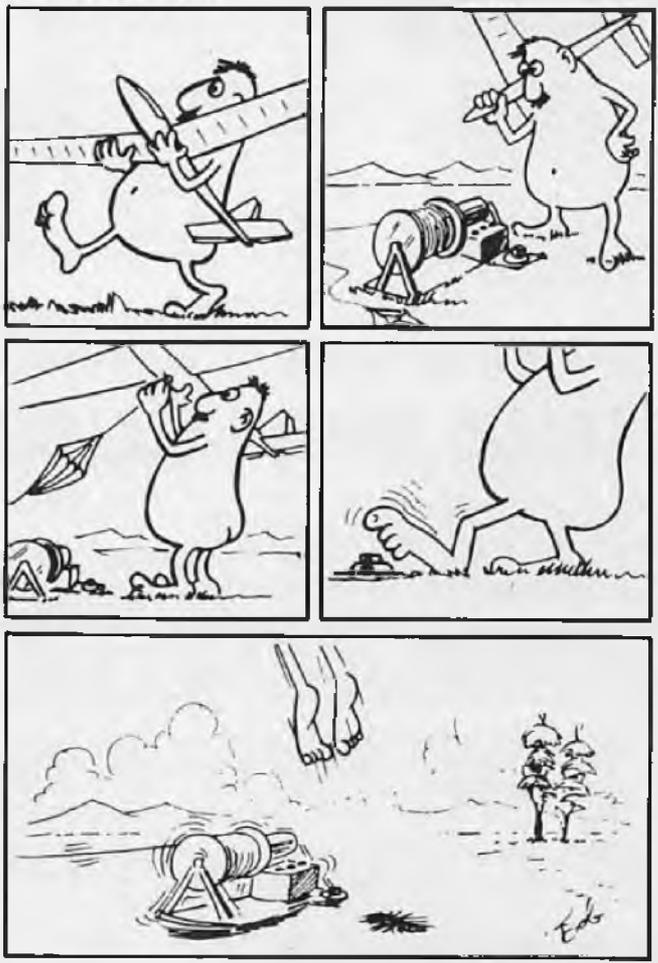
Soar Birdy winners, the host Joe Bridi and C.D. Buzz Waltz.



The three men who put this event together, Rex Powell as the organizer, host Joe Bridi and C.D. Buzz Waltz.

GLITCH

Reprinted from the Newsletter of the S.A. Assoc. of Radio Flyers, Nov. 1977.



THE NEW DU-BRO Universal MUFF-L-AIRE II

MUFFLER LENGTH CAN BE SHORTENED UP TO 1" TO FIT YOUR ENGINE INSTALLATION.

CAT. NO. 235
ONLY \$8.95

IT LOOKS LIKE AN EXHAUST STACK - BUT IT'S REALLY A MUFFLER!

Completely Universal - 3 muffler sizes fit engines from .09 to .80

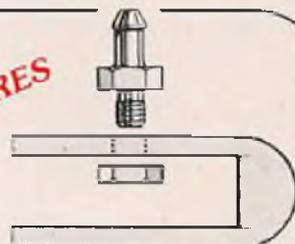
Includes pressure fitting

Adjustable stainless steel spring controls back pressure and noise level.

Lightweight aluminum body with tapered end - exits exhaust straight away from plane

MUFF-L-AIRE II with 3" long stack for engines .29 to .80

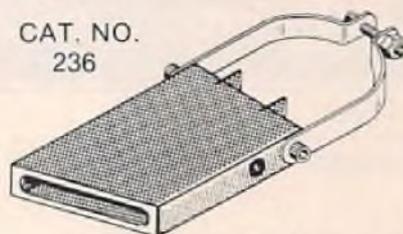
FEATURES



- PRESSURE FITTING IS SIMPLE TO INSTALL - JUST DRILL ONE HOLE (TOP OR BOTTOM) AND LOCK ON WITH NUT.
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- NOISE LEVEL AND BACK PRESSURE ARE FACTORY SET FOR BEST OVERALL PERFORMANCE. BUT CAN BE ALTERED AT YOUR OPTION.
- SUPER CLEAN!

MINI-MUFF-L-AIRE II ALSO AVAILABLE

CAT. NO. 236

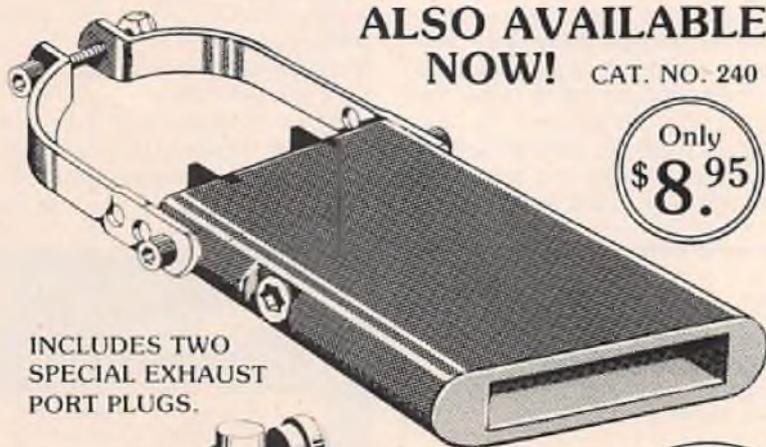


FOR ENGINES .09 to .25
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SPECIAL K & B .40 MUFFLER

ALSO AVAILABLE NOW! CAT. NO. 240

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INCLUDES TWO SPECIAL EXHAUST PORT PLUGS.



BLACK ANODIZED BODY. PRESSURE FITTING INCLUDED.

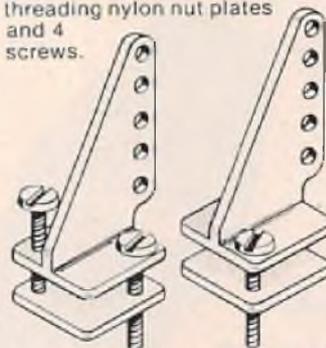
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NYLON "T-STYLE" CONTROL HORNS

5 Throw adjustment positions. Each set includes two horns which are centered on the base, 2 self-threading nylon nut plates and 4 screws.



CAT. NO. 237 ONLY 49¢

For the Beginner... Our Basic Trainer



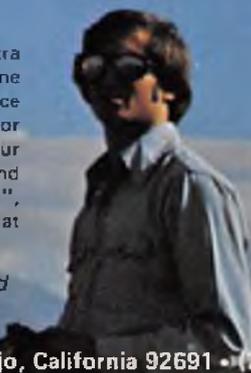
Our Rev-olution trainer is designed specifically for the beginner. Extra rugged construction prolongs "life expectancy", while a .40 size engine provides power to spare and makes economy of operation and maintenance outstanding features. Spare parts are as close as your hobby shop, or phone us; we'll have your order on its way usually within 24 hours! Our leading technology gets you off the ground at an affordable price. And factory trained personnel will answer our "Troubleshooter's HOTLINE", (714) 837-7905, to help you with construction, set-up and flying. What could be easier?! We're at your service.

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SOARING

from page 22

the cramped luggage compartments, these handles will get pushed into the plywood, cracking and splitting the wood. Use nylon webbing or rope as handles.

Paint your box white, it is more easily located and instructions and addresses printed over white stand out much clearer -- and the most important item --- when you are at your final destination the white box will not absorb heat at the flying field.

If you are going to travel to a European country (where the small auto is very popular) the model box goes on a car top carrier, so make the lid as water tight as possible. Always print the contents and destination of the model box in the language of the country in which you are traveling and, of course, your own native language.

When purchasing your airline ticket, have the model box dimensions with you. Explain to the ticket agent that the whole reason for the trip is to get the model box and contents to its final destination unscathed. Get the name of the baggage manager and explain to him the importance and fragility of its

contents. Bob says that at this point the airlines will realize the importance of the cargo and will let you oversee the actual loading of the box. If they don't want to do this, there are always other airlines.

Never pack heavy objects like transmitters and battery packs in the model box. If they break loose they can be propelled clear through a flying surface. Pack the model parts with foam and rubber bands so that if the box is rotated or stood on end, no part should fall free inside box.

A clean white box with no big scars or blemishes appears to be fragile and for some reason is always handled with

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NOW A MICROELECTRONIC DIGITAL WRISTWATCH/STOPWATCH BACKED BY A WORLD LEADER IN ADVANCED ELECTRONIC TECHNOLOGY. HELP TAKE THE GUESSWORK OUT OF YOUR FLIGHTS WITH A TI DIGITAL STOPWATCH. CALL OR WRITE:

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Hobby Shack

Designed by
Irwin Ohlsson

CALIFORNIA STATE CHAMPION 1937 PACEMAKER-40



The Ohlsson Pacemaker 40 was commissioned to be manufactured by OK Model Company, better known as Pilot, exclusively for Hobby Shack. This is a very high quality balsa kit, with all balsa parts hand machined and plywood parts so nicely die cut that they fall out at a touch. The Pacemaker is a fun airplane with nostalgic looks, but still modern enough to be attractive today. Being originally designed as a free flight, and a contest winner at that, it most certainly makes one fine radio control model for the novice and old timer alike! The construction, though not difficult at all, is a bit more unusual than the typical "box" style trainer, so we don't recommend this for your very first model to build!

THE KIT INCLUDES: ALUMINUM SPUN COWL • ALL LANDING GEAR WIRE PRE-BENT TO SHAPE • ALL HARDWARE INCLUDED • NUMBERED PARTS EASIER CONSTRUCTION • FULL SIZE BLUELINE PRINTS PLUS PHOTOGRAPHIC INSTRUCTIONS • HAND MACHINED Balsa PARTS • HIGH QUALITY KIT •

A Brief History -----

If anyone ever deserved to be inducted into the Modelers Hall of Fame, it was Irwin Ohlsson. I was most happy to see that he was recognized, and that such a tribute was finally made to one who contributed so much. In his younger years he would spend hours each week at the local school yard helping small children learn about modeling and flying freeflight airplanes. Mr. Ohlsson is most renowned for the O&R ignition engines (the "O" was Irwin Ohlsson) which are collectors items today. In 1937, Irwin won the California State Championship with his new PACEMAKER design, flying it in free flight with his own .56 engine. After that, he kitted the model himself and sold it with an engine for \$25.00. From these sales he made enough profit to pay for the tools & dies for the manufacture of his famous O&R .23. In 1938, the first .23 came out and Ohlsson flew the PACEMAKER for the first time with 'rudder only' radio control. Next, he tried floats and has been flying this design ever since. On the cover of the November 1978 RCM, you'll find one of these models that has been flying since 1968. About 9 or so of these have been scratch built, and now we look for a lot more PACEMAKERS to be in the air, all built from our high quality balsa kit. Irwin says that the kit is the best he has ever seen, and not counting its structural redesigning for radio control, it is almost identical to the original airplane!

**HIGH QUALITY Balsa KIT
40 ENGINE**

SPAN: 73 inches
AREA: 632.4 sq.in.
ENGINE: .40
RADIO: 4 channel

RETAIL
\$89.95

Hobby Shack
DISCOUNT PRICE
\$69.99

There's only one place to get it!

CHARGE IT

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KLOTZ THE CHAMPAGNE OF RACING OILS



Klotz has been blending the very best synthesized racing oils for over fifteen years. Today, more competition flyers rely on this synthetic and castor blend racing oil than ever before. Every year more serious modelers find out that Klotz blends perfectly with nitro and alcohol for *cleaner, cooler, faster and longer running* engine performance.

Anyone who is really serious about competition and

blending their own fuel will want to use Klotz . . . also, look for the "Klotz red" color in leading brands of pre-blended fuels. See your local oil distributor or write us for information . . . and one day soon, you too, will be toasting Klotz, "The Champagne of Racing Oils!"

KLOTZ POWER TO GO

Klotz Special Formula
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P.O. Box 1343,
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Ft. Wayne, IN 46801

SOARING

from page 24/22

more care than dark colored boxes.

In summing up, impress the airlines with the importance of your box and its contents; use native language stating fragile contents and destination; paint the box with waterproof paint. When traveling on land never let the box out of your sight. Bob and I are both interested in any other ideas or comments you may have regarding shipping your models -- drop me a line on your suggestions.

★



Joe the pilot, Keith the timer, and Kraft for that million channel radio for a two function sailplane.



A newcomer to the soaring scene, Bill Cannon and his wife, "Charlie."

In Palm Springs, where the sunshine spends the winter, somebody goofed. With snow all around the foothills, and between rain squalls, Joe Bridi held a "one of a kind" Soar Birdy two meter contest. Rex Powell and C.D. Buzz Waltz put together one fine contest that required skill and exact timing, but was still fun.

Our most gracious host, Joe Bridi, greeted everybody, inspected every plane personally and, if there was any deviation from the plans on an outward appearance, handicap percentages were assessed depending on the extent of deviation. A newcomer to the soaring world was Bill Cannon and his lovely

to page 166



EASY BAILER - Actual Size

"EASY BAILER"

Tired of having water in your boat, which adds weight, gets in your radio box, and sometimes gets into your carburetor and stalls your engine? Never fear, EASTCRAFT is here, with EASY BAILER. EASY BAILER is a simple valve that is small and light, but does a big job. It is very easy to install

and works automatically and requires no maintenance. EASY BAILER automatically removes unwanted water from your boat without letting water in. Less water build-up in the boat means more speed, more reliable operation of engine and radio gear, and less oil and water on the flywheel and starting belt. Never before has there been such a small inexpensive product that can do so much for you and your boat and its equipment. Pick up an EASY BAILER and see for yourself. Stock No. 851 \$3.50

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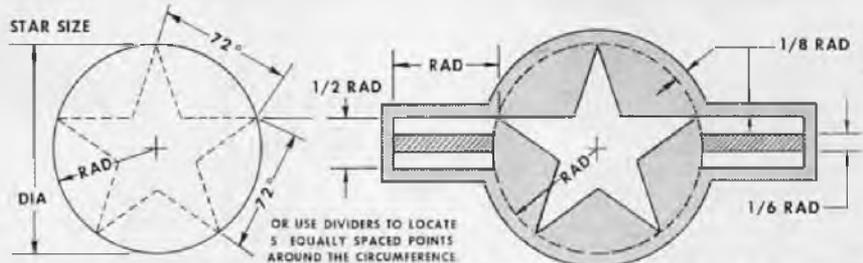
Insignia By The Numbers

It's a shame to see a well built scale model of a U.S. military aircraft spoiled by star and bar markings of the wrong proportions. At least one supposedly authoritative book on the subject has the wrong dimensions and I bit on them once, but later realized the mistake when comparing the model to pictures of the full size subject. Accompanying are the official layout instructions taken from USAF Technical Manual T.O. 1-1-4 "Exterior Finishes, Insignia and Markings for USAF Aircraft" (and of course the U.S. Navy uses the identical markings). Use them to draw a pattern of the desired size for direct transfer to a model, cutting iron-on film or a painting stencil.

On aircraft that are dark blue or black, the blue surround is eliminated and only the white and red parts are used. When originally introduced during WW II, the star and bar did not have the red stripe, this being added in 1947. During the period from June 1943 to September 1943, the 1/8 radius part of the insignia was painted red all the way around. Be careful about the late WW II period when the two tone blue and white matt finish scheme was replaced on Navy airplanes by an overall gloss blue scheme. From May 1944 to September 1944, this was sea blue --- a fairly dark blue but one on which the darker midnight blue of the insignia still stood out. After that, aircraft were painted overall gloss midnight blue and only the white star and bar was used. If you have watched carrier film clips on TV of the Pacific war, notice this difference on, say, Hellcats. I've seen some clips where examples of both types of blue and insignia were on the same carrier.

Engines For Scale

Four cycle types are particularly adaptable to scale models because of a noise level and sound more compatible with realism than a high pitched scream, and their ability to swing larger sized props than comparable two cycle engines. Paul Johnson is a collector of "out of the rut" engines and at the WRAMS show he somehow managed to pry Nat Polk loose from the only U.S.



SIZE REFERENCES ARE BASED ON THE CIRCLE ON WHICH THE STAR IS CONSTRUCTED AND NOT TO THE OUTER EDGE OF THE BLUE OUTLINE.

RED  WHITE  BLUE 

NATIONAL STAR INSIGNIA

DIMENSIONS FROM USAF TECHNICAL MANUAL T.O. 1-1-4



example of the unusual new Diamant 10/4T. So polished and pretty it should sit on top of a trophy instead of a test stand, the French import dispenses with the usual methods and operates the valves by means of a toothed belt drive. That's a Perry carb in the photo and, according to the "Frenghish" translation of the operating instructions, 10% castor oil fuel is suggested in winter and 15%, but no more than 20% in summer. Paul has some other new 4 cycles and we'll be running and taching all of them soon for Scale Views. Meanwhile, more Diamants are on the way to Polk's in New York. Now if someone will just tell us what a "raporteur" is, as used to adjust the "wimble," we'd be grateful. Come to think of it, that's probably like applying a rogifron to a reetun valve.

Fox's new 1.2 (or 20cc. for you metrification fans) twin has been announced for some time but was delayed in introduction. I got to examine an early display item and was impressed with the engine, particularly considering the comparatively reasonable price of

\$250. It has some entirely new design cylinders and other parts that are also on the new single cylinder Eagle II. The carbs are set for idle at the factory and the owner is not supposed to tinker with these settings for at least 30 minutes running time. The gadget in the photo is a "Y" connector supplied for fuel line coupling. (You could also use two separate tanks.) Duke recommends large tubing and enlarged tank outlets to provide the required 2 oz. of fuel per minute. I weighed the motor out of the



box without a prop at 2 lb., 12 oz. It is ported to run at high speed so the suggested ideal prop size is 13" diameter with 16/4 given as the largest practical prop, 11/8 as the smallest. But with 3 hp being developed at 14,000 rpm, don't worry about prop sizes. Duke says, "Leave the huge propellers for motors that are not capable of revving up."

Bookworm Trip II

Last month we tried to turn you on to **to page 30**

NEW

Hobby Shack - *PILOT*
RADIO-CONTROL
HIGH QUALITY Balsa KIT
SPORTAVIA RF-5B

ELECTRIC POWERED MOTOR GLIDER
 T.D. .020 GAS POWER OPTIONAL



The Sportavia is a light-weight electric motor powered glider, designed for the beginner or expert who wants to enjoy the fantastic thrill of silent flight! The kit comes complete with step by step instruction guide and full size plans which show the installation of the Mabuchi RS-380 electric motor as well as construction of the model. It features top quality balsa and wood parts, spinner, formed canopy and hardware parts. Also included is separate plan which shows the installation of the Cox TD .020 gas engine.

SPAN: 59 inches
 AREA: 348 1/2 sq. in.
 WEIGHT: 1.54 lbs.
 RADIO: 2 channel

RETAIL
\$44.95

\$34⁹⁹

ELECTRIC MOTOR SYSTEM
\$44.99

The electric motor system for the Sportavia uses two 6V small lightweight nicad battery packs that will run the motor two minutes. A two minute and one run will take your Sportavia high into the air and then you're challenged to find a thermal and continue the flight. The propeller adaptor and spinner are included in the kit. The motor system includes one (1) Mabuchi electric motor, two (2) nicad battery packs, one (1) automobile cigarette lighter charger, a slide on/off switch and one (1) circuit breaker. System is not pre-wired.

NEW

Hobby Shack - *PILOT*
RADIO-CONTROL
HIGH QUALITY Balsa KIT

DIVINE WIND
 High Performance Thermal Glider



SPAN: 65 inches
 WEIGHT: 2.97 lbs.
 AREA: 527 sq. in.
 RADIO: 2 - 3 channels

The DIVINE WIND is one of the best looking, best flying gliders to come from Pilot yet! It is a 65 inch span slope soaring glider that is fully aerobatic, using ailerons, elevator and rudder if you want. This is an all balsa model that has been carefully designed and tested for exciting flight performance in most wind conditions. The kits contain first quality balsa and hardwood parts, formed plastic canopy, full size plans and an illustrated step by step construction guide.

RETAIL
\$69.95
\$49⁹⁹

NEW

Hobby Shack - *HIROBO*
FALCON
RADIO CONTROL HELICOPTER WITH COLLECTIVE PITCH



After talking to many helicopter pilots, asking people in Japan which is the best basic helicopter kit, and after reading several reviews in model magazines about the high quality of Hirobo helicopters, we made the decision to import the Hirobo Falcon R/C helicopter kit. It has been said that it is the best, and for its size and class, we feel it is the best!

The Falcon is a good choice for beginner flyers because of its easy assembly, excellent flying characteristics and reasonable selling price. The Falcon is also good for the expert for stunt training. Its high stability, sensitive performance and ease of assembly make for lots of enjoyment!

The Falcon comes complete with a collective pitch system! Many of the more difficult parts are pre-assembled for you by Hirobo. With just a glance at the kit, you will see that both the metal and plastic are of highest quality. The fuselage is fiberglass - Not plastic! The bearings are all excellent, and the instructions feature several pages of exploded views to aid in assembly. The plans are a step by step type and will carefully lead you thru the assembly process. If you like helicopters, we know the Falcon will give you complete satisfaction!

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 WEIGHT (fully equipped) 7.3 lbs.
 ENGINE 40, 45
 RADIO 4 channels

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from page 27



A sample from AFP Vol. 7, coverage of the rare Blackburn Firebrand torpedo plane. Ideal RC scale subject, with lots of wing area, big tail.

the usefulness of new aviation books to scale modeling. Once hooked you'll soon start trying to find some of the older, out of print publications. Newcomers to book collecting will find that the value of a book may not be based so much on age as upon scarcity and desirability. There are many aviation titles of the 20's and 30's, printed in great numbers and stocked by most public libraries, that can be had cheaply. The famed reference "Jane's All The World's Aircraft" went into mass distribution as WW II gathered steam, tapered off quickly at the end of the war as all of the companies in war time aviation sub-contracting work went back to peace time pursuits, reduced circulation even more in the late 40's and appeared every other year in the 50's as the hoped for postwar boom collapsed. So 1941 and 1942 issues are not hard to find but the 1945-46 volume is so very rare and expensive, so much so that it has been re-issued in facsimile form. The 1947 and 1948 versions are rare, but not so expensive because they lack the end of the war roundup of experimental types featured in the 45-46 edition. Even relatively newer books, such as the privately printed 1959-60 classics "U.S. Marine Corps Aircraft 1914-1959" and "U.S. Naval Aircraft 1921-1941" by William Larkins, are much sought after. If I were to have to name the best of my own library, and I know of no other books I'd want more, it would be the seven volume set called "Aircraft of the Fighting Powers" published in England during the war. This series covers most of the combatants of WW II and presents 3-views in uniform 1/72" scale, some on two and three page foldouts. As with Jane's, the 1946 Volume 7 edition appearing after the war is scarcer and more valuable than the rest of the set and likewise has a lot of experimental coverage. Be warned that the first two A.F.P. volumes have low quality drawings. But no matter, I collect

anything with three views. If there is enough interest in the subject, later on I'll list the other best "titles with 3-views" to look for but for now, let's get on to some sources of out of print and used books:

Bohemia Bookshop, 116 Bohemia Rd., St. Leonards on Sea, E. Sussex, U.K. Frank Letchford, the proprietor, has been in business for 18 years and I have been a customer for most of that time. He carries both new and used books and can always supply the many good new English aviation titles as soon as they are available. Since there are few dealers in out of print books, his lists of rare oldies are of particular interest to scale builders. For example, his most recent list (Number 100!) was headed by the offer of a complete set of No. 1 through No. 262 of Profile Publications, in bound volumes from 1 through 7 and loose issues from 205. The price — \$100 — is very reasonable when you consider that many of them are out of print, hard to find and would cost much more as individual items. U.S. dealers have been asking as much as \$40 for some of the bound volumes. It takes about a month to 6 weeks for an order to arrive by surface mail from England, some of this is time snarled in the U.S. Postal maze. Frank accepts U.S. personal checks, American express checks, cash or unused U.S. stamps in payment — which avoids the complications of International Money Orders. A copy of the latest Bohemia book list will be air mailed to you for \$1.00. Regular customers are put on the mailing list. Oh yes, there is item 30 on his list, *Aircraft of the Fighting Powers, Vol. 4* for only \$10.00. It will be gone by the time you read this, but it shows that interesting items turn up all the time.

John Roby, 3704 Nassau Dr., San Diego, Calif. 92115, in business since 1960. John also has both new and out of print books, but specializes in hard to find material. He has a search service with world wide sources and will try to locate a copy of any desired publication, in print or out. 15 different book lists are available. The most valuable to the scale builder would seem to be the following: #106 — *Military Aviation, All Aspects; All Wars* — \$1.00; #109 *Famous Aircraft, Fliers, Flights* — 50¢; #116 *Model Aircraft* — 50¢; #119 *Marine Aviation, Civil, Military, Operations, Design* — 50¢; *P 100 Pilot; Owner; Test Flying; Racing* — 50¢.

W.H. Bell, 642 Braemar Ave., RR. 2, Sidney, B.C. V8L 3S1, Canada, send \$1.00 for catalog of out of print and used aviation books. Regular customers receive new catalogs automatically. He will accept in-person calls by appointment only. Call (604) 656-5170 after 5 p.m. The most recent edition featured a 9 volume set of Maintenance and Operation manuals for the B-24D.

Bookshelf

British Aviation Colours of World



A fold-out sheet of color chips is a main feature of this reference book.

War Two, edited by John Tanner, Director, RAF Museum. (R.A.F. Museum Series Vol. 3) \$11.95. In an effort to rein in an impulse to buy every new aviation title issued, I try to collect only books with 3-view drawings. But an exception to the rule is always made when something good turns up on color schemes and markings. This slim, 56 page volume, subtitled *The Official Camouflage Colours and Markings of RAF Aircraft 1939-45*, is a must for any scale builder doing a WW II aircraft of the Royal Air Force. Or, if you are like me, you'll want it to add to a reference collection. The book consists entirely of reprints of Air Ministry Orders from 1939 through 1944 concerning marking and color schemes. These are the official directives on how to paint all operational types. Diagrams show sizes and placement of insignia, serial numbers and lettering. Three view drawings illustrate the camouflage patterns for various sizes of aircraft. Tables list the correct code lettering for each RAF squadron. And last, but not least, is the fold-out color chip chart showing all of the official colors, and invaluable aid in mixing model paint. Newcomers to the subject will be startled by the color called "red." An old barn has a brighter red than this shade, which looks more like primer than a color. It was used on roundels and fin flashes and the chip immediately brands as wrong a lot of models, paintings and decals.

At about 50 cents per page, BAC of WW II, as they would say in England, a bit pricey, but worth it. Not yet widely stocked by aviation book dealers, I bought mine from Armed Forces Book Company (see last month's Scale Views column).

Living Color?

One of the first things I did when I got my copy of BAC of WW II was compare the color chip chart to the one called "Colour Standards of the Ministry of Aircraft Production" in *Aircraft of the Fighting Powers - Vol. 5*, published in 1944. Considering the wide gap in time and printing techniques, the two charts match up amazingly well. The 1944 chips are a shade lighter, but this seems to be the result of a very thin coat of ink

to page 162



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PIPER VAGABOND

— COLT — TRI-PACER

By Bryce C. Petersen

The one thing you can always count on when you join the model aviation world is the total lack of boredom. You have just completed your 100th flight with your faithful old bird and your mind starts to think about fishing, boating, and air conditioning, etc. The station wagon that entered the field awhile ago has attracted a crowd so you drift over for a look. A giant model is being assembled, and it is so big that the landing gear must be removed for transport. The model is upright now, and I heard someone say that it is 1/4 Scale.

The beaming modeler has just finished pumping fuel in the tank and has moved around to start things up. All I could think about was "all that MonoKote!"

What's this? He is using four fingers to flip the prop. Most unusual! Suddenly the big engine comes to life, but it is just ticking over. When he starts to taxi I noticed something odd. The wings are not bouncing up and down. A closer look and I see the wheels absorbing the shock just like the real ones do. A nice wide circle at the end of the runway and I say right out loud, "Boy, that's super."



When he starts his roll-out, something else was different. He is using only 1/3 throttle, and look at that --- the tail is already up. When the big model passed

by me, it had already transferred from ground to air. While watching the gentle climb-out, I knew that modeling holds a new adventure for me. Having not really absorbed what I had just seen, the big model came in gently over the runway and set its big wheels down ever so softly with its tail still in the air. I think it was watching that big tail sink slowly down that was the clincher for me. The next day I started the drawings for the 1/4 Scale Vagabond.

In all my experience with model airplanes, I haven't seen a design that performs with the grace and smoothness the Vagabond possesses; that includes the kit trainers that show up at the field.

Piper Aircraft must have felt the same way, because from the Vagabond design came the famous Colt and Tri-Pacer. All they really did is make it a little bigger and change to a tricycle landing gear.

I personally love to fly tail draggers and spend most of the time trying for the perfect three-point landing. If you are a nose wheel man, I have tried to add enough detail to the plan to build the Colt or the Tri-Pacer. If you build the

The family of Vagabonds — Micro Vagabond in front (RCM Plan No. 742, \$1.50), .19 Powered Vagabond (RCM Plan No. 500, \$3.25), 1/4 Scale Vagabond (RCM Plan No. 764, \$6.50).

Vagabond, the color scheme was always solid yellow with no trim. The Colt and Tri-Pacer was always two-toned --- white and what have you with lots of trim.

Back to the model. I would like to explain several theories I have about the construction of this model. First, the engine mount and location. The engine is mounted in solid wood with big sheet metal screws. The wood mount is epoxied lengthwise to the plywood doublers that make up the fuselage itself. This all becomes solid as a rock. The other way is to use a metal or plastic motor mount that is mounted to a 90° firewall with 8 bolts. The firewall can become a vibrator and there goes your 8 bolts. The firewall engine mount technique also requires a removable cowling that is usually made from plastic. Enough said.

The upright engine hanging out in the breeze is considered an eyesore when it could have been fully cowled. Well, there's more to it than that.

Consider a situation I have witnessed. I have entered a Stand-Off Scale contest and am waiting on the flight line, next to fly. The contestant in front of me has a beautiful Spitfire and has scored high on static points. His engine is fully cowled and inverted. The C.D. gives him the go signal and his model sits upside down on



a cradle. He gives the starter a quick bump and the engine starts. A quick flip of the aircraft and he starts his taxi.

When he advances the throttle, the engine sags and quits. A mad rush with a starter out on the field for a quick start in the upright position. After finally finding the hole for the glo-plug, a mad bump with the starter sends the front half of the spinner down the runway. The C.D. calmly announces that his time is up. While walking his aircraft back to the pits, he tells me that the competition is over for him because his overheated engine quit on his first round.

In contrast to his effort, my engine usually starts on the first or second flip because I pulled the fuel line on the last flight and let the engine run dry. The exact prime was added for easy starting.

Once in the air the smoothness of the aircraft and engine scores big, and everyone forgets that shiny power plant

sticking out up front.

Big scale contests are another matter. What I am talking about is the average fun-fly in your local area and not the Nationals.

Next from my soapbox is the basic rule of success, and that is to "keep things simple." The Vagabond uses solid foam fuselage halves front to back. The cowling is made up of two pieces of plywood. The side stringers from scrap balsa .

I wanted to use foam wings for simplicity, but I like to look up through the MonoKote at the wing ribs while flying.

The Vagabond is only a three-channel airplane. You simply do not need more control. If a gust of wind dips a wing tip on final, you touch a little rudder and it responds exactly like ailerons. A trick for spot landings is to reduce throttle until your model starts to sink over the end of the runway. A touch of throttle will check the sink rate at about 18" of altitude. As you approach the spot, you kill the engine and she drops in the spot on all three points. You can score big in the limbo event the same way by gauging altitude with throttle.

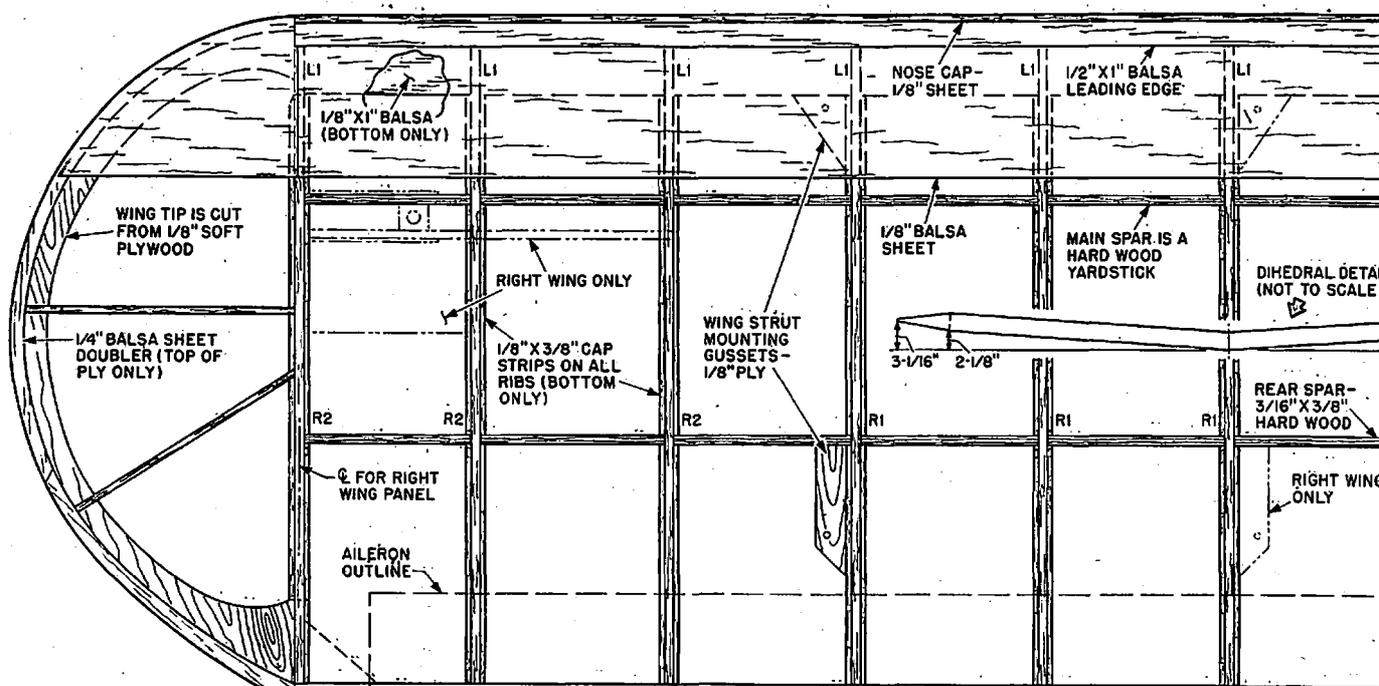
What all this adds up to is the Vagabond is one super stable airplane. Its low aspect ratio wing and short coupled fuselage make it perfect for scale modeling. It gives you excellent control in slow flight and high performance at top speed.

This is a big model. My wife says it is too big. It uses most of the floor in the Recreation Room. Everyone seems to be building big models. I understand there is a club in Pennsylvania that will not accept a member who builds models under six feet.

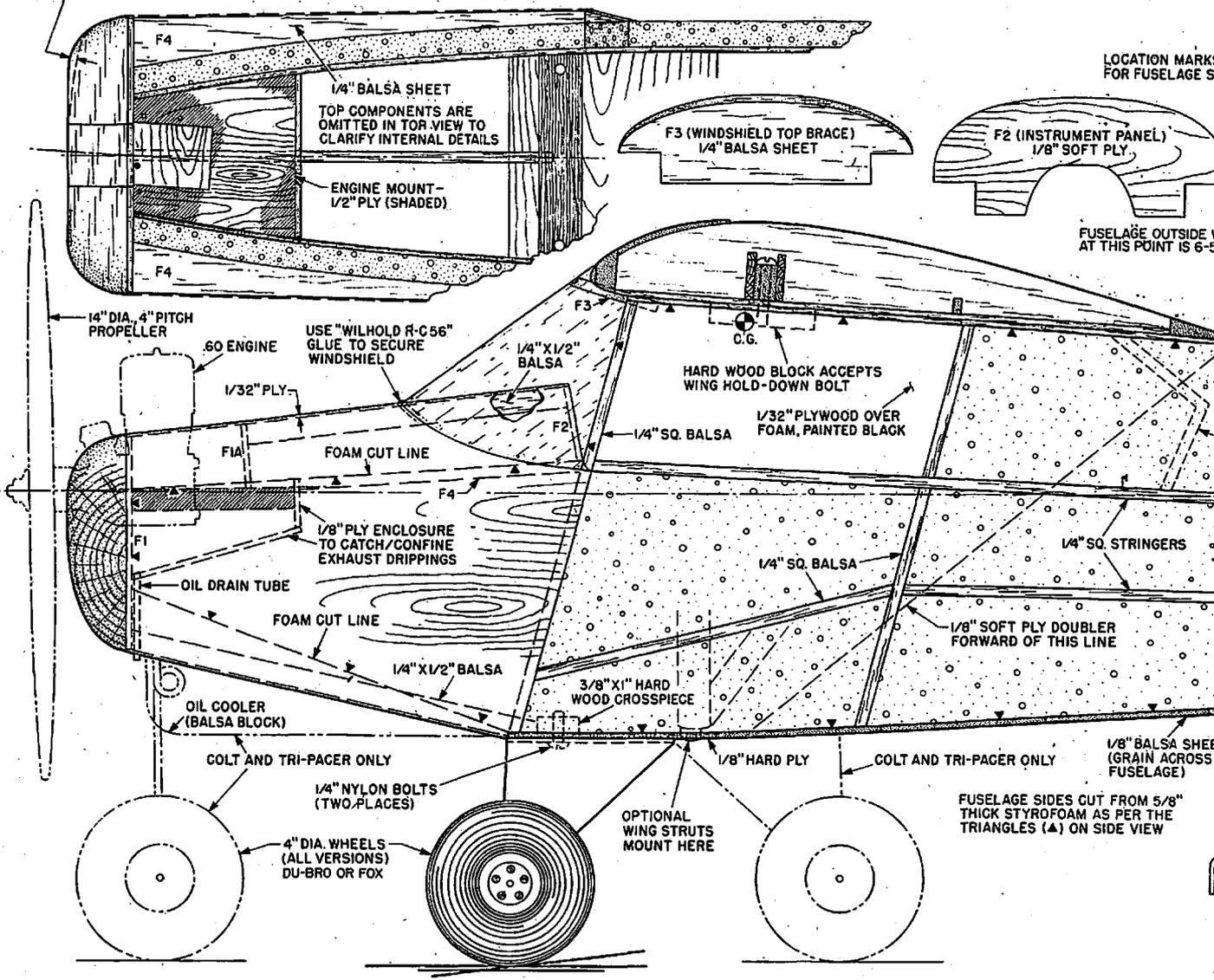
Actually, this model is not quite 1/4 Scale. Another inch and it will not fit in my car. Three more inches and it is 1/4 Scale but the transport problem reigned supreme. So let's get to the construction.

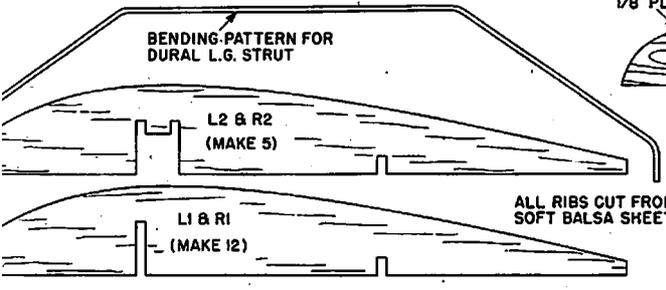
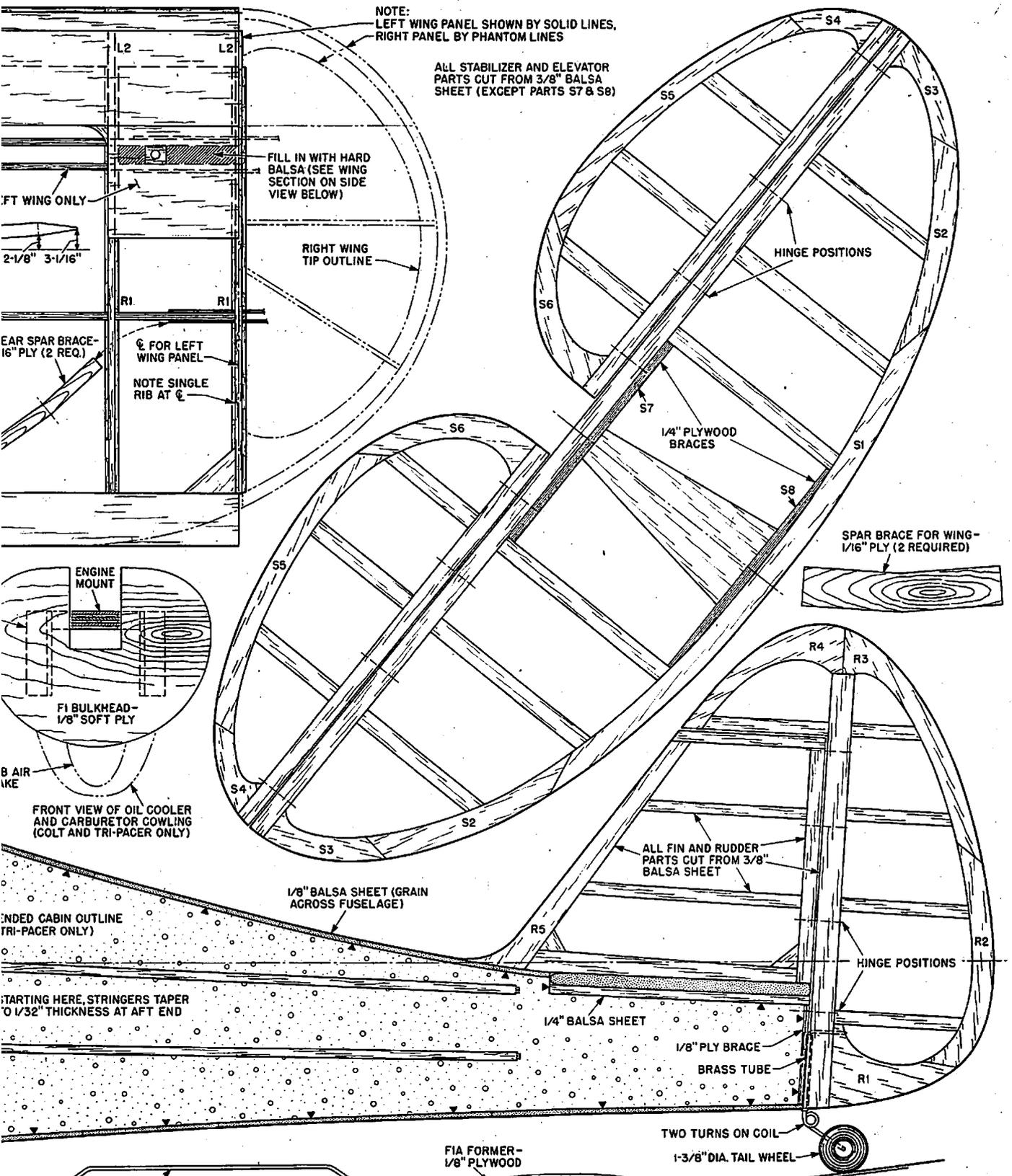
text to page 36





IF NECESSARY, TRIM THIS SIDE OF COWLING TO CLEAR PROPELLER (RIGHT THRUST OFFSET USED)



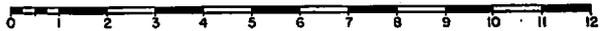


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QUARTER SCALE PIPER VAGABOND

DESIGNED AND DRAWN BY BRYCE C. PETERSEN

TRACED AND INKED BY PAUL PLECAN



PLAN NO. 764

CONSTRUCTION

We will start construction with the fuselage. Place your hot wire cutter on your workbench on two 5/8" standoffs and secure with weights. Feed your foam block through the cutter and slice a sheet of foam 5/8" thick for both fuselage halves. Finish your cut-outs with a jigsaw and lightly sand the saw cuts. Mark off your 1/8" light plywood inside doublers using the fuselage halves. You should be able to get both doublers from one sheet of plywood. Using 12-minute epoxy, secure the plywood doublers to the foam sides. On a flat table, stand the fuselage halves up and secure the landing gear platform (1/8" hard plywood).

Draw a straight line on your work table and center your fuselage front to back on this line. Pull the tail section together using the line for perfect alignment. Sand the inside of the foam joint so that it is 3/8" thick at its rearmost end and secure with epoxy.

With 1/8" balsa crossgrain, sheet the top and bottom (Photos 1 and 2).

Prepare your F1 bulkhead from 1/8" light plywood including the position lines. Using a "C" clamp, pull in the nose of the fuselage as per plans and sand the end flat. Again, use the line on your workbench for alignment and secure the F1 bulkhead to fit the position marks and secure.

Cut your engine mount from 1/2" plywood and epoxy in place. Be sure the right thrust side is correct (Photos No. 3 and 4).

Now you can add your F4 1/4" fillets using the cut and fit method.

You may have noticed that there are no bulkheads in the fuselage. I see no need for them and this becomes a real advantage when installing radio gear, cameras, parachutes, etc.

The next step is a real joy in the workshop because you accomplish so much with so little effort.

Using 1/32" aircraft plywood, sheet the bottom cowling (Photo No. 5). First, wrap wax paper around the area and mark a pattern. Using the pattern, cut the plywood and wet the area where the cowling bends around the bottom of the fuselage. With 12-minute epoxy, secure

PIPER VAGABOND Designed By : Bryce Petersen

TYPE AIRCRAFT	1/4 Sport Scale
WINGSPAN	73½ Inches
WING CHORD	15½ Inches
TOTAL WING AREA	1064 Square Inches
WING LOCATION	High Wing
AIRFOIL	Mod Clark Y
WING PLANFORM	Constant Chord
DIHEDRAL, EACH TIP	2½" Tip Rib
OVERALL FUSELAGE LENGTH	59 Inches
RADIO COMPARTMENT AREA	(L) 13" x (W) 5" x (H) 6"
STABILIZER SPAN	29½ Inches
STABILIZER CHORD (Incl. elev.)	9½" (Avg.)
STABILIZER AREA	264 Square Inches
STAB AIRFOIL SECTION	Flat
STAB LOCATION	Top of Fuselage
VERTICAL FIN HEIGHT	10¾ Inches
VERTICAL FIN WIDTH (Incl. rud.)	10½" (Avg.)
REC. ENGINE SIZE	.60-.61 Cubic Inch
FUEL TANK SIZE	16-32 Ounce
LANDING GEAR	Conventional
REC. NO. OF CHANNELS	3
CONTROL FUNCTIONS	Rud., Elev., Throt.

BASIC MATERIALS USED IN CONSTRUCTION	
Fuselage Balsa, Ply & Foam
Wing Balsa, Ply & Hardwood
Empennage Balsa
Wt. Ready-To-Fly 124 Ounces
Wing Loading 16.7 Oz./Sq. Ft.

the bottom cowling in place and hold with oversized "T" pins.

Next, we mount the engine. With the different types of carburetors, etc., it is easy to make things fit (Photos No. 6 and 7).

Photo No. 8 shows another pattern for the top of the cowling. The complete cowling is made up of two pieces of plywood. It is a good idea to box in, around, and under your engine and cover with a generous amount of epoxy. Stray oil can find its way back through the fuselage if you don't drain it out from under the engine with a drain tube.

Next, we sheet the top of the cowling and add the balsa nose block (Photo No. 9). You can make the nose block from one sheet of 1/2" balsa in three layers. Make it slightly oversize as per F1 on plan and sand flush with ply cowling.

Photo No. 10 is the completed fuselage showing the 1/4" stringers and landing gear in place.

Stabilizer and Rudder:

First, you epoxy together several sheets of 1/4" and 1/8" balsa to make solid sheets of 3/8" stock. Next, we stack out two each of S1 to S6.

Lay a sheet of wax paper over the plan and epoxy the parts in place — Photo No. 12. A sanding block will help square up the joints. Since you probably over-cut the parts a little, your only concern is that the joints fit and each part covers the plan where it is supposed to.

Photo No. 13 is a quick and easy way to smooth the ragged outside edges of your parts.

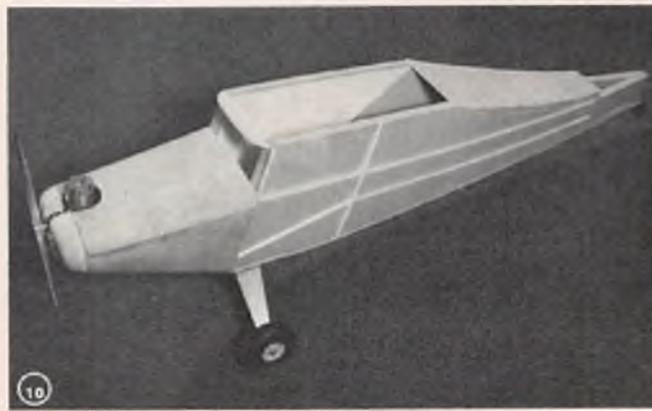
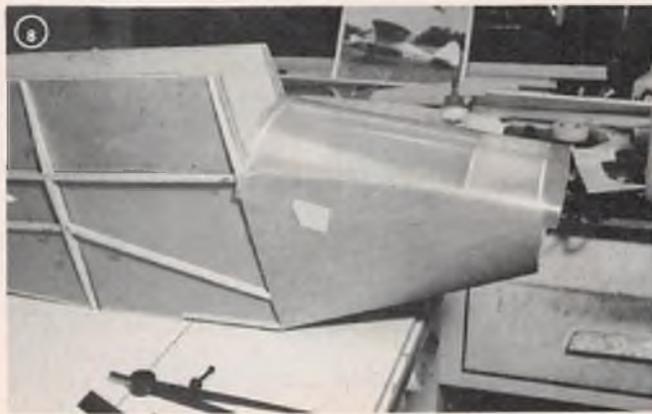
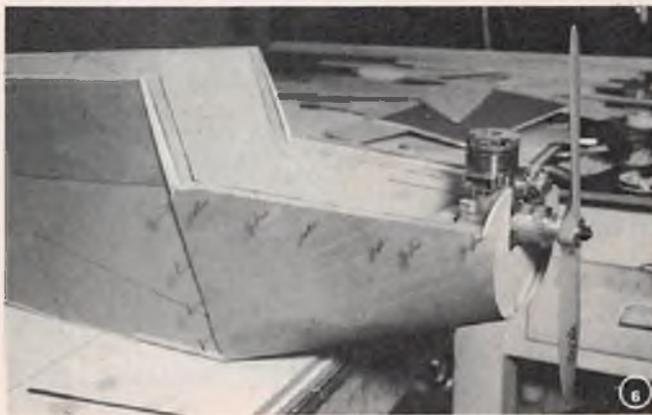
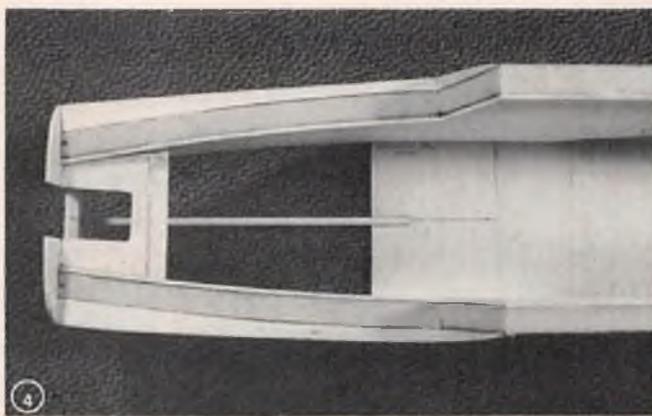
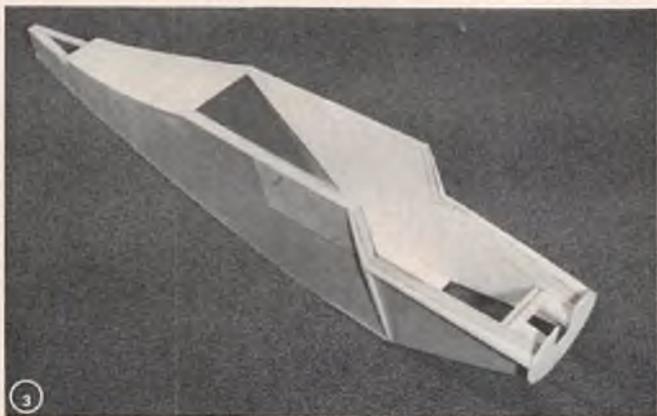
A belt sander upside down on a table and the job is completed in minutes.

Photo No. 14 shows a quick way to round off the edges. Grip the sandpaper with your first and second fingers and, using your thumb for a guide, you round all outside edges of your parts. Photo No. 15 shows the completed tail assembly.

Wing:

Photo No. 16 shows the basic construction of the wing. First, we pin the leading and trailing edge to the waxed plan. Next, you pin a 1/8" spacer strip to keep the ribs 1/8" off the plan. Your 1/8" x 3/8" capstrips on the bottom of the wing will fill this gap later. Next, add



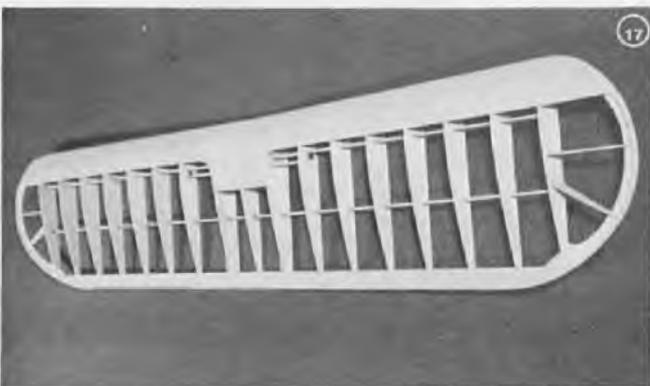


your yardstick spar and it is also raised 1/8" with spacers. Add your ribs and glue everything except the center rib which is glued when the two halves are joined together. Cut off all overhangs.

Complete the other half of the wing the same way except the center spar section is on the other end. Join the two halves together without the center rib in place and add 1/16" plywood spar

braces to join the spars.

Raise both wing ends (minus tips) 2 1/8" for dihedral. With a "C" clamp, join the two wings together. Next, add the center rib that is cut to fit the spar braces



in the spar area.

The wing tips are cut in one piece from 1/8" light plywood. Glue them to the exact center of the leading and trailing edges. The tips are raised to 3-1/16" from the table. 1/4" scrap balsa is added to the tips to be rounded off.

Next, we add the 1/8" sheeting on top and the 1/8" x 3/8" capstrips on the bottom. The 1/8" sheeting on top is sanded down to 1/16" back in the area where the ribs start. Each rib is carefully rounded on top. This lets the MonoKote pull down over the rounded ribs for a

most realistic look. Tip bracing is added and the wing is complete (Photo No. 17).

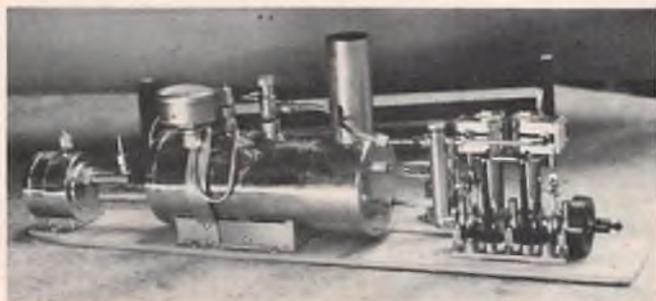
If you like to fly at full throttle, I would add wing struts.

Happy Landings.

□

RCM PRODUCT TEST

Hobby Shack HERCULES



SPECIFICATIONS

Name	HERCULES
Boat Type	1/40 Scale Tugboat
Manufactured By	Saito Seisakusho Ltd., Japan
Distributed By:	Hobby Shack 18480 Bandilier Circle Fountain Valley, California 92708
Mfg. Suggested Retail Price	\$279.95
Available From	Hobby Shack & Retail Outlets
Hull Length	35½ Inches
Beam	8¼ Inches
Hull Depth Amidship	5 Inches
Height (bottom of hull to top of mast)	16"
Draft Amidship	2¼ Inches
Radio Compartment Access Hatch	4" x 6"
Engine Compartment Access (under removable cabin)	5" x 18"
Recommended No. of Channels	3 (4 if bilge pump is added)
Recommended Control Functions	Rud., Forward/Reverse & Throt.
Basic Materials Used In Construction:	
Instructions	Minimal
Construction Plans	Detailed with parts numbered
Kit Includes	Everything except glues, paints, power plant & elec.
Power Plant	Saito 2 cyl. Steam Engine (T2DR \$179.99) Boiler & Burner (B2F \$109.99)

RCM PROTOTYPE

Weight, Ready To Launch 13 Lbs. incl. 8 (C) cells,
ballast and bilge pump

little help, however, the plans are very complete. They're all you'll need with the beautifully die-cut parts and neatly packaged parts.

We began by placing the ply deck temporarily onto the hull. Then some blobs of 5-minute epoxy were used to tack glue the cabin sides to the deck, after which the remainder of the cabin was assembled using a cyanoacrylate adhesive. Because the quickie adhesive gave us some trouble setting up on the plywood, we used a dry brush to brush some household baking soda onto each joint before the adhesive was applied. With that preparation, the cabin and attached hold cover were assembled. Once we had a rigid basic structure we used a hot knife to loosen the cabin from the deck and were ready to install the burner, boiler, and engine.

The burner, boiler, and engine are designed to mount to a ply floor installed inside the hull. To make the engine easy to clean and to fuel-up the burner and add water to the boiler without filling the hull, we set it up so the ply floor is screwed in place. Use the cabin as a guide to locate the boiler so the

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Imported by Hobby Shack, 18480 Bandilier Circle, Fountain Valley, Calif. 92708 (714) 963-9881, and sold through Hobby Shack stores and retail outlets, the 900mm long (almost 40") Hercules 1/40 scale Delux Tugboat kit is complete, with a capital "C". With a beautifully made fiberglass hull that needed no filling whatsoever, the kit includes everything you'll need except the glues and paint. The deck and cabin are 1/8" ply (hardwood strips are provided for deck planking) and parts such as the portholes, wheels, and prop are brass. The only thing we bought were the 1¼" rubber tires added along the sides for an extra touch of realism.

To power the little giant we purchased the Saito B2F boiler and burner assembly and the beautiful brass T2DR two cylinder steam engine. With the speed control that comes with the boiler, the engine can be operated from stop to full speed. The engine is capable of forward, neutral, or reverse operation. While a smaller boiler and engine will also fit, we wanted the longer running time permitted by the larger one as well as the greater torque from the two cylinder engine. Our boiler allows about a 20 minute run. We also purchased a "steam maker" unit which, when easily installed in the boiler, converts oil exhausted from a cylinder to wisps of smoke that puff from the smoke stack. At the time we bought the kit and engine, Hobby Shack had just received a pressure gauge and super smoke generator. This device is simply a container into which some two-cycle oil is poured. In adding this unit, the steam carries a greater amount of oil into the steam maker unit. An adjustable needle valve makes it possible to adjust the amount of smoke produced. The advantage in using this smoke generator is that you can really pour out the smoke if you choose. For us, the pressure gauge serves two functions. In addition to allowing us to monitor the pressure, it also contributes to the "steam engine mystique." Aren't all steam engines supposed to have lots of pipes and gauges? Ours do.

With regard to building, while we found the instructions of

RCM PRODUCT TEST

**Karoden Hobby Prod.
EL TIGRE**



El Tigre (the tiger) is a 62" wingspan, mid-wing pattern aircraft that was designed by Denis Donohue, and is manufactured by Karoden Hobby Products, P.O. Box 434, Bergenfield, N.J. 07621. Listing at \$79.95, it is available from dealers, or can be ordered direct for C.O.D. shipments from Karoden. Donohue has been working on this design for the past six years, with much effort and experimentation going into it. The most casual examination reveals the sleek aerodynamic lines he has achieved.

This kit contains no accessories and no die-cutting. As a matter of fact, the kit contains plans, a 4-page instruction manual, foam wing and tail cores, and a fiberglass fuselage, period. But what you get is near perfection. The wing and stab cores, we found, were extremely accurate, and it was evident that Bob Hunt, the gentleman who cut them, is an artist in precision. The next bit of near perfection that we came across was the fiberglass fuselage. It was white gel coated, light and straight, with integral vertical fin and factory installed firewall, leading edge bulkhead, and rudder post. The fiberglass belly pan was also white gel coated, and had a molded in nosewheel cut-out.

Building was no problem, however, we found that the aileron control hook-up could have used some more information. It was mentioned in the instruction manual and also shown on the plans, but lacked some important information. Granted, this is not a novice builder's airplane, and the experienced hobbyist can manage this installation with no big problems. The important factor is, to be sure that whatever linkage you use, be stiff enough as to not cause aileron flutter. We covered the wing with Midwest Micro-glass cloth and K & B resin. The entire ship was painted with K & B epoxy paint.

The nose was extended (3/8") to accommodate the Perry pump and Kraft .61 engine. We eliminated the front wing dowels and used three wing bolts in their place. When finished, El Tigre presents a very pretty sight. The fuselage lines converge and flow into the vertical fin and rudder in a most pleasing way. One of those planes that "looks like it's going a hundred miles an hour while it's just standing still."

The plane looks fast and agile and, as we found out, it was all that and more. Take-off runs are short and completely

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

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

SPECIFICATIONS

Name	EL TIGRE
Aircraft Type	Pattern
Manufactured By	Karoden Hobby Products P.O. Box 434 Bergenfield, New Jersey 07621
Mfg. Suggested Retail Price	\$79.95
Available From	Mfg. & Retail Outlets
Mfg. Recommended Usage	Competition
Wing Span	62 Inches
Wing Chord	11" (Avg.)
Total Wing Area	690 Square Inches
Fuselage Length	53 Inches
Radio Compartment Dimensions	(L) 11" x (W) 2 3/4" x (H) 3"
Wing Location	Mid-Wing
Airfoil	Symmetrical
Wing Planform	Double Taper
Stabilizer Span	24 Inches
Stabilizer Chord (Incl. elev.)	7 Inches
Total Stab Area	168 Square Inches
Stab Airfoil Section	Symmetrical
Stabilizer Location	Mid-Fuselage
Vertical Fin Height	4 Inches
Vertical Fin Width (incl. rud.)	NA
Mfg. Rec. Engine Range	.60-.61 Cu. In.
Recommended Fuel Tank Size	12-14 Oz.
Landing Gear	Tricycle
Recommended No. of Channels	5
Recommended Control Functions	Rud., Elev., Throt., Ail., Ret.
Basic Materials Used in Construction:	
Fuselage	Fiberglass-Resin: gel coated
Wing	Foam
Tail Surfaces	Foam
Hardware Incl. in Kit	None
Plan Size	30" x 54"
Building Instructions on Plan Sheets	No
Instruction Manual	Yes (4 pages)
Construction Photos	No
Kit Includes	Shaped Parts
Mfg. Rec. Flying Weight	120-128 Oz.
Wing loading based on rec. flying wt.	25.05 Oz./Sq. Ft.

RCM PROTOTYPE

Weight, Ready To Fly	128 Ounces
Wing Loading	26.72 Oz./Sq. Ft.
Covering & finishing materials used	See text
Engine Make & Disp.	Kraft .61
Muffler Used	Expansion
Radios Used	Kraft Signature
Tank Size Used	12 Ounce



WHY NOT JAZZ IT UP?

By Dick Tichenor

Have you browsed through your local hobby shop or glanced through the ads in RCM and noticed that there are dozens of nice kits but for some reason or other they just didn't turn you on? Well, here is a thought --- with a little imagination and ingenuity you can dress it up with a bunch of goodies and be the number one hero at your flying field.

James A. Lafer Jr., of Grosse Pointe Woods, Michigan, did that kind of a number on a Midwest Products Strikemaster. James submitted a beautiful set of photos to our Model of the Month Contest and we were so impressed that we decided to feature it as an example of how to make a Sunday flying sport machine look like an exotic

fighter. James' inspiration came from a James Bond 007 movie in which an R/C model was used to fire rockets and drop bombs.

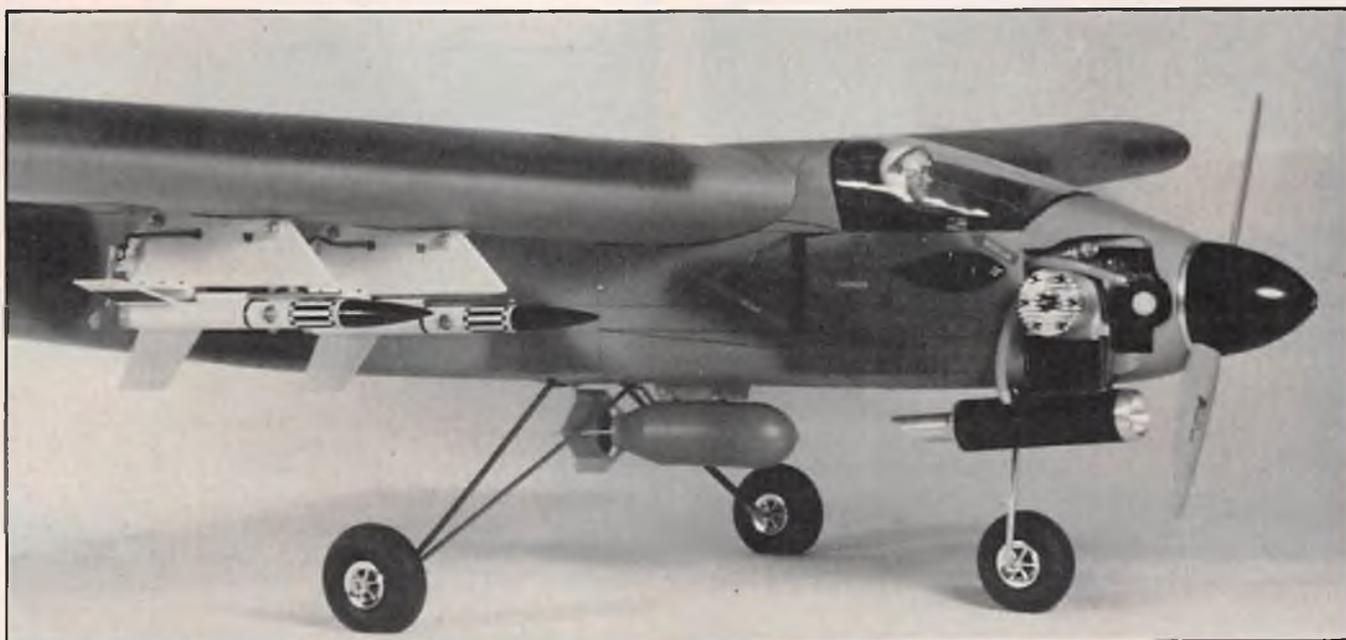
We have a feeling that Joe's Hobby Center and The Prop Shop in the Detroit area are quite fond of James. From his letter and photos we have identified some of the products used in this project. Starting with the Midwest Products Strikemaster and MRC 775 radio we see a Midwest spinner, Top Flite propeller, K & B .40 engine, Perry Aeromotive air filter, Semco muffler, Sullivan crap trap fuel filter, 2 Robart Super Fuelers, 8 oz., Sullivan fuel tank, and a Williams Bros. pilot (under a home-made canopy).

Operational Estes Mini-Brute

Screamer rockets and Solar igniters, Vortac bomb rack and exploding bomb make up the armament. Southern R/C Skyloft covering was applied to the foam aircraft and R/S Perfect paint was sprayed on with a Miller paint spray outfit and air brush. Numerous Du-Bro and Goldberg accessories were used throughout the project.

James is a member of the Radio Control Club of Detroit and flies this seven pound machine from Creekside Sod Farm where his fellow club members marvel at his military style take-off runs.

Now that you have seen what James Lafer has done with the Strikemaster, what are you going to jazz up? The possibilities are unlimited. □



HOW TO BUILD ELLIPTICAL

With Some Further Notes About Current Formula One Building Techniques

There are many good designs floating around out there, especially for scale airplanes, that will never get built, simply because they have elliptical shaped wings. Even the most die-hard built-up wing builder generally shies away from them, while the foam core wing fan won't even allow himself to think about one. The following is one man's procedure for a sure fire way to build foam core elliptically shaped wings.

Being new here at RCM, I am still learning. And one of the first things I learned from Dick Kidd and Dick Tichenor is their claim that between them and Don Dewey, they know everything there is to know about R/C. And if someone asks something that Dick and Dick don't know, it happens to be something that Don knows, but "he ain't here right now."

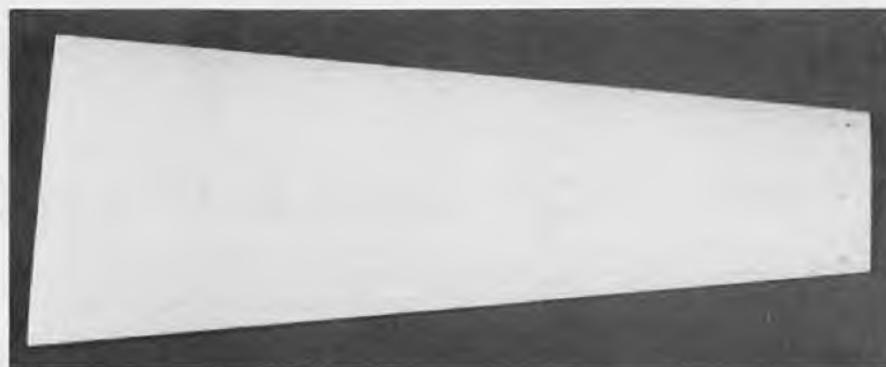
Well, about the same sort of situation exists between my building and flying friend, Bob Root, and I. Whatever you

are going to ask, we know, but usually it'll be something he knows, and he isn't here right now. The techniques for constructing elliptical foam core wings that I am going to present to you have been developed by Bob for use in building his "Stinger" design, first seen at the 1976 Riverside Nats. He has been updating the design since then, and the 1979 racing season will see the Mark II models in the air — if everything goes well, one of them being mine.

The other techniques I will tell you about are not new, but have evolved over the years out here where all roads

lead to Bakersfield, and are presented for you out there in say, Section, Alabama, who are somewhat removed from racing circles and might be curious about how such things are done.

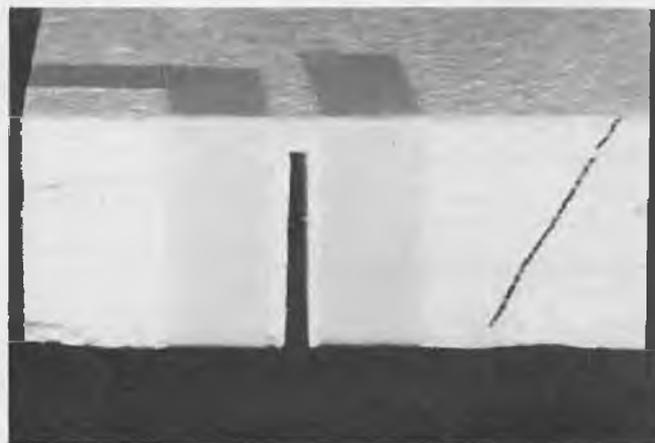
First, the wing itself which, as seen from the photos, has its beginning as a normal straight core. After it is sheeted, the leading, tip and trailing edge balsa pieces are added, shaped to give it that attractive but elusive curved look. As a kind of extra bonus, no extra pieces are required, only those generally used are needed, only without the usual straight lines.



The elliptical wing core, looks like any other wing core before the addition of balsa covering, leading and trailing edges.



Cutting a slot for the full length full depth spar, added for extra strength.



The completed 1/8" slot, generally requires two cuts with the average saw blade.



The two core pieces, and the tapered spar. Basswood was used for the latter, though plywood is acceptable.



The spar in position, bonded with slow drying epoxy, held together with strips of masking tape.

FOAM CORE WINGS

By Eloy Marez

Prior to sheeting the core, and having nothing to do with the elliptical shape, a full length, full depth spar was added to it — to prevent those high speed wing breakages that make these birds so hard to land. The spar we used is cut from 1/8" thick basswood, but could also be made from plywood. According to my designer friend, it is there not to absorb any center section stresses; only a simple butt joint is used there. The main

purpose of this spar is to prevent failure due to compression, which occurs about half-way out, span-wise, when it takes place.

Anyway, installation of said spar requires that the core be cut in two length-wise, which can be done with appropriate guides and the hot wire rig originally used to cut the core. Or it can be done on a table saw, if you are working with a purchased core and don't

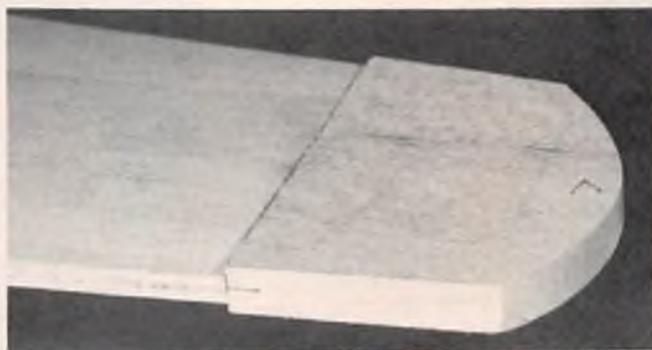
cut your own.

The table saw operation requires that the block from which the core was cut be taped together, and fed through the saw at the proper point. Adjust the depth of the blade so it cuts through the core, but not completely through the top piece of the block. Depending on the thickness of the saw blade, you may have to make more than one cut, adjusting very

to page 150



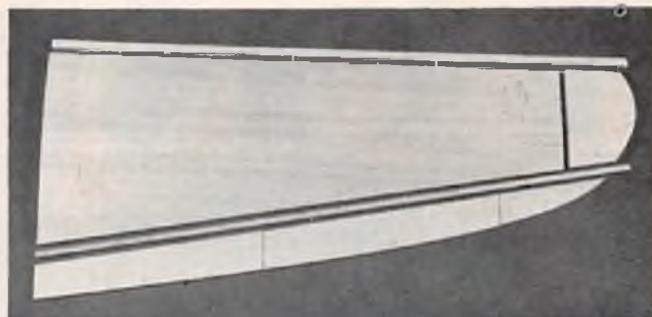
The core block piece, also sawn in two, has to be reassembled with 1/8th balsa spacer, held together with Super Tape.



The curved wing tip, sanded to outline shape, in position prior to shaping and sanding.



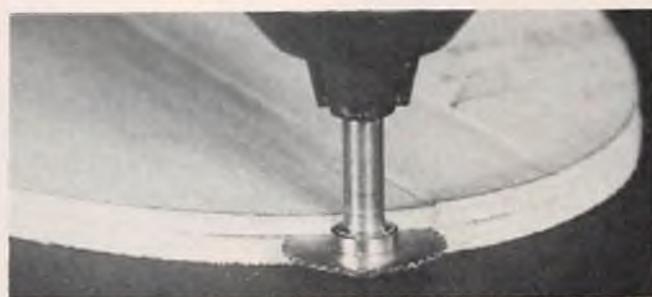
The wing tip, now shaped and sanded to the taper of wing top and bottom.



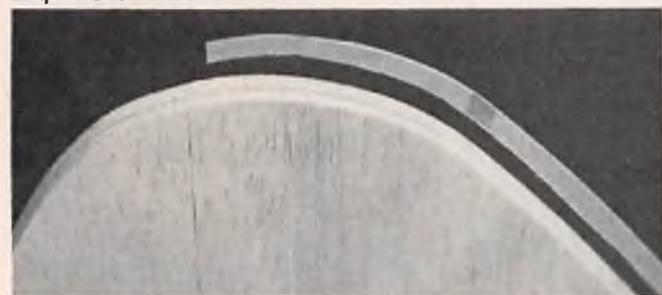
Sheeted core, shown with the rest of the pre-shaped balsa pieces required to give it the elliptical shape.



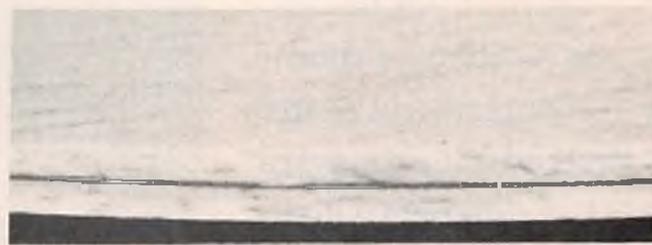
Assembled and sanded wing. Ailerons and inboard sections temporarily attached, later removed for installation of hinges and torque rods.



Cutting the slot around the perimeter of the tail surfaces for installation of plywood reinforcement.



Plywood insert prior to installation in rudder. Procedure for making described in text.



Edge of surface, with plywood installed. Next step will be to taper it down to a knife edge. Light, but strong!

COOK 45

RISER

Introduction by Dick Tichenor

Some of us senior citizen types have fond memories of building and flying 'A' frame rubber powered twin pushers back in the early 1930's. To commemorate the 50th model airplane Nationals in 1977, Bert Pond published a dandy historical book on the Nats, AMA, Etc. included in the book were several blue print style plans for antique models. Among them was the Cook 45 Riser.

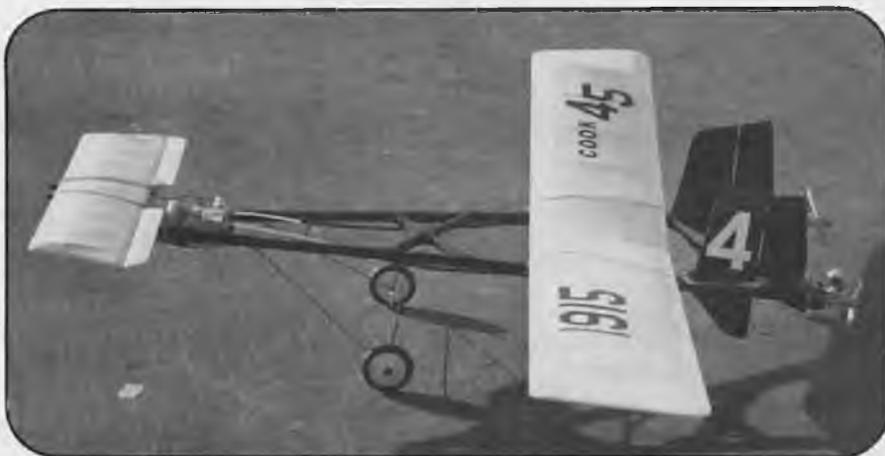
The Cook 45 established a duration record of 134.4 seconds and a distance record of 1698 feet in 1915. It was one of the few twin pushers that featured a landing gear. Since receiving that book there has been a gnawing desire to see an R/C version of the Cook 45. For the purists, we admit taking several liberties in the interest of practicality. For instance, the original used 39" long frames and we used 36" length because it was handy from our local hobby shop. Rudders were added for directional control, the original flew in a straight line. At any rate this R/C version represents the general style.

Jack Headley sort of did a number on us. For reasons known only to Jack, instead of shooting black and white photos of the Cook 45 in flight, he chose to shoot movies. He has shown us the movies, which thoroughly excited us, but we have no flight shots for our readers. Believe me, it flies great and I promise that you will be a sensation at the field when you take yours out to fly.

This whole project began during one of my irregular visits to H.Q. in Sierra Madre, when I was trying to convince Dick Tichenor that the next issue of R/C Modeler couldn't possibly be published without my latest project being included. Somehow the splendid arguments I put forth regarding my single channel version of the Dornier Do. X (with 12

By Jack Headley

Jack's twin pusher will set you aside from the rest. Once it's airborne, everyone will want in on the act. Be the first at your field with the "Cook 45."



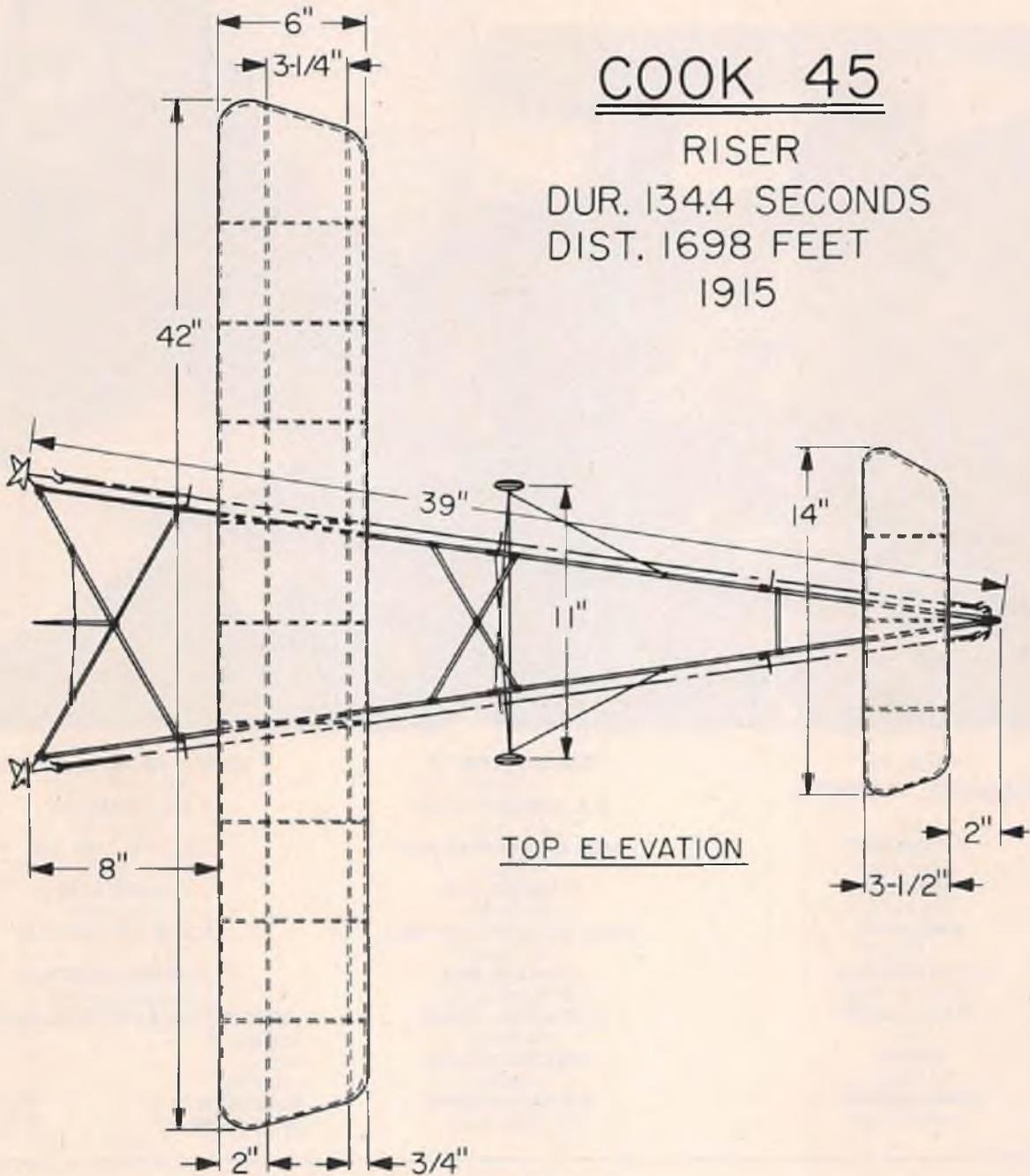
COOK 45

RISER

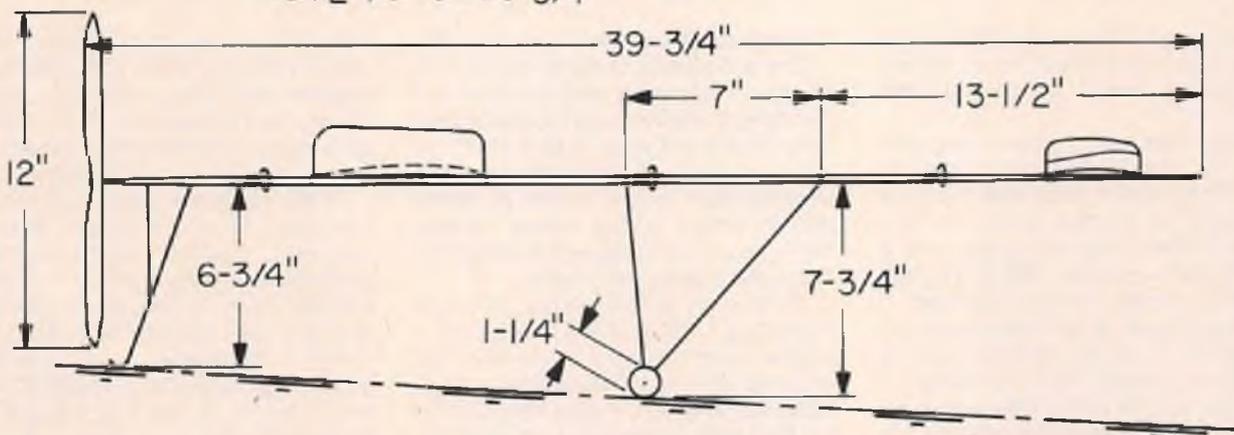
DUR. 134.4 SECONDS

DIST. 1698 FEET

1915



TOP ELEVATION



SIDE ELEVATION



COOK 45

Designed By : Jack Headley

TYPE AIRCRAFT

Antique Sport

WINGSPAN

47½ Inches

WING CHORD

7 Inches

TOTAL WING AREA

330 Square Inches

WING LOCATION

Aft

AIRFOIL

Flat Bottom

WING PLANFORM

Constant Chord

DIHEDRAL, EACH TIP

2½ Inches

O. A. FUSELAGE LENGTH

39¾ Inches

RADIO COMPARTMENT AREA

Variable

STABILIZER SPAN

17½ Inches

STABILIZER CHORD (Incl. elev.)

5¼ Inches

STABILIZER AREA

90 Square Inches

STAB AIRFOIL SECTION

Flat Bottom

STABILIZER LOCATION

Forward

VERTICAL FIN HEIGHT

7½ Inches (each)

VERTICAL FIN WIDTH (Incl. rud.)

5¼ Inches (each)

REC. ENGINE SIZE

.049 Cu. In.

REC. FUEL TANK SIZE

Integral Tank Mount

LANDING GEAR

Conventional

REC. NO. OF CHANNELS

2

CONTROL FUNCTIONS

Rudders & Elevator

BASIC MATERIALS USED IN CONSTRUCTION

Fuselage Spruce

Wing Balsa

Empennage Balsa

Weight Ready-To-Fly 25½ Ounces

Wing Loading 11 Oz./Sq. Ft.

electric motors), fell on deaf ears, and the only response was some qualifications about "...over my dead body."

Rather than see a grown man cry, Dick did offer a counter proposal. Reaching down into the remote recesses of his opulently carved mother-of-pearl desk he pulled out a tattered plan, and said "Why not try this as an R/C model, it's a sure winner."

Picking myself up from the luxuriously carpeted floor, where I'd been running through my Adolf Hitler imitation, I accepted this gift with a little suspicion. After all, I'd had several offers of a similar nature when passing by the racetrack at Santa Anita on my way to R/C Modelersville, but trusting soul that I am, I said "Ta very much," and pedaled

off home to assess this wonder project.

The scene now shifts to my humble abode. Unfolding the moth-eaten parchment, which closely resembled the Dead Sea Scroll, was no easy task, but when at last completed the project became clear. It was a twin 'A' frame pusher canard rubber model, vintage 1915, and I was supposed to make this into a radio controlled model.

Murmuring a few choice epithets regarding Dick and his forbears, I pushed the whole mess on one side, and resumed work on my wonderful Dornier. However, after a few days my curiosity got the better of me, and I retrieved the plans of the 'A' frame pusher from the trash can where I'd carefully filed them, and began some design studies (which is a fancy way of saying that I doodled on

the back of my Dornier plan). After awhile I had sufficient sketches to put together and make a real plan, and so the few pathetic pieces of the Dornier were swept off the building board, and the new design was pinned down.

At this stage the project lurched into top gear, spruce was cut, sanded, epoxied, bound, reinforced and generally assaulted. Plywood was plied, wire was bent, epoxy spread, Hot Stuff stuffed, holes drilled, then filled and drilled in the correct location and, in general, construction proceeded in my usual manner of one step forward, two steps backward.

Finally it was finished, the last lick of paint was applied to cover up a goof here and there, and the model was ready to fly. At this time a monsoon arrived in Los

Angeles, dumping hail, snow and rain all over everything. My favorite flying site Sepulveda Basin, filled up and no one could find the plug. And so it was back to the Dornier for a while, until Ma Nature regained her senses, and sent a little sunshine to dry up all that wet stuff.

Sunday, the 11th of February, is famous as the Anniversary of the Foundation of the nation of Japan, Thomas Alva Edison's birthday, and the day the first Radio Controlled 'A' frame pusher took to the air over Palos Verdes (Sepulveda Basin being still full of water).

The day dawned beautifully with no signs of rain, and a quick tour around the hill showed a handful of glider pilots sitting on the slope watching flaccid frequency flags for any signs of movement. In short it was the beginning of a perfect day for a prototype's first flight. The model was assembled, the radio checked and found to be okay, so there was nothing left to do but start the motors. These proved to be on their best behavior, started with a flick of the starter, and the model was then lined up into the non-existent wind.

For this auspicious occasion I had assigned myself the task of historian, to document the event photographically with my movie camera. This left the task of flying the beast to Kevin, who usually gets stuck this way, and so with Kevin on the sticks, I yelled "Action," and reached for the camera. In doing this I inadvertently let go of the model and before either of us realized it the plane trundled down the runway and took off, climbing strongly. By the time the camera was in action the model was passing through the 300 foot level, and all I managed to capture of the first flight was a few feet of film until the model became a fly speck in the view finder.

The rest of the flight was spent feeling out the controls, (elevator a bit too sensitive), and waiting for one engine to quit. This happened after awhile, but the loss of half the power seemed to have little effect on the controllability, and only caused the model to descend gently, for a trouble-free landing.

With the model on the ground we were finally able to breathe, and shower congratulations on ourselves for an ideal first flight.

We made several more flights that day, taking full advantage of a perfect day, and finally quit as the sun slowly sank into the Pacific.

All in all it was a great day, many flights, and no problems, the biggest worry --- what would happen with one engine out --- seemed to be "not much." Controllability was good with both one and two engines out, and the model in general behaved in a exemplary manner.

Sounds too good to be true? Well, if you want to come around and see the movies, feel free to do so. It may look like

a fly speck, but it's a real 'A' frame fly speck.

If, in a weak moment, you decide to duplicate my model, the following notes may be of some use. The model consists of three basic pieces, the main wing, the foreplane or front wing, and the 'A' frame fuselage.

CONSTRUCTION

Fuselage:

The fuselage, which is built from hardwood, and mainly uses 1/4" x 1/2" strips. Pin down the two long side strips onto the plan, then cut and epoxy into place the various cross members. Note that the 'X' shaped cross members are jointed in the center, with a half lap joint. One of the small sketches on the plan illustrates this. Dry sand the area of each joint flat, then add the 1/32" ply reinforcing pieces on both the top and the bottom of each joint.

The foreplane mounting structure consists of the side frames, which are first made on the plan. Be sure to make both a left and right hand frame. When dry, these two frames can be epoxied onto the main 'A' frame, making certain that both frames are set at the same angle of incidence.

You will have seen on the plans a note regarding the space needed for the servos. Make sure that you position the aft cross member here to suit the servos that you intend to use.

The various pieces of 1/8" dowel can now be installed. The short dowels at the back are for the wing attach bands, and the full length dowel aft of the servo location is used as an anchor for the rudder NyRod outer cover. This is seen on some of the photos, and will also be discussed further in the section on radio installation.

Engine Installation:

The two Cox .049 engines are attached to 1/8" ply plates, F1, which are epoxied to the ends of the side members. Note the direction of the thrust is along the longeron, and not pointing directly forward. This "toeing-in" of the engines doesn't reduce the thrust too much, but is helpful in reducing the yawing moments during the single engine flight. Next add the support plates F2 on top and bottom of the longerons, then the F3 fairing blocks, after which the spaces left between the longerons and F2 can be filled with scrap balsa.

The fuselage is completed with the addition of the balsa nose block.

Undercarriage:

Make the axle, U1, and the main U/C legs from 3/32" piano wire to the profiles shown on the plans, then assemble on the fuselage, using carpet thread to bind into place. (The carpet thread bindings were mainly used to preserve the vintage look of the model.) Bind the axle to the U2's with copper wire, then solder together. With the gear assembly symmetric, smear epoxy all over the

carpet thread joints to lock the unit into place.

The tail skid U3 is epoxied into a hole drilled vertically in the center of the aft X member, and braced with item U4, which is also bound to the fuselage with carpet thread. Solder U3 to U4, then smear epoxy over the carpet thread as previously done with the main gear.

Wings:

The wings can either be built in two separate sections, a left and right hand panel, or as a single piece, using 48" long strips of balsa. Whichever system you choose the construction sequence is the same, beginning with pinning down, onto the building board, the leading and trailing edge pieces, and the main spar. Cut out the wing ribs from 3/32" sheet balsa, and cement all but the two central ribs into place. Add the wing tips, made from 1/4" x 1/2" balsa, and trim the main spar, as shown on the plan, to the thickness of the wing tip.

While all this assembly is drying, the dihedral braces W1 and W2 can be cut out from 1/16" plywood. If you've made the single piece wing, the next step is to cut this into two at the center section, then bevel these spar ends to suit the dihedral angle. Pin one half of the wing down to the building board, prop up the other end 5" at the end rib, then cement together, with the dihedral braces.

Make the center section ribs, enlarging the slots in these for the wing joiners, and glue into place. Adding the top spar completes the wing construction. Sand the leading edge to shape, then lightly sand the wings all over, and prepare for covering. I used white Solarfilm for the covering material, but any of the current plastic films should be suitable.

Foreplane:

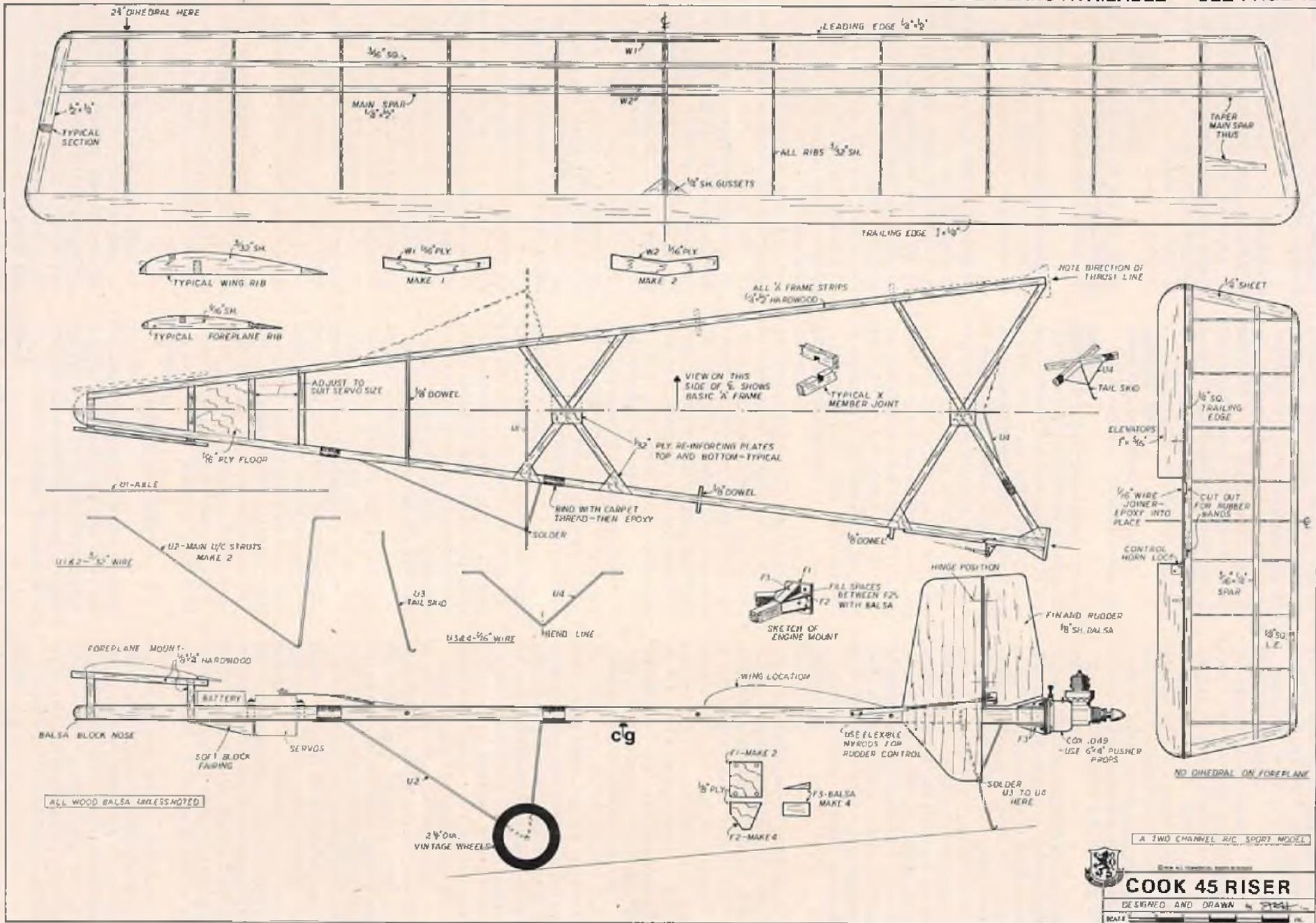
This item is built in a similar way to the wing, and so the construction sequence will not be repeated here. The only additional points worth mentioning are to use a hard piece of 1/4" square for the trailing edge, so that when the cut-outs are made, the strength of this item is not reduced too much. These cut-outs incidentally are for the rubber bands which attach the foreplane to the fuselage. The elevator is made in two pieces, joined with a "U" shaped piece of 1/16" piano wire. Epoxy this wire into the elevators.

On my prototype, the elevator was hinged to the foreplane with Solarfilm hinges. Make sure that when the foreplane is attached to the model, the elevator can move freely. If some friction exists between the attachment bands and the elevator joining wire, make the trailing edge cut-outs a little bigger (or use smaller rubber bands!)

Radio Installation:

The radio is used to balance the model, and so once the fuselage is basically completed, and the wings and

text to page 148



A TWO CHANNEL R/C SPORT MODEL



COOK 45 RISER

DESIGNED AND DRAWN BY [Signature]

SCALE 1" = 10" PLAN NO. 766

RCM PRODUCT TEST

R & Z Systems SUPER GNAT



The Super Gnat is manufactured by R & Z Systems Engineering, P.O. Box 1249, Pacific Palisades, Calif. 90272. This compact sport sailplane was designed by Rick Perkins and Zac Bogart. The kit contains a "roll your own" plywood fuselage with a molded rubber nose cone, a Jedelsky style two piece all sheet wing, and a tail assembly held in place with a "flash fastener." This unit, which attaches the tail assembly, has been used for the release of the complete tail group upon impact and also for quick disconnect in storing the sailplane back in the box.

A 21 page construction manual is included along with full size plans. All the hardware necessary for the model, including the pushrods, is furnished in the kit. The builder need only buy adhesives, covering material, and a radio. When completed, the model fits into its 36" x 7" x 7" box for storage and transport.

Assembly of the kit was quick and simple, with a few minor exceptions. All the wing parts were pre-cut and fit very well. The main panels were 3/16" shorter than those shown on the plan. This posed no problem during construction which took all of one afternoon. The instructions did not call for any washout in the wingtips. Wanting to use this sailplane almost entirely for thermal soaring, 1/4" washout was built into the wing panels. For slope soaring, this is not necessary. This was the builders choice only in order to help eliminate tip stall.

After installing the longerons on the plywood fuselage sheet, we began the rolling operation. The formers needed a small amount of trimming before the sheet went into place. Apparently we hadn't rounded the vertical fin slot well enough because the aft top of the sheet split open. A small hole was then drilled to stop the split and completed the fuselage. When all had dried, we replaced the damaged area with a balsa block. The instructions don't cover any type of repairs, and they should. The manufacturer was notified about the problem and have since switched to .4 plywood on the fuselage. This has relieved the problem. Anyone who has this splitting problem on the rolled fuselage, can send in the back cover of

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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	●										

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

SPECIFICATIONS

Name SUPER GNAT
 Aircraft Type Sport Sailplane
 Manufactured By R & Z Systems Engineering
 P.O. Box 1249
 Pacific Palisades, California 90272

Mfg. Suggested Retail Price \$34.95
 Available From Both Mfg. & Retail
 Manufacturer's Rec. Usage Sport Sailplane
 Wingspan 66 Inches
 Wing Chord 5 Inches
 Total Wing Area 320 Square Inches
 Fuselage Length 34.5 Inches
 Radio Compartment Dimensions ... (L) 5.75" x (W) 1.75" x (H) 1.75"
 Wing Location Shoulder Wing
 Airoil Under Camber
 Wing Planform Double Taper at tips
 Dihedral (each tip) 4.5 Inches
 Stabilizer Span 16.25 Inches
 Stabilizer Chord (incl. elev.) 3.75" (Avg.)
 Total Stab Area 45 Square Inches
 Stab Airoil Section Flat
 Stabilizer Location Middle of Fin
 Vertical Fin Height 8.5 Inches
 Vertical Fin Width (incl. rud.) 3.5" (Avg.)
 Mfg. Rec. Engine Range NA
 Recommended Fuel Tank Size NA
 Landing Gear Skid
 Recommended No. Of Channels 2
 Recommended Control Functions Rudder & Elevator

Basic Materials Used in Construction:
 Fuselage Ply & Spruce
 Wing Balsa, Spruce & Ply
 Tail Surfaces Balsa
 Hardware Included in Kit See text
 Plan Size 30" x 36" (1 sheet)
 Building Instructions on Plan Sheets No
 Instruction Manual Yes (21 pages)
 Construction Photos No
 Kit Includes Printed, Die-Cut & Shaped Parts
 Mfg. Rec. Flying Weight 22 Oz.
 Wing loading based on rec. flying wt. 10 Oz./Sq. Ft.

RCM PROTOTYPE

Weight, Ready To Fly 22.75 Ozs.
 Wing Loading 10.25 Oz./Sq. Ft.
 Covering & finishing materials used See text
 Engine Make & Disp. NA
 Muffler Used NA
 Radio Used Mac's
 Tank Size Used NA

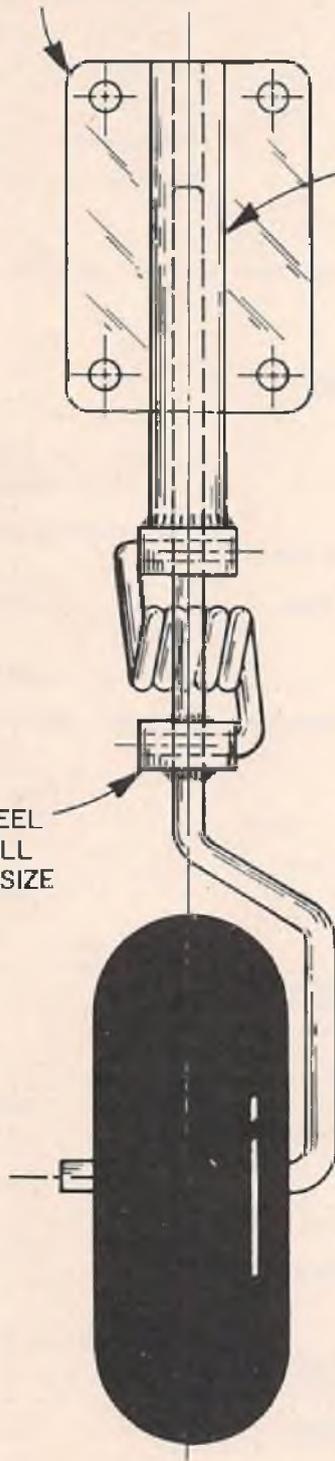
HERE'S HOW

Now that we are well into the flying season, and I am speaking of "we" RC'ers who live in the northern part of the U.S., maybe, now that our pride and joy is

trimmed and flying, for the season, we can look around for other things of interest. I know some of you out there like to experiment and try new ideas, however, it takes a little nudge in the

proper direction of interest to get you going. I am always interested in new and clever ideas because it's my business. And because I feel so strongly about passing on to you the good, tried and proven ideas that come across my drawing board, there are many that I screen out simply because, in my

MOUNTING PLATE



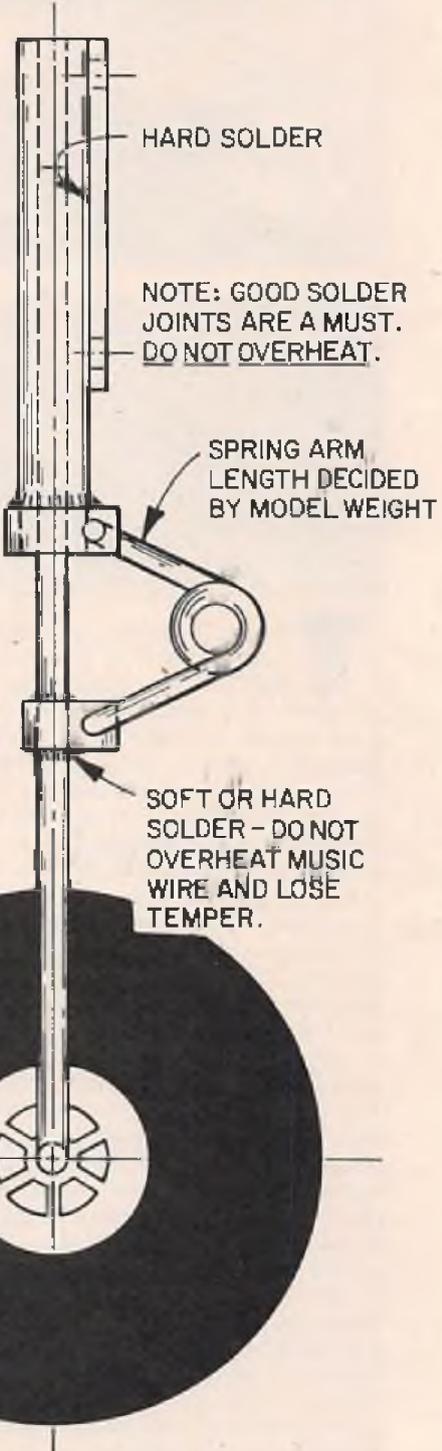
MILD STEEL BOLT SHANK.
DRILLED TO MUSIC WIRE DIA

SPRING MADE OF MUSIC
WIRE TO SUIT AIRCRAFT
WEIGHT



OPPOSITE FACING BENDS
ON SPRING PREVENT IT
FROM COMING OUT AND
HOLD WHEEL RIGID.

BRASS OR STEEL
COLLAR - DRILL
TO SUIT WIRE SIZE



HARD SOLDER

NOTE: GOOD SOLDER
JOINTS ARE A MUST.
DO NOT OVERHEAT.

SPRING ARM
LENGTH DECIDED
BY MODEL WEIGHT

SOFT OR HARD
SOLDER - DO NOT
OVERHEAT MUSIC
WIRE AND LOSE
TEMPER.

FOR MORE INFORMATION CONTACT:

C. J. FRASER
P.O. BOX 36
RICHMOND
NATAL - 3780 - SOUTH AFRICA

C. J. FRASER'S SHOCK STRUT LANDING GEAR

opinion, they would not benefit the average RC'er. So keep the ideas coming and share with others as I have done with you over the years. It's great fun knowing you have helped the other guy. That's what it's all about.

I received an interesting letter from C.J. Fraser who lives in South Africa. C.J. is very much interested in the development of model aircraft landing gear and sent along a couple of pictures of his latest idea. He goes on to say that, "For a number of years we have felt that model aircraft undercarriage development has lagged behind R/C equipment and the aircraft themselves. In the days when an aircraft 'arrived' and landings were a hit and miss affair, the old music wire system served very well. We now have sophisticated equipment with beautifully finished models, why not undercarriages operating as nearly as possible to the real thing?"

Here is a landing gear design which has been developed over the years and has served C.J. well. Make no mistake, you come in too hard and it ends or breaks which makes it very much a subject for the old hands at our game, but the results of well executed landings are very rewarding. The general appearance of the model is enhanced due to the scale-like effects. The music wire spring can be made from varying diameters until correct spring rate for the model weight is obtained. It will take a little experimentation on your part to wind a spring or maybe you happen to have an old nose gear of the proper wire size. You might give that a try. Once you have developed a technique for spring winding the rest should come fairly easy.

One other point to make note of, and that is, if you decide to silver solder the collars in place be very careful not to overheat the music wire leg. You must silver solder with a torch to get enough heat, so be careful not to anneal and lose wire temper. According to C.J. it is possible to soft solder the joints, however, good bonding is a must. I recommend not going over 700°F on music wire. Music wire is drawn and thereby work hardened to gain its spring temper. Once annealed with too much heat, it cannot be retempered. Stick with the soft or hard solder and stay out of trouble.

I hope that some of you will give C.J.'s landing gear design a try. Although I did not build one myself, the idea is very workable and should provide a realistic looking, as well as functional, landing gear. By all means, don't be afraid to experiment with new ideas. After you have it all in order and working to perfection pass it along to a buddy and watch him smile. We do this every month! □

THE R/C WIFE, Or, Why Is There Epoxy All Over My Screwdriver?

By Phyllis Moorman

Ever wondered what it would be like if your wife flew R/C, too? Are you thinking of the idyllic companionship and togetherness of a shared hobby? Well, my husband Ed and I both fly R/C, so let me tell you what it's really like.

It's really great to have someone to help you load the car to go out to the field. You both pitch in and cart out fuselages, wings, tools, fuel, and field box, in half the time. Then you settle back to enjoy the drive out to the field, chatting about the good weather or the prospects for the new plane. The trouble starts when you get there and start to unload.

"Hon, where're the transmitters?"

"Transmitters?!? I thought **you** loaded the transmitters!"

"But you know you always load the transmitters..."

The ride back to the house is much quieter.

Ed taught me to fly R/C (is that why his hair's grayed a lot these past two years?) and I still insist that he stand next to me when I fly. Call it superstition if you want to; I only know the last two times I flew alone I dinged a plane. I take no more risks. But even so, as much time as we spend flying together, we still sometimes misunderstand each other when he's instructing me. Take last weekend when I was practicing touch and goes with my new Dirty Birdy:

"Okay, Ed, you keep an eye on me and tell me what I'm doing wrong."

"All right," he answered. I drove the plane downwind, throttled back, and started my turn.

"Now, Hon," he said, "don't cut off that corner... nope, nope, you'll end up too high... no, left... more left... don't turn yet..."

"Don't talk to me!" I snapped. "I'm trying to concentrate! You know I can't think and listen at the same time!" I completed the turn and at the last minute I saw I wasn't lined up over the runway. Power, and I go around.

"**What on earth were you doing?**" I shrieked. "What were you going to do, let me run the darned thing into the trees?"

"B-But you told me not to say anything!" Ed sputtered, raising his voice a bit.

"Look, Turkey," I told him, "your job is to keep me out of trouble."

Were those hands I felt around my throat?



But I thought you loaded the transmitters!

Actually, we rarely criticize each other's flying, although I'm a tough judge when he practices the new Vegas pattern. But I just hate it when he keeps track of how many props I break.

Generally when we fly, I put my plane together, fuel it up, and Ed starts the engine. Once in a while, I take a little heat about that from the rest of the guys at the field, and I usually tell them, in my sweetest voice that I'm just not strong enough to hold the starter against the spinner.

Actually it's like this: I'm all for woman's lib, but why should I risk my fingers starting an OS .60 FSR when Ed's willing to do it for me? I mean, I'm not a fanatic!

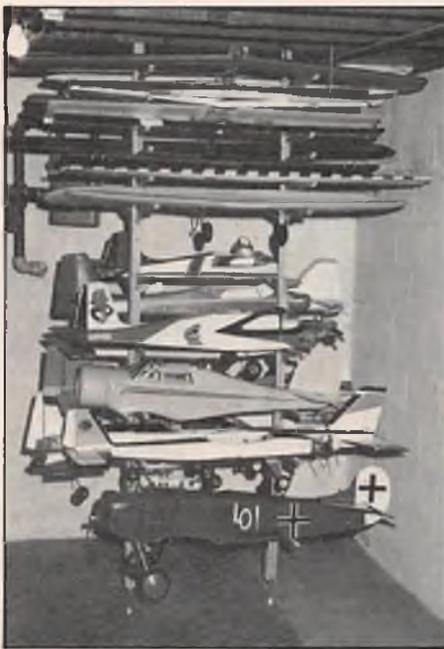
Of course, flying is only half the hobby for most of us. The other part is building. Ed and I usually practice a division of labor of sorts. We both build, but then he installs radios and engines and my specialty is priming, sanding, and painting. He tells me that my spray gun was the best investment he's ever made.

The only problem we have with building is that Ed is disgustingly tidy. He gets totally disjoined by little things like epoxy on his tool handles or being told his needle nosed pliers are lost --- somewhere out in the yard. I often see him with gritted teeth, scraping paint spatters off the drill or epoxy off of screwdrivers. Can you picture him fastidiously holding a sticky screwdriver by the blade, using only his thumb and fingertips, and growling, "What have you done to my favorite screwdriver?"

I can't imagine what all the fuss is about. Don't they work just as well messy? And my gosh! Sometimes I even delve in and straighten up the work room. Then what happens? For a week he tells me he can't find anything! I just can't figure him out.

Of course, I do have my moments of triumph. Like last summer when a good friend of ours dinged his beautiful Dirty Birdy. Two and a half rolls and full up elevator. The whole nose, forward of the wing, was shattered in about twenty pieces. The owner took a look at it and

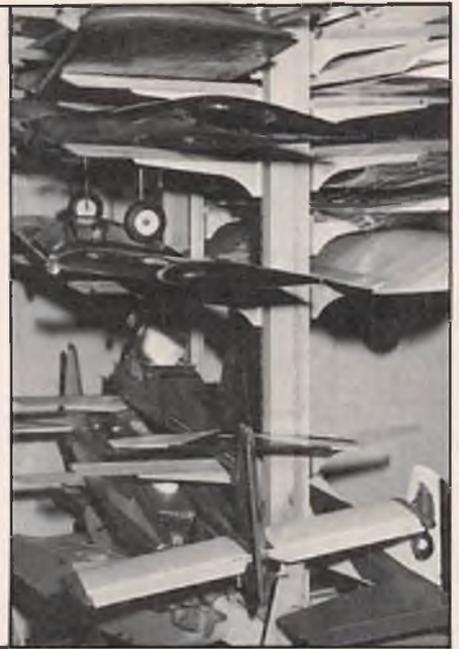
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SUPER RACK

LEFT: Super rack loaded with the only aircraft in the house. RIGHT: The L's are aimed inward. Planes are staggered as room permits.

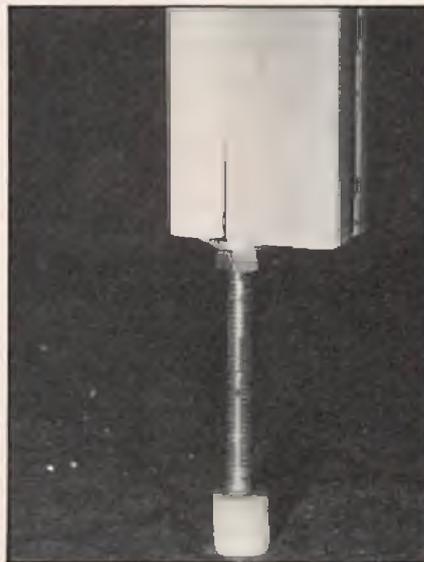
By Loren Stone Jr.



If you, too, have been accused of trying to make a giant hangar of your basement, perhaps your answer is the Super Rack. Thanks to my father in law's assistance in design and construction, Super Rack was a happy ending to a long search for an acceptable method of storing my R/C airplanes.

Construction starts by white gluing and nailing four 1 by 2's to form two "L" shaped upright supports. The length of these supports should be 2" shorter than the distance from the basement floor to the floor joists or basement ceiling. A 6" 1 by 2 is then glued and nailed to the inside lower corner of each "L" to assist in supporting the legs. 5" legs are made of 3/8" threaded rod and the feet are one inch long 3/4" nylon dowel. Drill a 3/8" hole 3 1/2" into the end of each upright and insert the legs. Place a washer and nut on each leg and drill a 3/8" hole 3/4" deep in the nylon dowel and place it over the end of the rod. (The rod and dowel assembly should fit freely, but snugly, into the bottom of the support.) The 5' metal standards are installed on both sides of each upright 4" from the top.

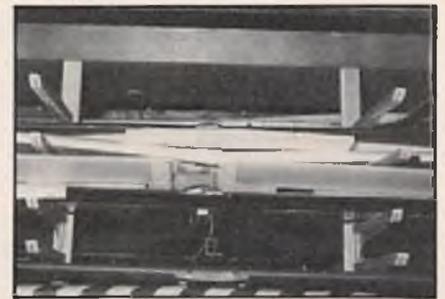
Install the uprights 20" apart by placing the top of each against the ceiling or joist and tighten the leg nuts against the "L" supports forcing them



Leg holds super rack solid.

tightly against the ceiling.

Shelf brackets are constructed by slotting 12" long 1 by 1's and placing them over the metal brackets. Drill holes smaller than those of the nails to be used through both the wood and metal bracket. A slightly larger hole than those drilled through the metal bracket allows



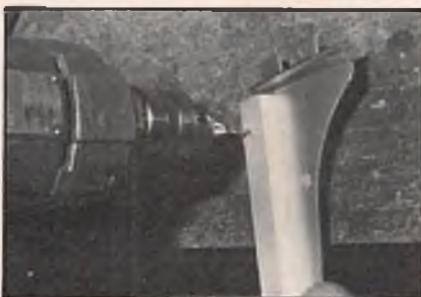
Which way is up? Uprights are butted solidly against joists.



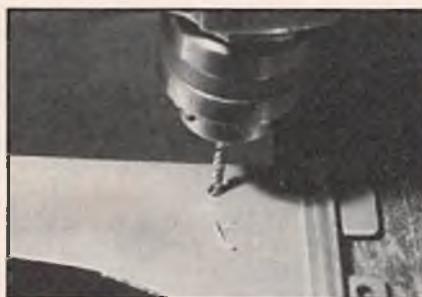
Wooden shelf bracket.

the nail to hold tightly to the wood yet pass freely through the metal bracket. The nail is then driven through the wood and metal brackets, cut off and peened flush with the side of the bracket. Although I used two nails in each bracket, one would probably suffice.

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Smaller hole through both wood and metal brackets.



Larger hole so that nail passes freely through metal bracket.



A board across creates a radio shelf and charging rack.

RC FLYING AND THE LAW

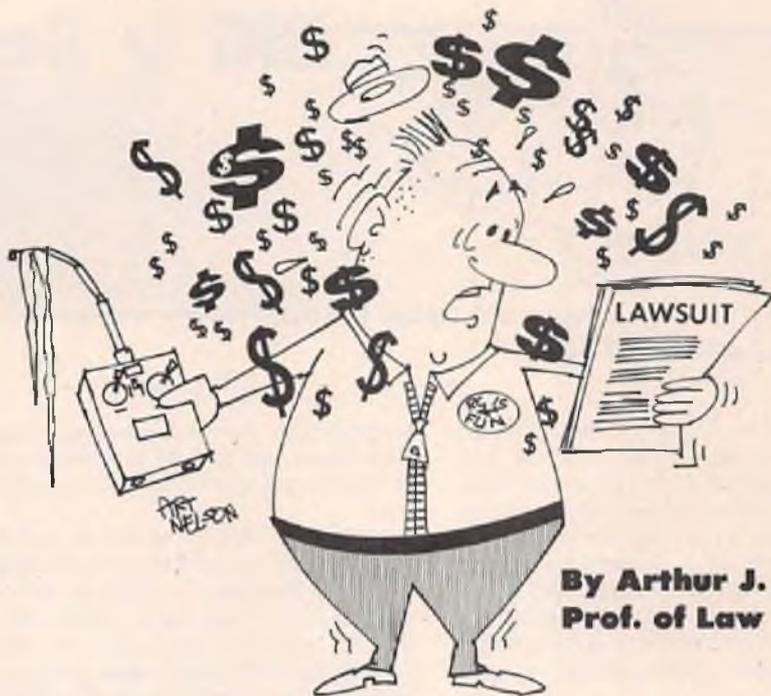
Part IX

ON BEING LEGAL AND CURRENT

Part of every private pilot's training is the so-called "ground school" phase. Here is where the student pilot will spend hours in a classroom or in a home study situation, learning the rules and regulations, particularly the Federal Aviation Regulations (known as FARs) pertaining to piloting a full-scale airplane. The aim is make certain that every flight is conducted in a legal manner and that the pilot is current in terms of his licensing and qualifications.

For R/C pilots, there is good news and bad news. The good news is obvious; we don't have to go through any "ground school" because there is no licensing procedure for operating a radio controlled model, whether plane, boat or vehicle. Nor, must it be said, is it likely that there will be licensing though there have been some thoughtful recommendations in favor of a licensing system; those who oppose any form of licensing for R/C modelers maintain that to employ licensing is to invite bureaucracy, unnecessary regulations and turn the hobby into something other than a great avocation.

So indeed as of this writing and in the foreseeable future, there are no "Radio Control Model Regulations" for the student to learn and obey in order that flights be legal, nor is there any licensing procedure in order to qualify and remain current as a licensed or certified pilot. But there is "bad news" and that is that the absence of regulations and licensing procedures mean that a dangerous free-for-all can take place in the skies, on the waters or on the ground, whenever one or more R/C modelers "do their thing." Anyone who has been in our sport for any length of time knows that there are too many instances of operating an R/C model that is beyond the qualifications of the modeler to handle safely and has seen hobbyists operating their models in such a reckless manner that you wonder if their intent is not to injure someone or



By Arthur J. Sabin
Prof. of Law

destroy their model, or both. I remember on one occasion out at our flying field when a pilot took his plane up into the sky after having imbibed a goodly number of beers (and probably some hard liquor); what a show he put on until finally one of the club members grabbed his transmitter and got the plane safely down before he maimed or even killed someone with it. It was pretty evident that about the only person he probably wouldn't have hit was himself! It flashed through my mind at that time that I certainly wish he had followed the pilot regulation calling for at least 8 hours "from bottle to throttle."

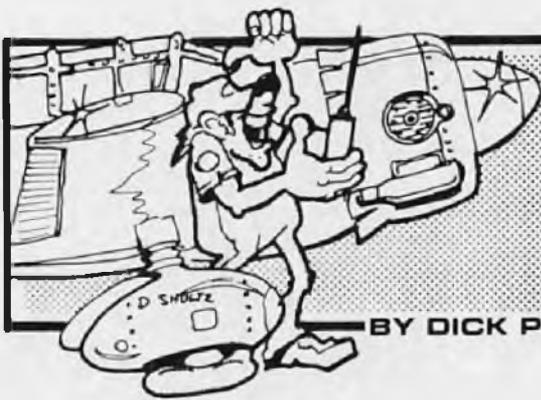
But there is a further complication by virtue of the absence of regulations and a licensing procedure. It involves insurance and it runs like this: The insurance you obtain through your membership in the Academy of Model Aeronautics (AMA) provides insurance coverage to its members, a feature that, perhaps for most AMA members, is the single most significant benefit of membership. In earlier parts of this series, the importance of that insurance and details on what the insurance does and does not cover and how it operates in conjunction with homeowners or tenants insurance have been covered. Throughout these articles explaining AMA insurance, it has been emphasized that a requirement for qualifying for payment by the insurance carrier for property damage and/or injuries done by the AMA member is **compliance with the official AMA safety code.**

It can be understood in this way: The law generally allows us to **insure ourselves against our own negligence** where that negligence causes injury to others by way of property loss or personal injury or both.

The law, reflecting human experience, accepts the idea that everyone from time to time fails to behave as a reasonably careful person and therefore is negligent (which is defined as the failure to act as a reasonably careful person would have acted under the circumstances) and should be able to insure themselves against their own negligence. If you think about it, you will realize that it is in the best interest of society for everyone driving automobiles to be able to insure themselves against their own negligence so that those who have their property damaged or lose limb or life can be compensated so that the damages are repaired, money is obtained for bodily injury, or compensation paid to the heirs of the deceased. Plainly put, when we have any insurance policy which insures us with respect to our negligence, we are paying an insurance carrier a premium in exchange for their willingness (within policy limits) to pay third parties who are injured or sustain losses because of our negligence. You **can't insure yourself against your intentional wrongs but you can with respect to your negligent acts.**

Every policy of insurance has certain conditions that have to be met before the insurance carrier or company will honor a claim made by any third party against the insured. For example, it is a usual condition that the insured must report the accident within a reasonable amount of time, that the insured will cooperate with the insurance company, supplying information, showing up at the trial if one takes place, etc. Now the point is that **one of the conditions of AMA insurance** is that you have **complied with the official AMA safety code.** If you are an AMA member and have not

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BIG is Beautiful

BY DICK PHILLIPS



I doubt there is a club or flying group in North America that doesn't have a couple of pretty capable photographers in its ranks. They take a lot of pictures in slide form and they frequently entertain everyone at a meeting by showing their work. (How often have you found that the only souvenir of your fantastic scale **whatsit** built two years ago is someone else's slide?)

The unfortunate part of all this is that these slides are usually shown once (maybe twice) at a club meeting and then go into storage forever.

A couple of years ago, I exchanged a slide/cassette show with the STARS of Olean, New York, which gave us both a good idea about what the other guys were doing. I showed theirs at a club meeting and they showed ours, likewise. It was a good idea and we had a lot of fun with it. Ribald comment on of so-and-so's latest crash was the highlight of the shows!

My point is this --- why not get together with the expert camera bugs in your club and put together a show? All you need is a sense of humor, a slide projector (preferably a Bell and Howell cube projector as I'll explain in a minute), a cassette tape recorder, and some time, coupled with a slide collection.

What you do is select an assortment of slides that typifies your club and its activities, outline a commentary for them and run a slide show, taping the commentary as you go. It's best to use a signal to indicate "Go To The Next Slide" although the sound of the projector advancing is usually audible enough to serve this purpose.

The Bell and Howell cube projector is best, we've found, since the cubes will hold about 40 slides each, they are compact to mail, and you'll find almost every club in the country has at least one available in their membership. They are a good match for a cassette in size too which helps in the mailing. Two cubes can be covered on a one hour tape easily.

I'd be delighted to see the idea catch on as we have had a lot of fun with the ones we've had and I'm sure you'll find the same to be true for you. Send it to your neighboring club or to a buddy

elsewhere for their club meeting. If the idea should catch on, it'll sure take care of the entertainment chairman's job for him!

My axe to grind in all this is that if anyone does one pertaining to the big models in their area, I'd love to see it. How about it, all you Super Scalers out there? Incidentally, due to the uncertainties of mailing, make sure you pack well, and duplicates of the slides will assure the originals are still around.

★

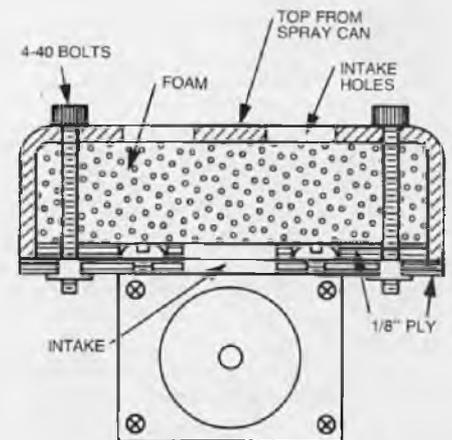
I mentioned a place in California to get your plans enlarged professionally and accurately using a photographic method. Great for all us guys who live in the west, but what about all you thousands of guys on the eastern edge of the country? Well, be of good cheer as there is a source for you too. Handy & Boesser Inc., 569 Broad St., Newark, New Jersey 07102, can do the job for you. They will shoot a neg for you of material up to 11 x 14 in the original for \$5.00. You can then have the negative done in your area on mural paper (which comes in very large sizes indeed --- check with your local processing plant for sizes available) or H & B will do it for you, up to 40 x 60 in size for \$25.00. Resultant plans larger than 40 x 60 could be done in sections of multiples of that size. The sample H & B made to show me their work is a full sized section of a plan blown up from a magazine page and it is excellent quality, certainly adequate for us to build from. If you need a bigger plan, and can't do it yourself, they can do it for you.

★

Joe Prebil of Elmhurst, Illinois, has shared an idea with us which would be of use to those of us who fly Quadra engines off dirt strips and worry about the grit getting into the engine. Those 20" and 22" clubs can raise a lot of dust and the way it swirls around the front end indicates there is some of it being ingested by the engine.

Joe's air cleaner is made from a couple of pieces of scrap plywood and the pastic cap from a spray can. The sketch is pretty well self-explanatory and the two screws which hold the plywood to the carburetor are the same ones which hold the carb to

the engine. Adding this unit to your engine will probably require re-adjustment of the needles, I suspect. Thanks to Joe for sharing his idea with us.



AIR CLEANER FOR QUADRA ENGINE

★

We have recently had a letter from Ben Tarnofsky of Tarno Aero Engines in Montreal. Ben has been running a test program on the engine and some results are available to us. Optimum power is produced at around 6000 rpm so Ben suggests that a 22/5 or 22/6 prop should give those turns. Ben tells me that they have been particularly pleased with the low vibration levels with the engine throughout the rpm range. He has been in touch with Eastcraft and their well known and proven Electra-Start system should be available for the Tarno engine by the time you read this. Ben says that the design of the crankcase is such that the gear pulleys, clutch and timing belt gears can be mounted right to the engine cutting down the possibility of errors in the location, creating problems with adjustment, and it makes a very compact package. The smooth running of the engine has been confirmed to me by another modeler who is now running one of the Tarno engines.

★

Wendell Hostetler who lives in Orville, Ohio, has been building a Sig Skybolt kit, which is not at all unusual.

What is a bit out of the ordinary is that Wendell has actually been building two Skybolts, one is from the kit and one is from scratch. The extra Skybolt is one and a half times larger than the one out of the kit box and it is powered with a Quadra engine. The **big** Skybolt has been flown recently and, as might have been expected, Wendell was pretty excited by the process. While it is not a particularly great performer vertically, according to Wendell, he found it to be a bit faster than he had expected and quick to roll either way, nice solid loops, and no nasty stall tendencies. CG came out right where it should be and the weight is 23 pounds and the landings, according to Wendell, are a revelation. Just couldn't be better. He flew it at his local airport and the airport manager was so impressed with it that he called it a masterpiece and swore he was going to go on diet pills so he could get down to a size which would permit him to fly it! Pretty fair recommendation, I'd say.

Wendell planned to be at Toledo and if you were there, you likely saw the **big** Bolt and had a chance to talk to a new convert to Big Is Beautiful. He is planning to make the full sized plan for the bird available and, as soon as it's ready (which should be before you read this) he'll be shipping them to those wanting a copy. If you are interested, you can contact Wendell Hostetler at 1041 Heatherwood Lane, Orville, Ohio 44667. Projected price, when I last heard from him, was \$21.50 for two 42 x 50 inch sheets, plus some construction, finishing and flying hints.

I can only assume Wendell is really a devoted **big** fan now as he never even mentioned the conventionally sized copy of the Skybolt! Maybe it hasn't even been flown yet!

★

A letter in today's mail from Bill Schultz of Olney, Texas, raised a couple of very valid points which I have covered in the past. However, as Clarence Lee has often discovered, similar questions pop up again and again over a period of time and the newcomer to the hobby (or to reading a particular column) may well not be familiar with the answer. Answering Bill's letter will be a bit repetitious for 'regular readers' but may be of some help to those of you there in the back of the class who either haven't been paying attention or who came in late. There will be a test later!

Dear Dick:

As I was getting the itch to go Big, I waited and waited for your column to give a "rule of thumb" on using spruce (?) in place of balsa, as to strength, etc. I finally went to three lumber yards for some straight grained spruce and ended up with six different types of wood. I came to the conclusion that for the average modeler, it's easiest to get No. 1 white pine which is used for

finishing houses. You can get any length and in 1" x 4" through 1" x 12". The next problem was to figure out its strength in relation to balsa. With a trusty spring scale and many strips of all sizes I came to the conclusion it's 40% stronger than balsa for a given size (1/4" x 1/2" x 36") I also learned that a 1/4" x 1/4" open frame fuselage is stronger than a 3/16" balsa slab-sided fuselage. The reason I'm writing this is that I'm sure you've done some research on it and I would like to see it printed.

I made a set of dividers to scale up a proven kit. In this case the kit had a 51" wing span and I wanted a 80". I used 1/8" x 1" aluminum to make up proportional dividers. I also counter balanced my elevator pushrod to add a little pull up.

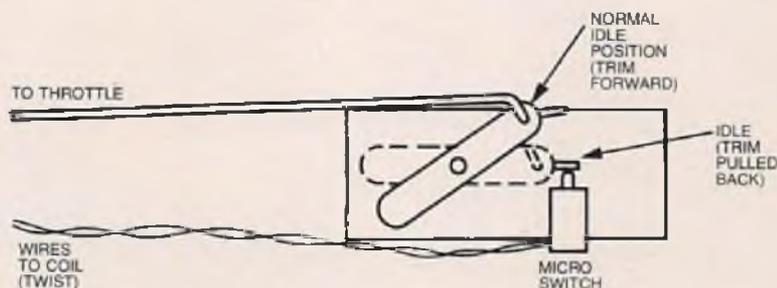
I had a 180° servo for the throttle on the Quadra because I used two servos for aileron control and I used the following as an ignition kill. As my receiver is behind the wing, I experienced no interference, but it could create problems?

At idle with trim pulled back it also kills the ignition and I found the 180° servo works the throttle on a quadra closer to stick speed than a conventional servo.

Sincerely,
Bill Schultz

Bill is right about the wood. It doesn't have to be the really fine stuff from the spruce bin at the hobby shop which we have used for years for glider wing spars and the like. Any straight grained, and preferably close grained wood without knots or other blemishes, will do. Ready availability is the criterion. White pine, Pattern pine, poplar, and many other of the soft woods will do quite well. Any of the gasoline fueled engines of around 2 cubic inch displacement won't have much trouble moving well built models made from these woods. Cedar is great for leading edges, for example, as it is light, easily worked, and the pieces are usually large enough that the relative weakness of cedar will not be a problem.

Availability of a well maintained saw (either table or radial arm will do) with a good sharp blade will produce all the strip stock you'll be able to use for quite a while out of a few dollars worth of wood. Be sure you pick the good stuff, though, as there is nothing worse than discovering at about 8:00 PM on a



Sunday night that all you have left has knots right in a strategic location!

Bill's use of a spring scale to check the strength of the wood is further than I have ever gone. The fact that most of the soft woods are substantially stronger than balsa, with a moderate increase in weight, satisfied me that it was what I wanted.

Construction methods can increase strength markedly as well. For example, the use of gussets made of light plywood at all fuselage framing joints can add significantly to the overall strength of the model. As Bill points out, this type of fuselage (properly designed) can be stronger than a balsa slab fuselage by quite an appreciable margin.

The use of proportional dividers was pretty well covered in a previous article (July '78), and it is a bit lengthy to cover again as a re-cap. It's a good, accurate method of enlarging plans, at minimum expense, as long as you are willing to take the time required and apply the care you need to get a usable plan. Since that column was written, a couple of commercial firms have indicated their availability to enlarge plans for you (previously mentioned in this column). You can do your own plans with the photo method too, and this was covered in the September '78 issue. The pantograph was covered in the May '78 column and except for the old graph method (March '78) that's about it for methods of getting large plans from existing ones. Be aware that the commercial use (i.e., selling enlarge plans) of someone else's design could violate copyright laws, so check with the originator before launching your 'business'.

Bill's mention of a spring to apply a little 'up' to the elevator is simply the addition of a spring on the pushrod (or control horn) in the 'up' direction. It gives your servo a little help in that direction and will help hold any 'slop' out of the control, however, it makes the servo work harder in the 'down' direction and should be used with great discretion, if at all.

The best solution is to keep the control linkages as free (but snug) as possible so any 'slop' is minimal, if it exists at all. Control 'blow-down' in a large model can be hazardous to your creation.

The addition of a 'kill' switch is a great

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AVATAR

Don Grassi's .40 sized machine has it all put together in one package. At 5 lbs., it's alive and eating up the sky.

Avatar — "A Variant Phase/A version of a Continuing Entity." The design presented here is exactly that --- it didn't start out that way, however. It started out simply as a "scaled down" .40 sized version of my Avanti. (See the May 1974 issue of R/C Modeler Magazine.) But being a compulsive designer, "slight modifications" to update the design were impossible to resist. So --- the domino theory took over, resulting in a Avanti in outward appearance even though it is essentially the same aerodynamically, since the force arrangement, relative areas, and wing and power loadings are quite similar.

The attitudes that prevailed when I

undertook this project to "scale down" the Avanti, were that .40 sized pattern ships are just not smooth and groovy, lack penetration and act badly in crosswinds. I sort of refused to accept what I was hearing and proceeded on the basis that "all generalizations are false" and specifically that a good clean design with sufficient power, having about 520 square inches of wing area and weighing about five pounds, would perform satisfactorily.

For starters, the horizontal tail surface was lowered and placed on the thrust line; the rationale being to improve the appearance of the rolling maneuvers, if not the actual maneuver itself. Then the fuselage lateral area was modified and redistributed for improved knife edge characteristics. Having made those two "slight modifications," any resemblance between this bird and Avanti would not be purely coincidental.

The Avanti wing planform was retained and simply "scaled down" since it worked well and looked just fine. However, the dihedral was deleted to improve inverted flight stability. The progressive airfoil concept used so successfully on Avanti (17% thick at the root and 18.5% thick at the tips) was also retained; however, on Avatar the tip thickness was changed to 18% (the

racer's edge?). Except for a slight amount of positive incidence built into the wing seat (only to preclude the possibility of an inadvertent negative angle of incidence) the design features a zero/zero set-up.

The motor chosen for both versions was the HP .40 with a Super Semco expansion muffler. This combination was more than adequate and, though I have not tried a conventional .40 (not Schneurle ported). I am sure that any good .40 would do the job quite handily. The motor was side mounted on a metal mount fifteen degrees above horizontal. The side mount was chosen over the more conventional upright since it gives a cleaner looking model from above and from the left side, while tucking in the muffler closer to the fuselage. The choice of fifteen degrees above horizontal was necessary for muffler clearance with the fuselage without unwanted extensions, and actually turns out to be a very neat and compact installation.

Avanti did not use wing fillets, so the first version of Avatar was built without them; however, wing fillets were added on subsequent versions.

The performance difference was surprisingly noticeable to say nothing of the aesthetic improvement, making the

ABOUT THE AUTHOR

Donald A. Grassl was born in 1924, in Fairfield, Connecticut. He majored in aircraft design at the Academy of Aeronautics, N.Y., and is presently Manager of Engineering, Raytheon Co., Missile Systems Division, Lowell Plant, Lowell, Massachusetts.

He has been designing and building model airplanes since he was 9 years old and has dabbled in just about every phase of the sport/hobby through the years.

In the post-World War II years, he was a serious free-flight competitor with a very enviable record in the Northeast. He currently limits his modeling activities to sport flying radio control models of his own design, both pattern and Stand-Off Scale.

He is a Past President of the 495th Radio Control Squadron, Chelmsford, Mass., and has held various other offices in that active Massachusetts Club.

AVATAR

Designed By : Donald A. Grassl

TYPE AIRCRAFT

Advanced Sport Pattern

WINGSPAN

54 1/2 Inches

TOTAL WING AREA

520 Square Inches

WING LOCATION

Low Wing

AIRFOIL

Symmetrical

WING PLANFORM

Double Taper

DIHEDRAL, EACH TIP

None

OVERALL FUSELAGE LENGTH

46 Inches

RADIO COMPARTMENT AREA

(E) 11 1/2" x (W) 2 1/2" x (H) 2"

STABILIZER SPAN

21 1/2 Inches

STABILIZER CHORD (incl. elev.)

5 1/2" (Avg.)

STABILIZER AREA

120 Square Inches

STAB AIRFOIL SECTION

Flat

STABILIZER LOCATION

Mid-Fuselage

VERTICAL FIN HEIGHT

7 3/4 Inches

VERTICAL FIN WIDTH (incl. rud.)

7" (Avg.)

REC. ENGINE SIZE

40-46

FUEL TANK SIZE

8 Ounces

LANDING GEAR

Tricycle

REC. NO. OF CHANNELS

4

CONTROL FUNCTIONS

Rud., Elev., Throt., Ail.

BASIC MATERIALS USED IN CONSTRUCTION

Fuselage Balsa, Ply & Hardwood
 Wing Balsa & Ply
 Empennage Balsa
 Wt. Ready-To-Fly 80 Ounces
 Wing Loading 22 Oz./Sq. Ft.



effort well worth the little extra building time required. Along the same vein, the fin was smoothly faired into the fuselage to clean up that turbulence generator.

The resultant design is a groovy .40 sized machine that eagerly goes wherever it is pointed and sort of slips through the air effortlessly with a responsiveness and silky smoothness that is truly reminiscent of a .60 sized pattern ship. All of this, while still retaining the excellent low speed stall characteristics of the Avanti --- it really leaves very little to be desired.

CONSTRUCTION

My versions of Avatar weigh five

pounds (80 ounces) resulting in a wing loading of 22 oz./sq. ft., consequently they are extremely lively and flair out beautifully on landings. I am sure the design can support a little higher wing loading, but I would recommend you keep it light by carefully selecting your balsa. Use **soft** balsa blocks and planks, and soft/medium sheets. The use of hard balsa should be restricted primarily to structural members such as wing spars, wing leading edges, and to those places as noted on the plans. Where there are two or more of any piece required, cut them at the same time and

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sand them stacked to ensure that they are identical. This holds especially true for the wing ribs and fuselage side panels. Since hand cutting is not as precise as die stamping, it generally pays to temporarily assemble things and check for good fits before gluing.

WING:

A "true" tapered wing can be best achieved by the use of a jig that permits the building of the wing in one piece. However, for the benefit of those who do not use a jig, the following procedure in conjunction with a flat work surface will produce very satisfactory results.

In essence, each wing panel is built separately, upside down or "bottoms up," then joined by the use of short pieces of dowel keys at the center ribs.

Cut out all ribs and stack and tape both R1's together and jig drill (preferably with a drill press) two 1/4" diameter holes, as shown, through both of them. Identify each rib "top" to take care of any non-symmetry realized in the drilling.

Make one each of the trailing edge jig blocks from 1/4" thick balsa, as shown on ribs R2, 5, 8, and 10, and pin these to the plan, at their respective locations. Since the trailing edge has a constant cross-section, it can be cut out on a table saw. Pin the trailing edge to the wing jig blocks after lining the interface with wax paper. With the use of a straight edge and square, make sure that the trailing edge is straight and directly over its position on the plan.

As discussed earlier, fit all parts before gluing. Pin all the ribs to the plan and to the trailing edge. Since the wing is being built upside down, pin ribs R2, R3, and R4 to the plan with the landing gear support notches up. Next make the wing spar assemblies as shown and test one of them in the rib notches. It should lay in there straight and flush with the rib top surfaces. Place the leading edge in position. It should be straight and in contact with each rib notch. Make any corrections as required before proceeding. Before gluing anything, check all ribs for location and squareness to the work surface. When you're satisfied with everything, glue away.

Assemble the landing gear rib reinforcements to their respective location and insert the hardwood landing gear support into the notches. The landing gear support should protrude 3/32" above the ribs to allow for sheeting. When all is "go," apply epoxy liberally, clamp everything together and hang out to dry. The torsion block (undrilled) should be installed next.

After sanding away any surface projections, add the 3/32" bottom sheeting and cap strips. It usually helps to wet the exterior surface of the leading edge sheeting to help form it to shape. Let this assembly dry thoroughly while still pinned down. Remove the wing

panel from the work surface (save the wing dihedral jigs for the opposite wing panel) and install the upper wing spar assembly.

Build the other wing panel in the same manner.

JOINING THE WING PANELS AND AILERONS:

When both panels are at the above stage of completion, they should be joined together sort of like the way porcupines make love — very carefully. This is one operation that can make the difference between a bird that "flies right off the board" and "instant kindling wood." Check R1 for squareness with the top surface of each wing panel by placing the panel "bottoms up" the way you built it onto the work surface. If it is not square, sand R1 perpendicular to the work surface using a square sanding block. Put the two panels together and insert a piece of 1/4" diameter dowel about 1/4" long through each of the keying holes in ribs R1. The surfaces and all edges of both panels should be flush and even. When satisfied, glue the two panels together with the dowels in place.

Install the center section gusset between the upper and lower spars. Install the 1/4" thick plywood leading edge gusset and fill in with micro-balloon loaded epoxy between the wing leading edge and the gusset.

Make the servo compartment to suit your servo; the one shown is for a Kraft KPS-10. After sanding away any projections, add the top sheeting and cap strips. Cut out the wing tips slightly oversize and glue the left one on permanently. Tack glue the right one only for removal and hollowing out after shaping to the proper contour.

Add the aileron control horn assembly to the wing panels by epoxying the outer tube only to the trailing edge centered on the hinge line. Cut out the ailerons slightly thicker than shown to allow for final sanding and assemble them to the wing with hinges but without glue. Glue the hard balsa center section trailing edge block between the ailerons checking for freedom of motion with the ailerons and the control horns. Lock the ailerons in "neutral" with tape and sand the complete assembly to final shape. Remove the right wing tip and hollow it out, then glue it on permanently. In sanding the leading edge radius, a smaller radius at the center section, that progressively becomes larger towards the tips, will improve the tip stalling characteristics of your wing.

TAIL GROUP:

Only a few words are required since this assembly is rather straightforward. When locating the center stabilizer ribs, make certain they are square with the trailing edge and spaced apart for a snug fit with the fin. After top and bottom sheeting is complete, add the tips and then cut out the top sheeting only

between the two center stab ribs to accept the fin extension. Glue up the two elevator halves and, while still pinned to the work surface, connect them with the 3/32" diameter music wire using epoxy.

Prior to contour sanding the fin/rudder, and stab/elevator, cut all the hinge slots and assemble them without glue. Then sand to shape as shown. Do not contour sand the portion of the fin extension that protrudes below the fuse top planking. Glue the fin into the stab checking for squareness and perpendicularity.

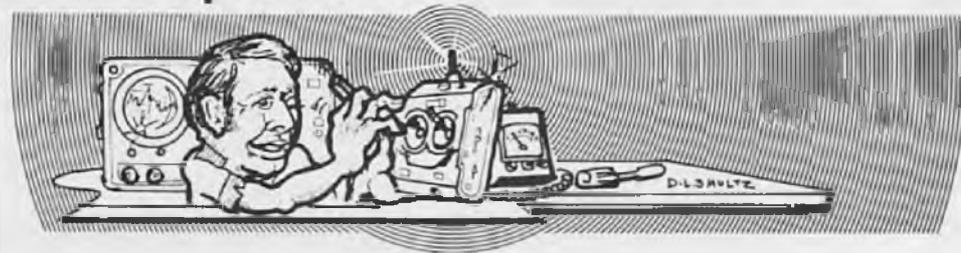
FUSELAGE:

The typical pattern ship box fuselage consisting of two slab sides, separated by bulkheads, closed up with top and bottom planking and contour sanded to shape, is employed on Avatar.

Glue up a pair of fuselage slab side assemblies (one right, one left) including all doublers, longerons and triangular stock as shown on the plan. After these have dried thoroughly, tape them together accurately paying particular attention to the wing seat and aft fuselage portion. Sand the outer edges so that they are identical. In cutting out the bulkheads, note that F2, 3, and 4 are exactly the same width and, at this point, drill all the required holes in them. Install the blind nuts to the aft face of bulkhead F2 for the motor mount and the landing gear mounting block. Note that the lower two holes in the landing gear mounting block are not used since they are too close to the edge of F2. Re-drill them as shown, and install it now.

Add all the required cross pieces and doublers to the bulkheads as shown. In some cases, these are of triangular stock and, in others, rectangular stock.

If you don't have a fuselage building jig, the following method will produce very satisfactory results. Pin one of the sides down to the work surface and, without glue, fit F2, F3, and F4 in their respective locations; then put the other side on and check for fits, squareness, and alignment. When all is okay, liberally apply slow-curing epoxy to all interfaces, reassemble, realign, and add a flat weight to the upper fuselage side from forward of F2 to aft of F4. Jig F2, F3, and F4 so that they remain perpendicular to the work surface during the curing cycle. When the assembly is fully cured, plan and install all control rod outer tubing. Sand away any projections and add the lower nose block and all required filler blocks and triangular stock to the engine compartment. Glue the 1/2" thick balsa plank to the underside of the fuselage at F2 and F3. Add the 3/16" sheet top deck and, when dry, trim it flush. Using the plan view as a template, pin the fuselage assembly "bottoms up" (always "bottoms up" — must be a message in there somewhere) to the plan directly over F2 through F4 and weight it down so that it can't move. Glue the aft end of



Last August I mentioned that I receive a lot of letters asking my opinion of various brands of R/C equipment. I suggested that we conduct a poll of actual users and determine how they rate their equipment with regards to performance, reliability, maintainability and cost to own. I'd like to thank all who gave us their inputs and, in particular, Mr. Iver Husum and the Vingtor RC Club located in Oslo, Norway. This club made a real project of this suggestion and I think their results are significant and all R/C manufacturers should take note.

R/C Equipment Poll Results

First I'd like to say that because of the ratio of responses to the number of R/C systems in use, I don't believe the results have a great statistical probability of being the final word. However, they do represent opinions of quite a few modelers of various interests and years of experience. Therefore, they have to be better than my opinion inasmuch as I have never used most of the brands of equipment on the market. Because they are opinions of a small minority I will not attempt to rank the systems in precise order and, in fact, may not mention some at all, where there were just too few inputs. What I will do is try to pass along comments about what people like and don't like about their equipment. This may get the attention of the manufacturers and also make all of us think a little harder about what we want in our next R/C system.

The most surprising thing was that most of the inputs were very positive with most people happy with their equipment. I would have expected more complaints as that is what I usually get. Maybe those are written in a state of frustration, or passion to kill someone or something. Maybe when one sits down and thinks about it, he realizes that his equipment isn't so bad. On the other hand, there may be some cover up, as no one likes to admit he bought the wrong system.

Most of the inputs were from Kraft and Futaba owners. Not too surprising because there probably are more people flying these systems than all the rest combined. Both of these systems rated right up there at the top. Again not too surprising because if they weren't very good, the word would spread and

they wouldn't be selling very many. I'm sure advertising has a lot to do with sales, but the communications in the R/C fraternity is such that a lousy product can't make it on advertising alone. ProLine also came out near the top of the charts. I'm sure the reason ProLine isn't up there with Kraft and Futaba in number of sales, is due to a higher price. So don't fall into the trap that you decide on a particular brand just because it is the biggest seller and therefore must be best. There are some people who think that one Cadillac is worth two Chevys. Yet a lot more Chevys are sold. It depends what you are trying to do. You don't need a \$500.00 radio for sport flying, but you probably won't be very competitive with a \$200.00 system.

Behind the three systems mentioned above, the owners of EK, RS and the more recent Ace equipment with the NE544 servo amps seemed relatively satisfied. The least satisfied were owners of Heathkit and early Ace equipment. This could very well be due to the fact that these are kits and the individual doesn't have the resources to construct a system that measures up to the standards of a factory built system where a number of specialists and special test equipment is available. We got very few inputs on World Engines and Royal, even though these are fairly popular systems, but I would say they rate some place in the middle.



Iver Husum - Vingtor RC Club, Oslo, Norway.

What I would like to do now is take you through the report we got from the Vingtor RC Club in Norway. Some of it

will be Mr. Husum's words and some will be my attempt to condense some of his effort. It represents a "hell of a job" to quote Iver who did the translating.

First a little about the club: Vingtor RC Club is one of the biggest and most active in Norway, and is located in Oslo, the capital in the country. The main interest of the members is sport, aerobatics (pattern) and scale; gliders, FF and UC are nonexistent in Vingtor. There are 70 members. About 7 of them have competed in international contests (pattern).

They prepared a form with the same questions I had with the exception of those on maintainability and cost. They also asked questions about frequency of crashes due to pilot error and equipment defects.

The purpose of the investigation was twofold:

(1) To get some statistical data so it would be possible to know a little more exactly how often different groups of pilots crash because of pilot error, radio trouble and technical defects (flutter, etc.). In this way, it will be possible to know to some degree what we have to demand of the radios reliability, and if today's equipment meets these demands.

In all we have some 4000 flights (4300 to be exact) to do our statistics on, so I think the conclusions aren't too far off.

(2) To give you, Mr. Oddino, some of the data you requested in the August issue of RCM, on different brands of radios. We think your idea of getting the users of radios to tell what they think of the manufacturer's products, is very good indeed. However, I believe that most people are lazy, and therefore don't want to write a long story about their equipment; I presume you would get more answers if the pilots could just fill in their marks (numbers from 0 to 10) in the right places.

I'm sure you're right on that one, Iver. I also think your conclusions are pretty accurate.

Conclusions

(1) Almost everyone seems to be satisfied with the performance of their equipment. That is the case of every group, both sport flyer and competition pilot, pattern and scale. We observe that some pilots want features like dual rate, reversal, etc., which are becoming

more and more popular these days. We also see that some of the competition pilots want "crossed trims" and wheel trims.

But as a conclusion, performance got very high scores from everybody. Numbers are from 5 (average, okay, satisfied) to 9 (can't be better, fulfill all my wishes) with 6, 7 and 8 being most frequent.

(2) Most people (about 80%) also seems to be satisfied with the reliability of their radio, but the picture is a little more mixed. Dividing the number of flights into the number of crashes, we find that there is one crash (caused by the radio, on an average) for each 340 flights. Near miss (caused by the radio, still average) is one for each 300 flights. This will say that a radio will fail once for each 160 flights, causing a crash or a near miss.

There are very few crashes because of technical failures like flutter, etc., compared with those caused by radio trouble and pilot error.

(3) I think it is very interesting to know whether or not one serious radio trouble for each 160 flights (average) is "okay," or too much. That depends on what sort of pilot you are. The sport pilots have a crash (still average) for each 150 flights caused by pilot error, and that means loss of models is most frequently caused by pilot error and not by radio trouble.

We then must conclude that for most sport pilots the reliability of their radios is "more than good enough." Remembering the marks of performance, we can understand why most sport pilots (about 80%) are satisfied with their equipment.

(4) This picture changes quite a bit, when we turn to the competition pilots. If we take the 10 best pattern pilots in our club (from last years Nats in Norway), we find that they, on an average, make a pilot error so severe that it causes a crash, for each 480 flights. This means that radio trouble causing crashes is far more frequent than pilot error, for this group of pilots. If we go further, and have a look at the 6 best pattern pilots (those flying the international FAI program) they, last year, had almost 1500 flights without even one crash caused by pilot error.

We then conclude that for this group of pilots (competition/pattern and good sport pilots) today's radios just are not reliable enough. To a good competition pilot, the reliability of the radio must be much better than today, if he is going to be satisfied. As a matter of fact, his equipment must be able to last for about 1000 flights, before it causes a crash. I believe the radio manufacturers have a problem solving that one.

(5) Many pilots did not know what failed when they crashed because of the radio. Therefore it is rather difficult to make a conclusion to the following

question: Which parts of the radio causes most trouble - (crash or near miss). From the answers it seems though, that the servos (servomotors, potentiometers and connectors) are the most unreliable components of our systems. However, it looks like every part of our equipment can shoot you down. (As though we didn't know.)

(6) We had expected radio trouble to be less frequent to the competition/pattern pilots than to sport pilots, due to the greater radio knowledge of the former. Much to our surprise the figures told us that the sport pilots had a little fewer crashes because of the radios. Perhaps the reason for this is that the environment in a typical 0.60 pattern model is rather bad for the receiver system, with vibration levels being very high much of the flight time.

(7) If we try to look into the future, we probably will get systems with even better performance, without increases in price. (I don't know what marks the pilots will give then for performance, we perhaps have to add 11 or 12 to the scale.) Considering the new encoders (NE5044) and decoders (NE5045, 5046) and all the other new things in electronics, we perhaps will see dual rate, exponential, reversal, etc., on ordinary "Sport series" equipment. That's good, really good; **but**, the weak link of today's radios is not the performance, but reliability as shown above. Of course it is all right that the manufacturers make radios with all those fine features mentioned above, but what many of us really need is equipment with much better reliability. We want better and more reliable connectors, servomotors, pots, etc., and it is in this area the manufacturers should put some engineering hours.

A few additional comments at this point. I reviewed the individual questionnaires with the following observations: If you look at the more experienced flyers they are not all that happy with the performance compared to the newcomers. They rated deadband on gimbals, stiffness of sticks and trim placement rather low. Servos were also criticized more by the experts.

Most of the Norwegian flyers also fly Kraft and Futaba. Mr. Husum and his brother fly both and offered some comparisons.

Their two Kraft systems glitched all the time until they switched modules from 27 MHz to 72 MHz. That solved that problem. They also had trouble with the Kraft KPS-15 servos, primarily in the pots which caused buzzing. Rather than clean pots every thirty flights, they switched to Futaba servos. Now both Kraft systems are satisfactory. By the way, these were KP-7C systems, one a 1976 and the other a 1977.

They also own two Futaba Contest FM 7 ch. systems, some of the first produced. They have had significant

trim change problems during all flights which they believe is in the transmitter. They also miss the plug-in modules on this system and dislike the pig-tail connectors on the receiver very much. They do like the ability to adjust the rates from outside with a screwdriver. Here are more of Iver's comments:

One thing I want to mention, is that I would like better trim positions on transmitters. Using Mode II, we would like elevator and aileron trims on the left side (crossed trims). We also think it would be better with less sensitivity on the trims. Best will be "wheel" trims with clicks or a ratchet. This of course, applies to both the Kraft and the Futaba. As a competition flier, I feel this to be a rather important point. Many of the other competition pilots in the club have the same point of view.

He finally gave Futaba a slight edge because the dual rates were standard and he felt the servos were more reliable. He assumes that the trim drift problem has been solved because others don't complain about it. This is a trap that seems to surface in many of the letters I received. Many people recommended equipment different than what they owned because the other guys didn't seem to have any problems. The grass is always greener ... he didn't say which system he competes with.

Well, we hope you will find at least some of the material presented interesting. We in Vingtor RC Club would appreciate very much that you commented on some of our conclusions and point of views.

*Sincerely,
Iver Husum*

Well, I found the material very interesting and will continue to look over the questionnaires. Thanks again to the whole Vingtor RC Club and all the others who wrote in. This might be a good project for other clubs or groups that specialize in other events in R/C. If the guys who pay the money, tell the manufacturers what they want, they will get it, and usually at a bargain price.

Canadian R/C System

On a recent trip back east I had the good fortune of spending an evening with Paolo DiMario, President of Isotronic Electronics Ltd., of Canada. This is one firm dedicated to quality and to providing the modeling public what it wants. For the sport flyer there is the custom series and for the competition pilot there is a professional set. The Pro transmitter has metal open gimbals and all the latest rate switches, reversing switches, crossed trims, roll buttons, etc., that the competition pilot is looking for. The board that controls all the adjustable functions can be unplugged and stored with the airplane to which it was calibrated. The present receiver has pig-tail connectors but Paolo is working on a new one that eliminates those. I was particularly interested in his

servos. They are the linear push-pull rack type with the pot driven off an isolated gear. It uses a sealed pot that is adjustable externally. The final output gear is metal and I couldn't feel any backlash in the racks. It uses the NE544 for electronics. The custom series had a most interesting transmitter for one who likes to look inside. Almost all interconnections were accomplished by the printed circuit board. Only two cables from the gimbal mounted pots could be seen. The encoder also uses the NE544 integrated circuit.

I hope to get some samples of the servos and do a little more indepth evaluation. Could be just what many of us have been looking for. In any case, I think you'll be hearing more about this equipment in the future, because Mr. DiMario is obviously listening to the modelers. It is not by accident that the Isotronic system has many features that were requested by our friends from Norway.

PCM System

Mr. Dennis Knowlton of the University of Wyoming sent us a paper on his pulse code modulation system as promised. I'm hoping that RCM will publish it in its entirety but if not we will try to cover it in this column. As a preview let me throw you a few highlights.

The system is a true digital system in that information is coded in digital words just like a digital computer. The advantage of digital machines is their repeatability. There is no temperature or voltage drift and no change with time. A digital word made up of one's and zero's always means the same thing whether it is neutral or five degrees of up elevator. This all depends of course on a transducer to convert from stick position to a digital word. This takes a device called a shaft encoder and right now these are too big and expensive for model airplane equipment. Mr. Knowlton suggests using our existing pots and analog to digital converters as an interim solution but we will eventually want to eliminate these items. So, if you want to get rich in this hobby, come up with a small inexpensive shaft encoder, preferably optical with no contact problems, that you can sell for less than five dollars. You'll have it made.

Another unique feature of the system is that the information is put on a phase modulated sub-carrier. This would then be transmitted by either an AM or FM carrier similar to our present equipment.

The system is much more efficient than our pulse position modulation systems as far as bandwidth is concerned and theoretically will allow more than one user simultaneously on the same RC channel. Mr. DiMario of Isotronic also had a scheme for operating more than one system on a single RC frequency and we discussed this at length. The RC industry needs to get together and decide how to best use

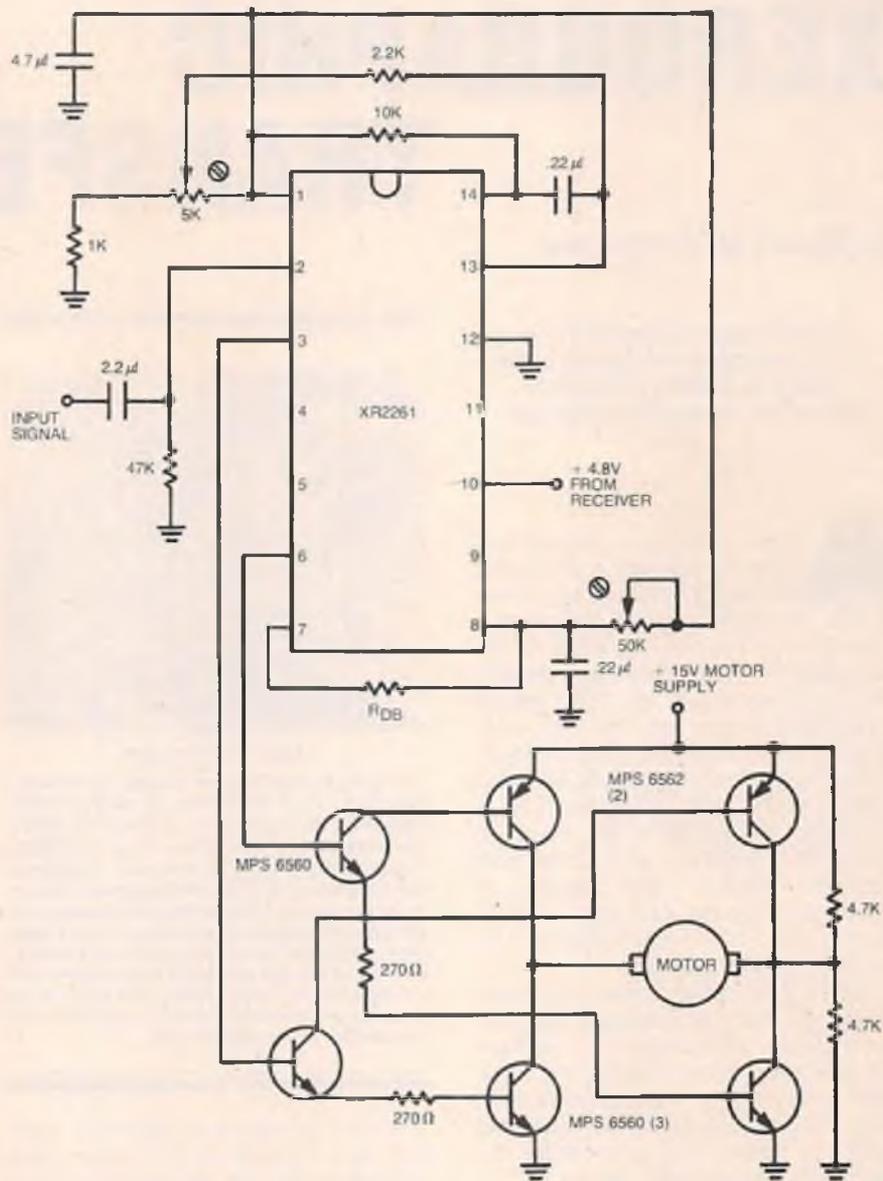


FIGURE 1

the spectrum given to us. If we allow inefficient use, we will never be able to change it when more sophisticated techniques become available. We need to establish standards similar to TV and stereo broadcasting, and do it right. If any of you have seen European TV you probably noticed the better resolution. Yet we will never have it in the U.S. because we set our standards and built jillions of TV sets. If NBC wanted to improve their picture quality with a new picture format they would be stopped by the FCC and public.

Anyway, back to the PCM system. The receiver is somewhat complex and will no doubt require micro processor technology to make it feasible for model use, but that is coming fast. A phase lock loop locks onto the subcarrier and a scheme called correlation detection is used. This virtually eliminates all signals and noise that are of a random nature and are not correlated. If any of you are audio buffs you probably have read

about the great promise digital tape recorders have for the music world. The whole world is going digital and I believe future RC systems will too.

More On Giezendanner Wipers

The letters continue to come in with glowing reports that the Giezendanner wipers solve the servo pot problems. The following is from famous Mode I proponent Stu Richmond.

Hi Jim:

... on Giezendanner wipers ... A better mousetrap!

I'm a very active flyer and have two sons who are deep into Formula 1 ... the most grueling atmosphere for a radio system.

I maintain **only** servos, all else goes to Kraft and ProLine for factory service.

The boys, Bruce and Brian had to have servos cleaned and lubed every 25 flights (average flight is only 2½-3 minutes) or less for reliability/safety in Formula 1. With installation of the G-D

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XEROGRAPHIC TRANSFERS

By Edward M. Van Wagner

Photos By Walter Sanborn

A technique for transferring part drawings from construction plans to building materials by using xerographic process.

A time consuming, tedious and aggravating job that all scratch builders eventually encounter is that of transferring the outline of a piece part, such as a wing rib or bulkhead, from the construction plans to the building material. This article describes a process that not only speeds that job up, but also is simple and easy to do and produces an exact replica of the part in full detail on a variety of materials. It can be used across the spectrum of hobbies from scale to "peanuts" and airplanes to boats with equal success, and its application is limited only to the ingenuity of the hobbyist.

Up to now conventional techniques used to trace a part on building materials have been (1) by cutting the part from the plans and cementing it to the wood as a cutting outline. This process leaves your plans looking like a war censored letter to home, not to mention the additional removal and cleanup of the paper from the wood, or (2) by tracing the part outline using carbon paper, or (3) by making a perforated outline using a pin to punch holes through the plan and into the wood, or (4) by rubbing the back of the plan with a soft lead pencil and transferring the lead by tracing the outline, or (5) by actually redrawing the part on the wood as I have many times. In any event, all of these methods, and others, can be put behind us now with the advent of a transfer technique that antiquates all previous ones and may well revolutionize the modeling hobby. The nasty part is taken out of scratch building, and transfers are now elevated to fun.

I have discovered that the images of ordinary xerographic copies made on plain bond paper can be transferred directly to most construction materials including balsa, plywood, or cardboard by application of heat and pressure. That's right, simply make a xerographic copy of the part you wish to fabricate, take the copy back to the shop, and transfer it to balsa or other materials at your convenience with a hot iron.



ABOUT THE AUTHOR

Edward M. Van Wagner resides in Webster, New York. He is a member of the Rochester Aeromodelling Society, Inc., and has served as their President, Newsletter Editor, and Field Coordinator. He has been a modeler for 6 years, and Ed graduated from the Rochester Institute of Technology and University of Rochester with a degree in Electrical Engineering. He has been employed by the Xerox Corporation for 24 years, as Senior Engineer on design and development of copiers and duplicators. His early work experience centered around application of xerography to the graphic arts.

A brief description of how the process works is necessary to develop an understanding and appreciation. First, don't be frightened by the heat and pressure bit. This is very simply achieved, as mentioned, by use of a sealing iron, the same type used to apply those modern heat bondable plastic coverings to airplane frames. Most airplane modelers have one, but for boat builders who are not into that sort of thing, an ordinary household pressing iron will do fine. The iron is the only workshop tool needed in the transfer process.

Back to the process. The images of xerographic copies are composed of finely divided plastic powders called toners that are developed out and transferred to paper by electrostatic means. They are then permanently bonded to paper with the application of heat. This is possible because the toners are, by design, thermoplastic, and the temperature range in which they soften and melt is compatible with that of household irons or sealing irons. If heat is reapplied to them, they will re-soften and re-melt. This fact is the one that allows them to be used to make transfers. The xerographic image

softens with heat and when pressed against the wood, part of the plastic image flows into the fibers. Upon removal of heat, the image solidifies rapidly and bonds to the wood. When the copy is lifted, a portion of the original image splits away and remains with the wood to provide a replica of the part.

The fun part comes in actually transferring the copy image to the building material. Simply center the xerographic image face down over the material, press the backside of the copy with a hot iron, and lift the copy away. Presto! Printed on the material is a high quality image having exceptional sharpness and with sufficient detail to fabricate the most intricate part. To be expected, the image is somewhat lighter in density than that of the original copy because, as mentioned, the process of transferring is a sharing process. The quality of the transferred image can be somewhat improved by preparing the surface with a light sanding; the smoother the wood, the better the transfer. Be sure to remove all loose sanding dust before you make the transfer.

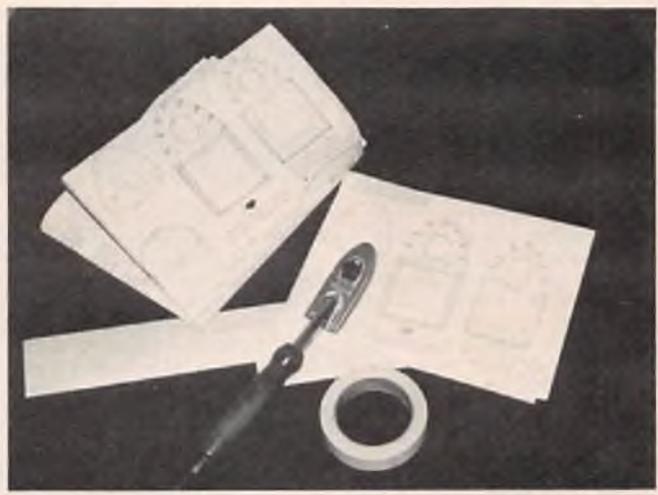
Also, for good continuity of transfer, it is important that the iron makes contact with the back of the paper over the entire image area. If the iron misses a portion of the image, a vacancy will result. Heat alone will not do it. You must press the plastic image into the fibers.

Iron temperature is important but not critical. I find that a temperature below the scorch point of the paper is sufficient. On my sealing iron the pointer is set at half scale, but a few tests will rapidly indicate if the iron is hot enough or not. If you don't get a transfer the first time, turn the heat up a little. The transfer is best made using long slow ironing strokes, providing sufficient time for the image to reach the melting point and flow into the fibers.

Here is a tip to utilize those odd scrap pieces of balsa that are piled in a box beneath the work bench: Find a piece of balsa just big enough to put, for example a bulkhead on. The size is checked by placing the wood over the image on the copy. If no parts of the image stick out beyond the wood edges, carefully tape the wood in place with drafting tape. This prevents the wood from shifting out of registration when the copy paper is turned over for ironing. Of course, wood grain direction must be considered



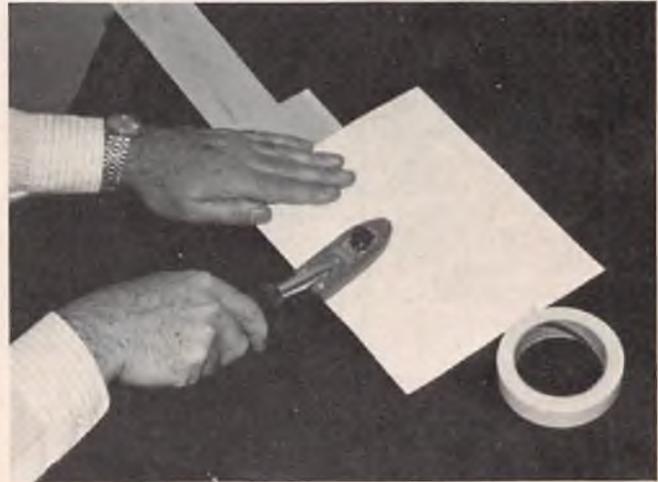
Copying a section of the plans.



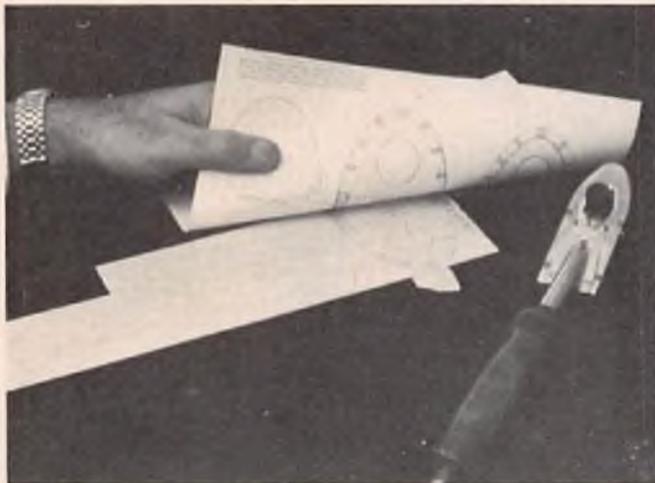
The plans, copy of the parts, a sealing iron, tape and wood.



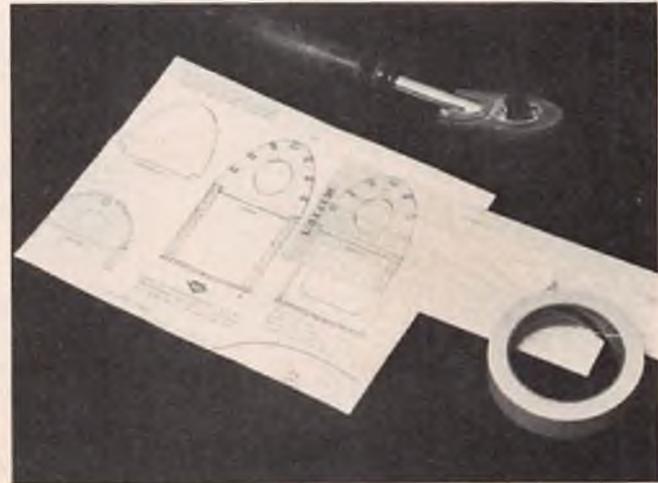
Center the wood over the copy, tape in place, and . . .



Turn over for ironing.



Separating the copy from the wood leaves an image on the wood.



Comparing the bulkhead copy with the image transferred to balsa.

before positioning the piece over the image.

A word of caution. It might not be practical to transfer exceptionally large parts such as fuselage sides. There are several objections to this with the most practical being that most office copiers will only make copies up to 8.5" x 11" and, therefore, large pieces cannot be

copied on one sheet of paper. Sure, it's possible to copy sections of a fuselage and transfer the copies to wood in sections, but it's obvious what a cumbersome task that could be. A second objection is that most office copiers are adjusted to produce copies with images slightly larger than the original image. Xerox copiers usually

magnify their images by about 1%. For small parts this is inconsequential as we are discussing an increase of only .010" per inch of part size. For instance, a wing rib with a 6" chord would reproduce with an increase of about 1/16". Knowing this, the finished part should be checked against the plans, a good practice in any

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ROME WASN'T BUILT IN A DAY . . .

. . . but then, they didn't have "Hot Stuff"™

Cyanoacrylate! A word difficult to pronounce, but generally meaning an adhesive composition which produces rapid bonding with superior strength. First developed for the aerospace industry, natural progression of demand has resulted in many different formulas, varying widely in use and quality.

Satellite City's Hot Stuff has virtually replaced the term cyanoacrylate in the hobby and craft industry with a product and name that has come to be used as a description and a method. As an example, the words "xerox it" means to reproduce printed matter to most of us. "Hot Stuff it" has come to mean "Construct - Build - Repair - Fix It - Now!", because of its formula quality, high strength bonding capabilities, and adaptability for construction of hobby and craft projects as well as the repair of sports equipment and household items plus many industrial manufacturing uses.

Quotes about Hot Stuff from the hobby press such as "A revolution in construction technique" and "the numero uno cyanoacrylate adhesive" are frequent. Extensive and numerous editorial comments have been extremely favorable.

Because of this world-wide acceptance, Satellite City, the manufacturers of Hot Stuff, has had much input from modelers everywhere with regard to special applications of the product. Enthusiastic input such as this, coupled with Satellite City's own constant experimentation, is ever expanding the scope of Hot Stuff use. Some of these special applications described as Hot Stuff Tips have been included here and, although a use for a specific interest may not be shown, we are confident that our readers will find many of the tips overlap into other hobby areas.

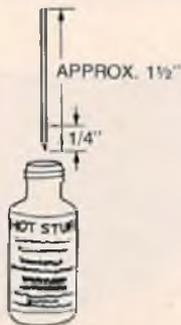
Hot Stuff, developed by and for modelers, is packaged in containers with see through bottoms - the visible thin consistency indicates freshness at a glance.

Normal shelf life at room temperatures is six months. To extend shelf life, store unopened containers in a freezer until ready for use. Once opened, keep containers at room temperature.

Hot Stuff Applicator Tubing is Teflon and was devised to obtain the smallest inside diameter possible, so the correct small drop applications can be used. Experiments have included larger I.D. tubing which was found to cause "flooding" of the bond area, resulting in slower, weaker bonds and a gross waste of material. Conclusion: Small drops are best!

Tubing Tips: Use about 1½" of tubing and push beveled end 1/4" into hole in center of bottle insert. This is a necessary tight fit. Clogging sometimes occurs at the end of the tubing, due to the nature of the adhesive. End clogs are easily removed with the fingernails (hold upright). Deep internal clogs are removed by cutting off the end of the tubing until clear. Once inserted, do not remove the tubing except to replace and *never* put wire, pins, etc., into the tubing. This will cause deep clogging due to trace moisture. If the bottle is tapped down sharply on the work bench when construction is finished, the excess liquid in the tube will go back into the bottle.

Extra tubing is available at your hobby shop — 18" for 50¢ — Cat. #T-500.



NEVER PUT PINS, WIRE, ETC., INTO TUBING AS THIS CAUSES DEEP CLOGS DUE TO TRACE MOISTURE ON THESE ITEMS

PREPARING FOR USE — UNSCREW CAP, INSERT TEFLON APPLICATOR TUBE 1/4" INTO THE CENTER OF THE FLAT SPOUT. IF HOLE SEEMS TOO TIGHT, USE A PAPER CLIP TO OPEN IT SLIGHTLY. THE FIT SHOULD BE SNUG TO PREVENT LEAKAGE. DO NOT TRY TO APPLY HOT STUFF

WITHOUT THE APPLICATOR TUBING (TOO MUCH ADHESIVE IS WASTED). STORE BOTTLE UPRIGHT WITH TUBING IN PLACE. HOT STUFF DOES NOT EVAPORATE AND RE-CAPPING CAUSES THE HOLE IN THE SPOUT TO BECOME CLOGGED. KEEP OUT OF REACH OF CHILDREN.



REMOVE END CLOGS THAT OCCUR PERIODICALLY WITH FINGERNAIL WHILE HOLDING TUBING ABOVE BOTTLE. DO ONLY WITH BOTTLE UPRIGHT.

HOT STUFF TIPS SPECIAL SITUATIONS

Failure to Bond: Usually occurs where certain oils are present on the surface to be bonded, such as some (few) plastics, balsa wood which has had long exposure to oils from the air, and pitchy woods such as spruce or pine.

Solution: A light dusting with common baking soda will increase the alkalinity of the surface to be bonded. Application of Hot Stuff in the normal manner will then result in the fast, high strength bond desired.

Gaps or Uneven Breaks: These can be filled with baking soda prior to bonding. Baking soda is extremely fine — sands easily and paints over beautifully.

An Excellent Applicator for baking soda is a 3 oz. ear syringe available at drug stores. Cut off tip so hole is about 3/16" in diameter. Fill by suction and apply by *tapping* gently on work.



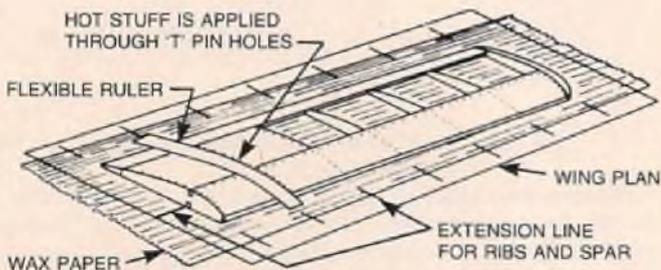
SPRINKLE BAKING SODA INTO SHALLOW GAPS. WIPE OFF EXCESS. APPLY HOT STUFF. DEEP GAPS (HOLES) SHOULD BE FILLED IN STAGES (SODA & HOT STUFF — MORE SODA & HOT STUFF), THEN SAND.

Bonding New or Broken Parts: Fit parts firmly together *first*. Drop Hot Stuff onto joint. Hot Stuff penetrates the tiniest crack and bonds in seconds.

Drilling Engine Mount Holes (Metal Mounts): Use a bare crankcase as a jig. Clean the lugs and engine mounts, position as desired and place a drop of Hot Stuff on each side. Drilling is now easy, using lug holes as a guide. Strike each lug sharply with a small hammer to remove.

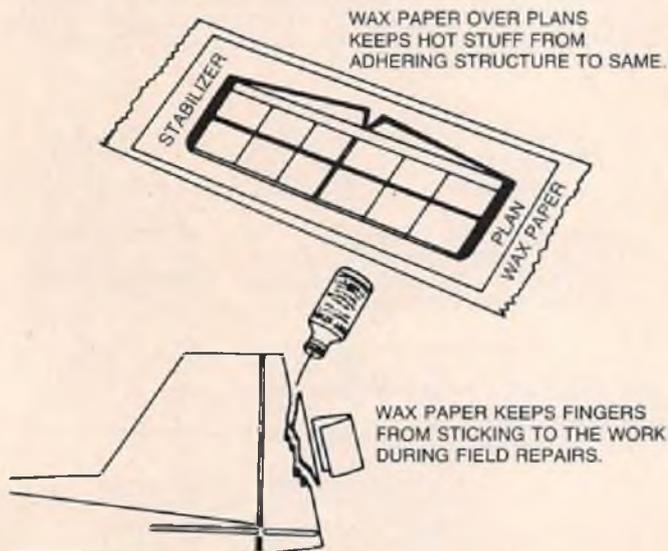
To "Hot Stuff" Blind Areas (Planking Over Internal Structure): Place planking over internal structure such as wing, fuselage, hull, etc. Lay flexible steel rule on planking in line with structural members (ribs, spars, bulkheads). Use a 'T'

pin to pierce a hole *through* the planking along the steel rule every 3/8". When complete, spot Hot Stuff through a couple of holes, remove steel rule and, while holding firmly, put a drop of Hot Stuff in each hole, for instant permanent bond.

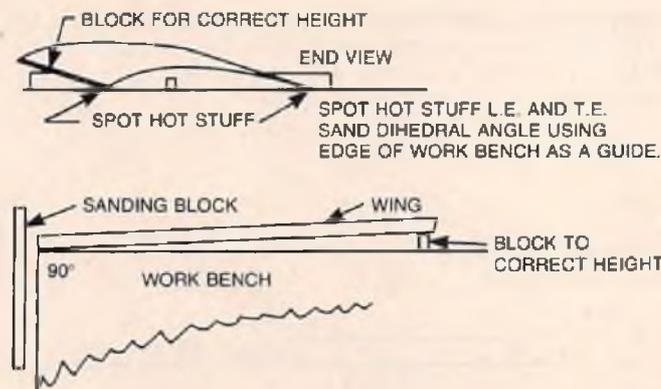


BOAT HULLS, AS WELL, A SNAP USING THIS METHOD. "HOT STUFFING" THROUGH 'T' PIN HOLE HAS BEEN DESCRIBED AS SIMILAR TO "BLIND RIVETING" AND IN MOST CASES, ELIMINATES THE NEED FOR CLAMPS AND OTHER HOLDING DEVICES. AS SOON AS IT'S HOT STUFFED, IT'S DONE.

Wax Paper and Hot Stuff: Hot Stuff doesn't stick to a good quality wax paper. We recommend *Cut Rite* brand and advise its use over the plans on which the construction will be done. Wax paper in a pad provides an excellent barrier between fingers and bond area when bonding small pieces such as those found in many field repairs.

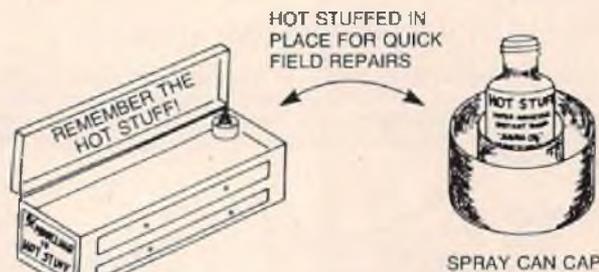


Dihedral Wing Panels: To make duplicate dihedral angles, place the root end of the wing panel at the very edge of the work surface. Block up the tip to desired height. Put a drop of Hot Stuff between the work surface (if wood) and leading and trailing edge. Sand root ends using the vertical work surface edge as a guide. Remove by sliding sharp blade between surface and structure.



Hot Stuff Holder For Bench and Field Box: Spray can cap holds bottle upright and stores extra tubing. "Hot Stuff" the cap in the corner of the field box.

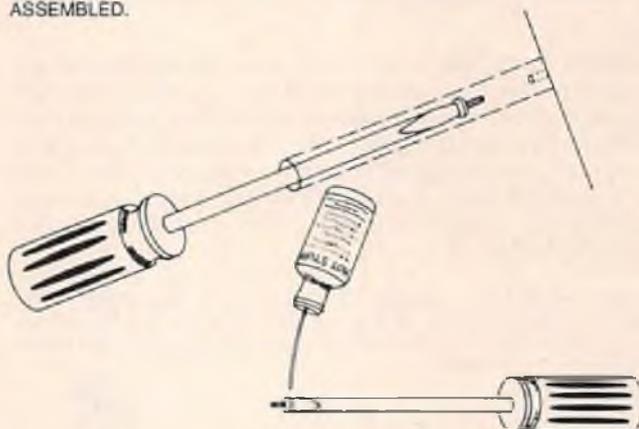
SPRAY CAN CAPS MAKE IDEAL HOLDERS FOR HOT STUFF ON THE BENCH. FOR TOOL BOX, USE HOT STUFF TO BOND CAP IN AN OUT OF THE WAY CORNER.



Unnecessary Nose Weight: Hot Stuff helps keep the lead out! It adds virtually no weight to structure and aids in arriving at the proper C.G. *Note: Every extra ounce in the tail of a conventional aircraft requires approximately 3 to 4 ounces in the nose as ballast.*

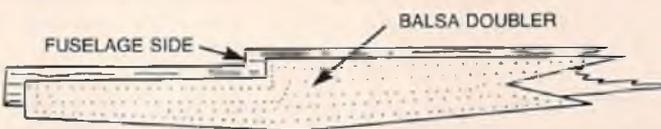
"Hot Stuff" a Screw to the Screwdriver: To reach hard to get places — great for emergency use on the field!

FOR HARD TO GET AT PLACES, SPOT HOT STUFF SCREWS OR NUTS TO THEIR RESPECTIVE DRIVERS. THIS SAME METHOD CAN BE USED FOR HOLDING GASKETS, SEALS ETC. IN PLACE WHILE PARTS ARE ASSEMBLED.

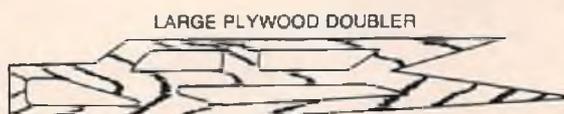


Doubler Construction Made Easy: Drill small holes in doublers before assembly (about every 1/2"). Fit the doubler in place and apply Hot Stuff in each hole and, finally, around the edge. If the doubler is huge and no sanding will come into it (from a fuselage curve for instance), the holes could be very large and lighten structure at the same time.

BALSA DOUBLERS MAY HAVE DRILLED HOLES FOR LIGHTENING OR IF SOFT WOOD IS USED, 'T' PIN HOLE WILL SUFFICE FOR HOT STUFF APPLICATION. HOT STUFF BLUE LINE IS HANDY HERE AS ITS APPLICATIONS ARE VISIBLE. THE POSSIBILITY OF MISSING SOME OF THE HOLE OR DUPLICATION OF APPLICATION IS GREATLY REDUCED.



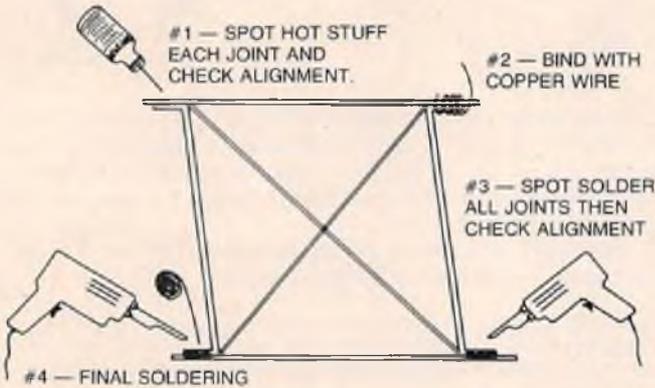
PLYWOOD DOUBLERS CAN BE LIGHTENED WHILE RETAINING THE LARGEST PART OF THEIR STRUCTURAL INTEGRITY. IMPORTANT: THOUGHT MUST BE GIVEN TO PLACEMENT OF CUT OUT AREAS AND CORNERS SHOULD HAVE LARGEST POSSIBLE RADIUS.



Soldering: Hot Stuff is extremely useful as a soldering aid. When parts are ready for assembly, clean them with alcohol, dry, and tack in place with Hot Stuff. Check alignments, bind with copper or steel wire as desired. Start soldering with a 'touch' joint as far from the bond as possible. When all joints are complete in this fashion, re-check alignment and finish soldering.

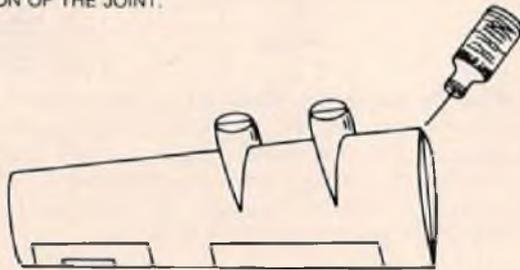
SOLDERING: TYPICAL METHOD (WING STRUT SHOWN)

ASSEMBLE FORMED PARTS ON A FLAT SURFACE OVER WAX PAPER. SPOT HOT STUFF EACH JOINT. IF PARTS FIT UNEVENLY, USE SMALL AMOUNTS OF BAKING SODA TO FILL GAPS. SEE ILLUSTRATION. HOT STUFF WILL HOLD ASSEMBLY TOGETHER WHILE ILLUSTRATED STEPS ARE FOLLOWED.



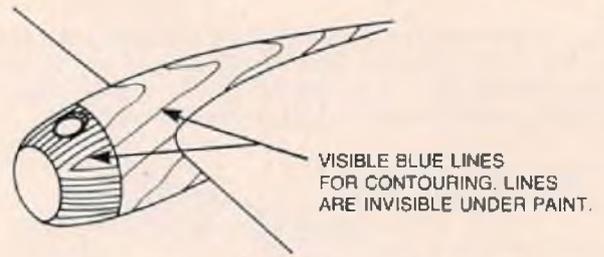
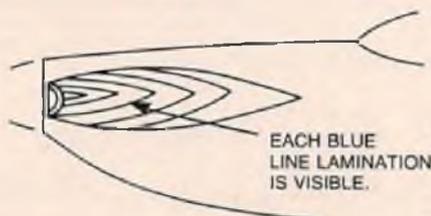
Plastic Parts (Kits, Etc.): Mate parts first. When parts are lined up, fit them closely together and apply a drop of Hot Stuff to the joint. Hold firmly a few seconds and proceed to the next construction step. No goeey mess or distorted parts --- just a clear, solid, permanent paintable bond in seconds. One more tip --- a drop of Hot Stuff on a wing leading edge (two halves) joint goes a long way if the section is angled and the drop is put on the high end.

PLASTIC PARTS SUCH AS WING OR HULL HALVES ARE MATED FIRST. HOT STUFF WILL TRAVEL ALONG THE TIGHTEST FITTING JOINT AND SHOULD BE APPLIED IN VERY SMALL AMOUNTS AT THE UPPER MOST LOCATION OF THE JOINT.



Visible Joints With Hot Stuff Blue Line: A special advantage --- visible *Blue* bond line --- that is perfect when used for bonding areas that will later be sanded to compound curves, or in laminating large areas with speed and accuracy. Eliminates duplication of bond and waste of material. The first and only *blue* cyanoacrylate product marketed for extensive use in industry, hobbies, home, sports, etc.

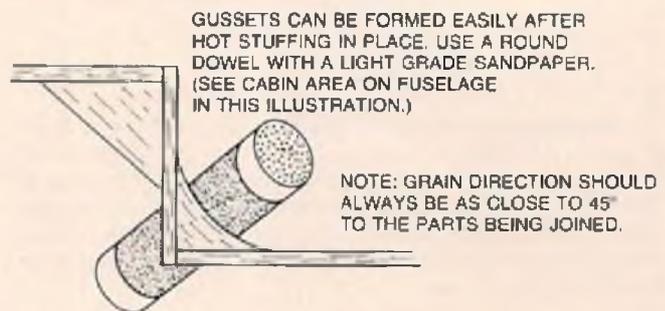
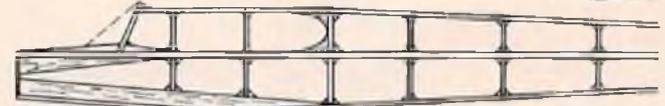
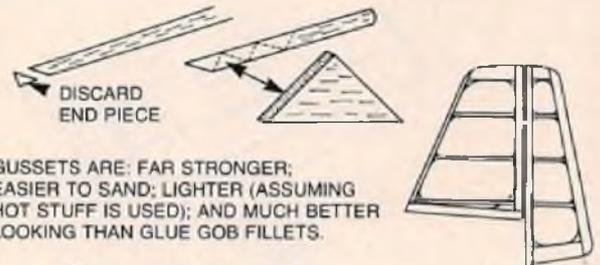
HOT STUFF BLUE LINE AIDS IN FORMING COMPOUND CURVES FROM LAMINATIONS. EACH LAMINATION GIVES THE BUILDER A REFERENCE AS TO THE SYMMETRY OF THE WORK.



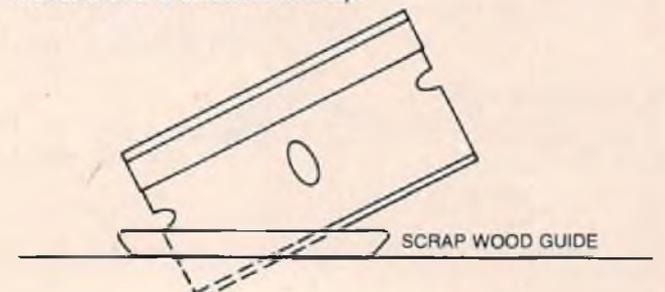
We Love "Big" Models, Too! Special Tips For Ultra-Large Aircraft

Balsa or Ply Gussets: Note grain direction. Hot Stuff bonds are far stronger than the material being bonded and bond weight is almost nil. To achieve the greatest structural integrity with a minimum of weight, consider internal balsa or ply gussets rather than gobs of epoxy, etc., that do little more than add unnecessary weight. Gussets may be cut quickly and accurately with a miter block. Much spruce and ply is used in *big model* construction, so keep in mind the use of baking soda as outlined under "Special Situations." A light dusting of bond area with baking soda will allow the fast, high strength bond desired.

GUSSETS ARE MADE FROM STRIPS OF SHEET WOOD (WIDTH DICTATES SIZE OF GUSSET, LENGTH DETERMINES AMOUNT) CUT THE END OFF THE STRIP AT 45° AND DISCARD. NEXT CUTS THAT FOLLOW ARE ALL MADE AT 90° TO THE PREVIOUS CUT. IF MANY GUSSETS ARE NEEDED, CUT SEVERAL STRIPS OF IDENTICAL SIZE AND SPRAY LIGHTLY WITH 3M 77 SPRAY CONTACT ADHESIVE. LET DRY A MINUTE AND STACK ON TOP OF ANOTHER. A BAND SAW OR JIG SAW CAN BE USED TO CUT SEVERAL GUSSETS AT A TIME. PULL GUSSETS APART CAREFULLY LATER.

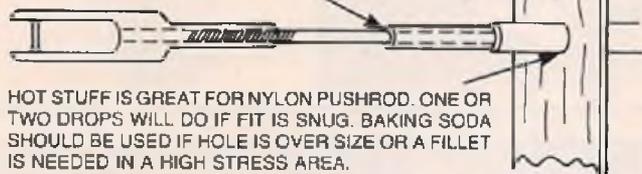


Easy Cutting Guide: To cut a constant depth in soft materials, "Hot Stuff" a piece of scrap wood to the side(s) of a clean razor blade. This method works extremely well for trimming MonoKote to a constant overlap.



Nylon Pushrod Installation: An easy and quick method for installing pushrod (nylon type) in your aircraft or boat.

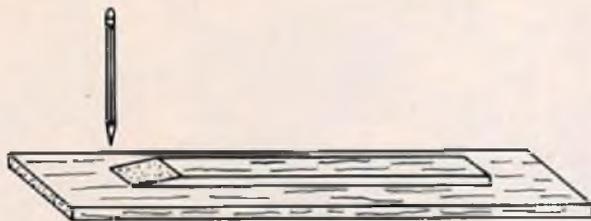
ONCE POSITIONED CORRECTLY, APPLY ONE OR TWO DROPS OF HOT STUFF. ALLOW 15 SECONDS FOR CURE. CAUTION — TAKE CARE NOT TO GET HOT STUFF BETWEEN PUSHROD & HOUSING.



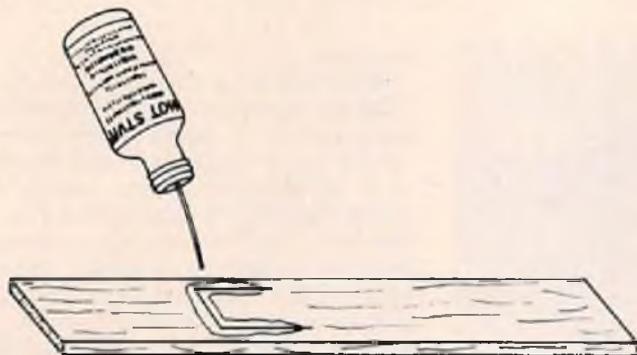
HOT STUFF IS GREAT FOR NYLON PUSHROD. ONE OR TWO DROPS WILL DO IF FIT IS SNUG. BAKING SODA SHOULD BE USED IF HOLE IS OVER SIZE OR A FILLET IS NEEDED IN A HIGH STRESS AREA.

Fairing To A Feather Edge (Without Adding Fillets):

Step #1: Trace lightly around object to be faired with a pencil.



Step #2: Apply Hot Stuff over pencil line and wipe quickly with the edge of a piece of spruce to smooth before curing takes place. *Note: Inside and outside of trace line should be coated as far as necessary --- usually 1/2".*

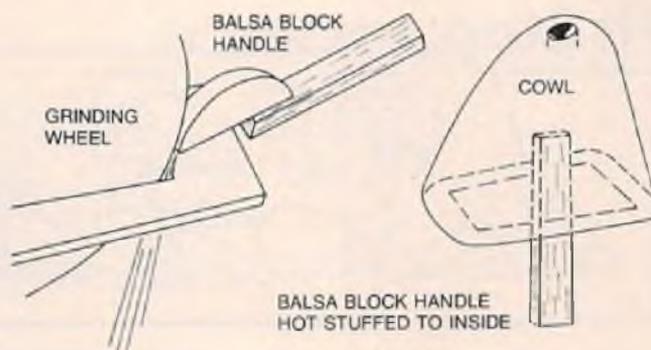


Step #3: Hot Stuff the object to be faired in position with trace lines. Now sanding can be done to fair the one into the other while Hot Stuff protects bottom piece against gouging. *Caution: A heavy hand will gouge anything.*

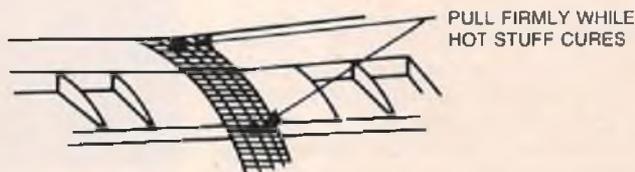


For A Better Grip On Things (Tools, Etc.): Cut a piece or pieces of light sandpaper to fit a hard-to-hold object, and "Hot Stuff" corners of the paper to the object. Use wax paper to hold corners down tight. When cured, apply Hot Stuff around all edges and over surface to seal. *Or,* if grip area is a compound curve, use strips of rubber. "Hot Stuff" one end, stretch to shape, and "Hot Stuff" the rest while holding in place. No need to apply Hot Stuff to outside surface of the rubber.

Working With Hard-To-Hold Projects: When the project is hard to hold, put a "handle" on it. Cowls, wheel pants, and smaller items, such as metal pieces to be ground or cut, can all be easier to work on if they can be held onto. "Hot Stuff" a block of balsa to an unaffected part of the work, then remove by cutting later.



Super Strength In Minutes With Hot Stuff and Fiberglass Cloth: Dust the area to be bonded lightly with baking soda. Cut the cloth to fit, place over the area making sure to leave an overlap at each end. Apply Hot Stuff to the front or rear and pull firmly at both ends. Hold for a few seconds. When the first application cures, release tension at that end and apply at other end pulling while second bond cures. Apply Hot Stuff on center between two previous bonds to cover an area 1/2" by 2", using wax paper as a barrier, press this area against the wood with your fingers. Repeat until the entire center is bonded. Remaining cloth may now be "Hot Stuffed" in the same manner as the center. When complete, sanding can be done immediately.



Cowls, wheel pants and center sections, are light, strong and easy to cover with fiberglass cloth and Hot Stuff. You may wish to add a "handle" to the work. See "For A Better Grip On Things."

Step #1: Cut to fit and gore where necessary, as with normal glassing. Position and smooth (or stretch if necessary) one area at a time and "Hot Stuff" perimeter of that area. Hold a few seconds and release. Repeat until all areas are bonded.

Step #2: Polyester resin may now be applied as in normal glassing, without the worry of the corners coming up while the resin is curing.

To Finish It Fast: Eliminate Step #2. Saturate cloth with Hot Stuff. If a bubble appears, slice with a sharp razor, "Hot Stuff" and press down with wax paper. Sprinkle lightly with micro-balloons or baking soda to hasten cure and fill cloth. When cured, sand with aluminum oxide paper #120 grit. Sanding is very easy and can be completed in minutes instead of hours. Super Poxxy primer may be used to finish before painting.

Extraordinary Circumstances: In the unlikely event that a large area of skin may become bonded to another, there are certain solvents which can reduce and eliminate the bond but these should be used only with extreme care as they are flammable and can cause injury to eyes and other tender body parts. If doubt exists, one should consult a physician.

Acetone is a very slow solvent. Nitro methane (in its 97% pure form) is effective. Fabrics which have been bonded can be restored by dipping the bonded area for a few minutes in N.M. The bond will finally soften and can work free.

Again — *Caution,* test also for color fastness.

For your information: Hot Stuff is non-toxic. The fumes, while curing are mild irritants to the eyes and lungs, such as that from cigarette smoke. As with any chemical, one should always use proper ventilation and those who have respiratory problems should naturally pay special heed to the ventilation warnings on all chemicals, as respiratory problems are aggravated easily by anything other than pure air. □



1979 FLORIDA WINTERNATIONALS OR TO DIFF OR NOT TO DIFF

This year's Annual Winternationals race in Orlando, Florida, promised to be better than ever, with 25 Foreign racers participating. Racers from England, Monaco, France and Venezuela were eager to race in America. To add a little extra spice to the race, Ted Longshaw, from England, called me the day before he left for Florida. Ted is the President of EFRA, the European equivalent to ROAR, and one of the nicest guys you'll ever want to meet. At the end of our phone conversation Ted said, "Gene, we're coming over there to beat you!" I replied "I figured that's why you're coming, but it's not going to be easy!" From our poor showing in Monaco, and the fact that PB won most of the races in Europe last year, with the help of their new differential, it was easy to see that they would figure that now was the best time to beat the Americans in America. When I told Ted it wasn't going to be easy, I wasn't thinking so much of our own Associated team, but of that one man Delta team, Arturo Carbonell. Arturo is truly an amazing R/C car driver and I figured that he would be the man to beat to win this race.

The Central Florida R/C Auto Racers Club of Orlando, had made some changes to the race format and race track due to suggestions received at the last year's Winternationals race. I think the club deserves a great deal of thanks for these changes. They doubled the practice time, which greatly helped the racers from out of the area. They also changed the shape of the track, so that there was hardly any cars damaged from the track layout. Both of these things really helped everyone.

Most of the visiting racers arrived on Saturday with open practice scheduled for Sunday. We arrived at midnight on Saturday and immediately headed for Daytona Raceway. The 24 Hour Daytona Race was underway and it was really exciting to watch Danny Ongais and his Porsche 935 and the other Porsche's and Ferrari's racing on Daytona's road course in the night! We stayed till 4:30 a.m. and headed back to



Only part of the 139 cars are shown which participated in the Florida 1979 Annual Winternationals race.



The Central Florida R/C Auto Racers Club sponsored the race on the 700 ft. long course.



Virtually the same English team that came to the World's Championships in Pomona, also came to Florida. Starting 2nd from left in the back row, Dave Preston, Mrs. Phil Booth, Ted Longshaw, Keith Plested, Phil Greeno, Phil Booth and Debbie Preston. Wally Bailey from Jim Davis Models and Ian Agnew from AMPS, the differential people, were also here.

the hotel.

By the time we got up on Sunday, the Orlando club had the track set up and a few guys from the New York area were running. They thought it was nice and warm out, even though it was only 50°. I guess that probably was a lot warmer than New York. We went out, did some shopping for tables and chairs, came back to the track, and in 5 minutes Jianas was on the track running. Monday morning we got a little practice in and then it rained at noon. Tuesday was practice all day. Wednesday morning it rained again, so Jianas and I went looking for methanol for the Monaco team so they could mix their own fuel, as did the English team.

Thursday was a perfect day, as were the next 3 race days. This was the last day of practice, and all 139 entries looked very good as the bite started to come up on the track. The whole English team was running very well with their differentials. And Arturo appeared with a tuned pipe on his K & B and literally flew around the track. But the guy that was leading the pack was Jianas with Rick Davis turning some practice times close to Bill's. Rick, myself and my son, Curtis, ran differentials the first few days, and as long as we could stay ahead of Jianas, who was running a solid axle, we left the diffs on. But by Wednesday night we couldn't stay with Jianas, so we took the diffs off. Mike Rowland and Roger Curtis also took their diffs off to try the solid



The Monaco team with Patrick Gabbiani standing on the left, Richard Lajoux in the back center, Jean Louis Bevacqua waving and Patrick Rigot from France on the right.



When you're Top Qualifier you'll have a smile like Bill Jianas. Bill led the Main until his front tire came off.



Even with Daytona Speed Week racing at the same time as our Winternationals, we had 3 nights of TV coverage for our racing!



Joe Zimmerman got in the spirit of the race with his Racing Circuits Concours Trophy winning entry. Joe's electric powered Dodge Daytona towed the Elfyn bodied race car to the judging area.



Main Event drivers from all around the world. From the left, Mike Rowland, Roger Curtis and Gene Husting - all from So. Calif., Arturo Carbonell - Florida, Jack Jacobs and Rick Davis - Detroit, Bill Jianas - So. Calif., Keith Plested, Phil Booth and Phil Greeno - England.



Rick Davis, Main Event winner - Rick's 3 qualifying heats were also the best 3 combined heats of the race, using his Associated RC300 prototype car.

axles, but they ended up putting their diffs back on.

We were ready for the first round of qualifying on Friday. Most of the experts were paired in the first 3 heats. Roger Curtis, with the diff on his RC300 car, won the first heat with 31.3 laps in 10 minutes. Phil Greeno won the next heat with 30.7 laps and the fastest woman driver in the world, Debbie Preston, from England, was right behind Phil with 30.5. The 3rd heat had all the fast guys in it. Jianas went out after 7 laps with a blown engine. Rick Davis, from Detroit, then turned in one of his usual smooth fast runs to turn 31.8 which was good for top

time of the day. Phil Booth was just a half lap back with 31.4. The rest of the day was left for practice and it was interesting to see the feverish activity

going on in preparation for the final 2 rounds of qualifying the next day. The bite on the track was such that I think it was probably just as well equally suited for a diff car as a solid axle car. But there would be 2 more days racing and the bite would be increasing each day.

The whole English team was using OPS engines with dust bin silencers - we call them can mufflers. The American Experts were using K & B engines with a variety of exhaust systems. Arturo and Mike Rowland had tuned pipes, Rick Davis and Jack Jacobs had McCoy's old magnesium mufflers and the rest of us

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Mike Rowland drove one of his best races with the help of a differential and tuned pipe to a well deserved 2nd place finish.

RACE RESULTS WINTERNATIONALS

"A" MAIN

Place	Name	Car	Country
1	Rick Davis	RC300	USA
2	Mike Rowland	RC300	USA
3	Gene Husting	RC300	USA
4	Phil Greeno	Greeno-PB	England
5	Bill Jianas	RC300	USA
6	Roger Curtis	RC300	USA
7	Arturo Carbonell	Della	USA
8	Phil Booth	PB	England
9	Keith Plested	PB	England
10	Jack Jacobs	RC300	USA

"B" MAIN

1	Rod Galloway
2	Aljjandro Manrique
3	Steve Sanders
4	Wally Bailey
5	Dana Smeltzer
6	Dave Preston
7	Curtis Husting
8	Debbie Preston
9	Doug McNeely
10	Richard Ballentine

"C" MAIN

1	Will Petty
2	Joe Zimmerman
3	Oswaldo de la Rosa
4	Louis Przybyla
5	Ted Longshaw
6	Danny Dondy
7	Patrick Gabiani
8	Georgia Campbell
9	Felix Galavis
10	Joe Tassilo



A relatively crash free race allowed Gene Husting to take 3rd place.

THE R/C FLITE STREAK

By Jack Headley



Looking for a quickie model for the weekend, or something novel for the flight line, then try the R/C Flite Streak. If you're not familiar with the Flite Streak maybe I should point out that it's a U-Control model, kitted by Top Flite, with a wing area of 390 square inches, suitable for engines between .19 and .35 cubic inches. Conversion from U-Control to R/C is quite simple, and almost any modern 3 channel radio will easily fit inside the wings. Engine size is reduced from that required by the U-Control version, as we don't need to drag all those steel cables round and round in circles.

Although the article following is devoted to the Flite Streak, similar models, such as the Midwest "35" series of WW II profile uokies, and Carl Goldberg's profile stunters, are also suitable for conversion to R/C, and the same approach is suggested for these models.

Rather than providing a set of conversion drawings for my particular example, I've illustrated the changes required by a series of photos, which show the typical revisions needed. For your own model (assuming that you decide to try this approach), some small changes, due to the particular kit and/or radio being used, may be necessary.

Briefly the changes made to the Flite

Streak kit are as follows:

The wings have a revised center section to make room for all the radio gear, and also to provide a mounting surface for the main landing gear.

The fuselage needs only some slight revision in the engine mount region, to suit the particular engine being used.

The tail unit may need some reinforcing. The wood in my particular kit was rather soft, and so I increased the thickness by 1/16".

The controls used are the standard elevator as supplied in the kit, the engine throttle control, and a coupled rudder and elevator. The rudder is made from item R3, and the ailerons from the pieces called the "pre-cut stationary flaps" as supplied.

The landing gear is changed to a three wheel system. There are a few more smaller items to be considered and we'll discuss these as we go along, so let's start by looking at Photo #1.

This photo, and the one following (#2), show the revised center section. The inner ribs are replaced by hollow 1/4" sheet riblets forward of the spar, this allows the battery pack to be installed in the leading edge region. Aft of the main spar the two innermost ribs are removed, and a full length 1/8" plywood floor is installed. This floor serves as a mounting plate for the servos, which are attached with servo

tape.

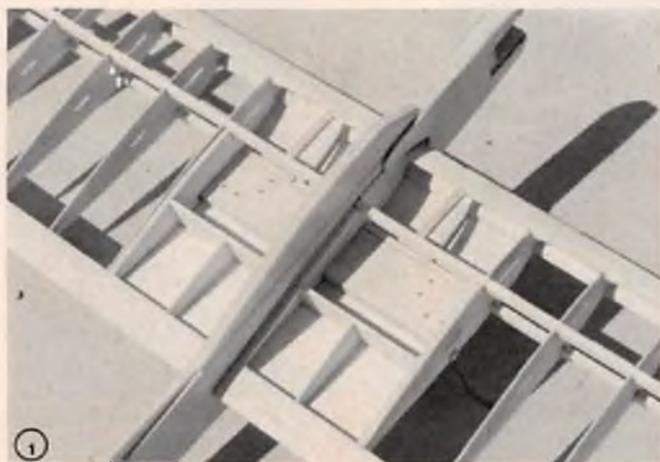
At the ends of the radio compartment, two 3/16" ribs serve to locate and reinforce the ply floor. A 1/8" sheet full depth spar closes off the radio box. Note that this spar, and the 3/16" ribs, are recessed 1/16" below the wing surface. Adding the 1/16" center section sheeting builds up this area back to the original rib profile.

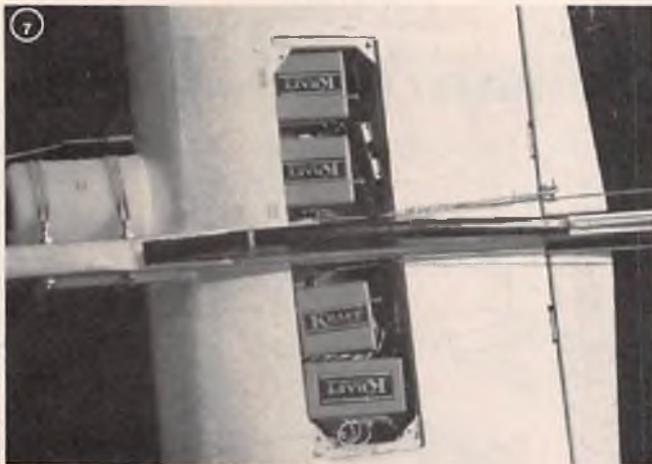
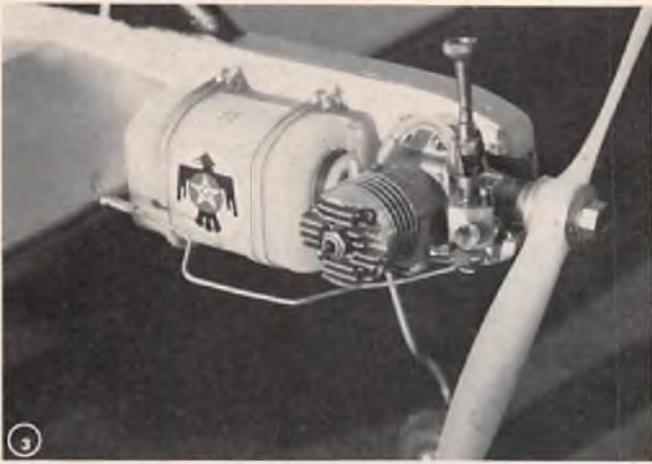
The undercarriage is bent up from 3/32" piano wire to the shape shown in Photo #2, and held in place by small wood screws and nylon clamps.

Engine Installation: The engine position is really fixed by the tank size. I used a 4 oz. tank, and butted this up to the leading edge of the wing; the tank, as you can see, is then held in place by rubber bands stretched between "J" hooks. The engine is placed as close to the tank as possible, leaving a little space for the fuel lines.

Photo #3 also shows the throttle control, this being a single length of 1/16" piano wire. The "Z" bend in this wire is intentional, and lets you adjust the idle speed without unhooking the pushrod. Open up or close this Z as required to make final adjustments to the throttle.

The kit includes pieces for the tail assembly cut from 1/8" sheet and since in my particular kit the wood was rather soft, I increased the thickness to 3/16"





by cementing duplicate pieces of 1/16" sheet to each of the pieces provided. This gives a little more rigidity to the tail unit. While adding the 1/16" sheet doubler, slip the control hinges in-between the laminations, and the assemblies are quickly made.

Use items R1 and R2 for the fin, and item R3 for the rudder, and hinge together with some fairly thin hinges. Cement the tailplane to the fuselage, then reinforce with 3/8" triangular stock, as shown in Photo #4. Install the fin and rudder without the offset shown on the plans, and reinforce the fin/fuselage joint with some 1/8" triangular stock.

Control Hook-ups: The three control channels are engine, which we've already seen on Photo #3; elevator, which is a single pushrod from the servo to the elevator horn, and can be seen in Photos #5 and #6.

The last control function is the coupled ailerons and rudder, and this requires a little more detailed discussion. The servo drives the rudder directly, with a pushrod, soldered to the rudder control operating the right aileron. The soldered joint should be close to the servo, to allow the flexibility for correct aileron operation. The left aileron is driven from the right aileron with a couple of pushrods, and a reversing lever (which, incidentally, can be made from the bellcrank supplied in the kit).

Photo #6 shows the arrangement of these pushrods and the reverser. I deliberately left all this external on my

model, so that I could make adjustments to the aileron deflections, but if you have smaller servos than the ones I used, the aileron mechanism could be installed internally, and still be accessible for control adjusting.

Now that we've made a large hole in the wing for the servos and other airborne bits, some sort of cover plates are required to preserve all this delicate machinery from the elements. I used 1/16" plywood for these, and provided small 1/8" plywood gussets in the radio cavities, so that the cover plates could be screwed down. The ply gussets are recessed about 1/16" into the wing so that the cover plates lie flush with the upper surface. Photo #7 shows these gussets, and also shows the servos and receiver in place. Photo #8 illustrates the radio covers in place.

The nose wheel leg is made from a piece of 3/32" piano wire, which initially is bent into a  shape. Drill two vertical holes throughout the nose and engine bearers, with only the front hole going completely through the body. Push the wire through these holes, and epoxy securely into place. A small groove cut in the top of the body allows the top arm of this wire to be recessed into the fuselage, and then covered over with epoxy during the gluing process.

Photo #9 shows the final configuration of the nose leg; the lower bends, to center the wheel and provide an axle, are made after the epoxy has set-up.

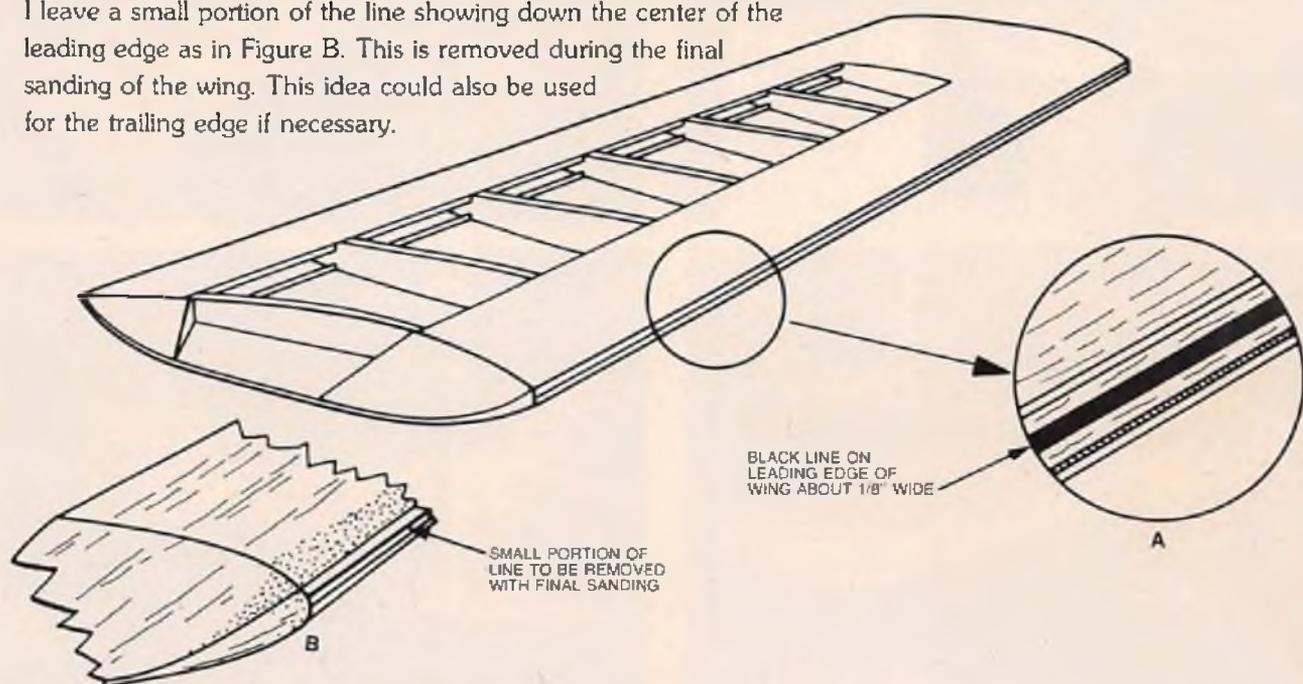
Finish: Finishing the model is really a matter of personal choice. I used the silkspan supplied in the kit to cover the wings, and finished off the body with balsa filler, followed by a couple of coats of clear dope. The whole model was then sprayed with silver dope, after which the canopy was painted black. Decals from a Sig Kougur kit finished off the model. Photo #10 shows my completed prototype.

Flying: I was lucky to have the services of Ace flier, Kevin Flynn, to do the test flying on the prototype R/C Flite Streak, and he did his usual masterful job of wringing out the model. No problems were encountered during the flight trials, except for a little too much elevator sensitivity (which was easily remedied by a change of control horn setting), and having to fly with the throttle hooked up backwards. (My first goof this year!) In flight, the model is fast and agile, and the engine could probably be reduced to .10 size without any worries. The only flight problem I observed is not really a model problem, but one of visibility. The model is so skinny that, at a distance, it's difficult to tell which direction it's heading. Moral: fly close to home base.

In summary, I can just say the U-Control kit is easily converted to radio control, with a spectacular flight performance. It makes an easy project for a rainy weekend or two and, in addition, doesn't make too big of a hole in one's modeling budget. □

KEEP THAT LEADING EDGE STRAIGHT By Vincent Bobrosky

When shaping the leading edge of a wing, I have found it difficult to keep the edge straight, that is, without low spots along the edge. To solve this problem I simply draw a black line about 1/8" wide along the leading edge strip as in Figure A. During the shaping process the line can be observed as to not remove too much wood. I leave a small portion of the line showing down the center of the leading edge as in Figure B. This is removed during the final sanding of the wing. This idea could also be used for the trailing edge if necessary.



Did you ever get your cord caught in a whirling prop? Your electric starter power cord, we mean! Or maybe you are the type who trips over it and drops the transmitter. These are probably extreme cases, though the possibility exists and we're probably safe to assume that they've happened more than once in our hobby. Any way you look at it, the long dangling starter cord can be dangerous or, at best, is something of an aggravation. It's in the way when you are getting ready to crank up, you can't store it easily or rapidly in your flight box, etc., etc.

The solution is simple: replace it with a coily cord, actually called retractile cords, of the type now found on most telephone handsets. A very short length of coiled cord will extend to an adequate length during the starting procedure, but will immediately spring back and out of the way when the pull on it is released. It is short enough not to need tucking out of the way when carrying or otherwise using your field box.

Unfortunately, our starters don't come so equipped. And such a cord is not available within the hobby market, or even down at the local electrical supply house. In fact, they are rather hard to find. We have just learned of a source of a reasonably priced cord of this type, available in usable lengths for our purpose. We've tried one, and found it to be of good quality and the answer to many of our prayers.

This cord can be ordered from Brookstone, 127 Vose Farm Rd., Peterborough, NH 03458, who publishes a very nice tool catalog which is yours for the asking and which you should not be without. The Retractable Power Cord, two conductor, is Stock No. N-2512, and is priced at \$9.95, plus \$1.55 for shipping.

Don't let that \$9.95 scare you off completely. The cord is 2' long in the retracted position, and stretches to 12'. Thus you can share both the price and the length with a friend, each of which will wind up with an easy to handle 1' length, capable of a 6' stretch.

It is a simple procedure to remove and replace the original cord. The exact procedure will depend on your particular starter, and if you care to take it apart enough to get to the basic connections within the motor and the switch. The easiest way is simply to clip the existing wires right at the starter body, and splice in the new ones. Keep the black to black for negative polarity, and the red or white, whichever is present for positive. This is not important, except that those are the standard color codes; if you wind up with a reverse running starter, simply switch the battery connections.

Our starter being old, and somewhat field worn, we decided to replace the



A RETRACTILE POWER CORD FOR YOUR ELECTRIC STARTER

wiring right to their internal connections. At the same time, we cleaned, greased, and checked; you might consider the same if yours is also on the ancient side.

Whatever your personal requirements are, you'll have to make a splice or two. We recommend using solderless crimp on connectors. They are available in many types, both for splicing and for terminal and plug ends.

It takes a special tool to apply them properly, but they come in handy for so many car and home repairs that you should have one anyway. And they are not that expensive; the tool is Radio Shack priced at only \$2.99, and is called a 3-Way Crimping Tool, Stock No. 64-405. There is a more expensive model that also strips wire, and cuts bolts, at \$7.99.

The splicing devices are called Butt Connectors, Stock No. 64-3037 for a pack of assorted sizes, at 89¢. To use, simply strip the wire, insert it in the end of the connector, and squeeze it with the crimping tool.

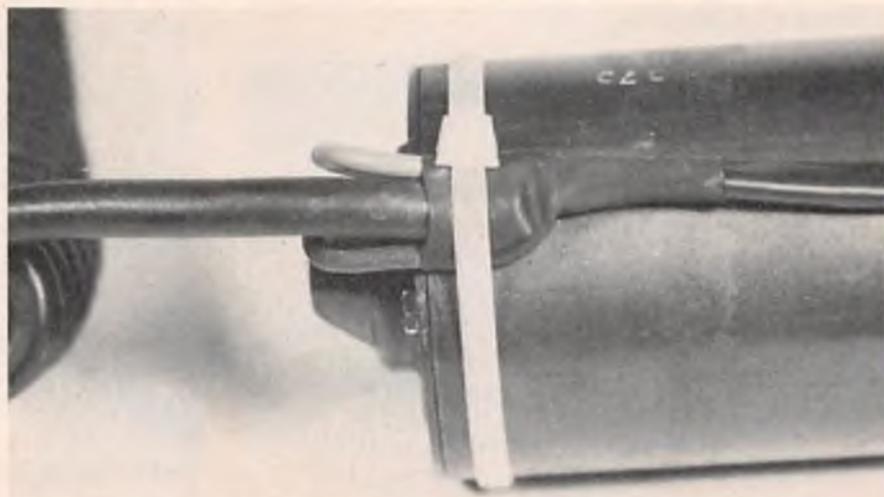
At any point where a splice is made, we recommend that you also apply a short piece of shrink tubing of the proper diameter. If possible, run both wires

together and put the tubing over both of them. Your Top Flite heat gun will do an excellent job of getting the shrink tubing down to size.

You may stick to the alligator clips down on the battery end if you like. But for a semi-permanent, no slip installation, we like to use the quick disconnects made especially for mating with the spade tongue terminals found on most of the gelled electrolyte batteries. Radio Shack also has those in an 89¢ assortment, Stock No. 64-3039.

To ease the strain on the cord, we recommend securing it to the starter body with a nylon cable tie, of the type available from Ace R/C as "Wrap 'N Ties." You'll need the larger size, Stock No. 50L423; six for \$1.19. On the battery end, a simple tubing clamp can be used to hold the wire onto the flight box, to relieve strain on the battery terminal connections.

The splices and connections are incidental and subject to your particular requirements. The retractile power cord is the main attraction, which we recommend as highly useful, and safer to use than the cord originally furnished with your starter. □



FORMICATOR

By Mack Moffat

A Formicator is not a dirty word (it's not a four letter word); it is a low cost (now **that's** a dirty word) kit vacuum former. It is manufactured by Idea Development, Inc., P.O. Box 7399, Newark, Delaware 19711, and retails for \$39.00 including an assortment pack of ABS plastic. The Formicator kit requires no cutting, or purchase of other materials to complete it. The only items required to build the Formicator is a good quality white glue (we used Titebond), and common hand tools. The platen or frame and vacuum chamber are kiln dried wood, to prevent

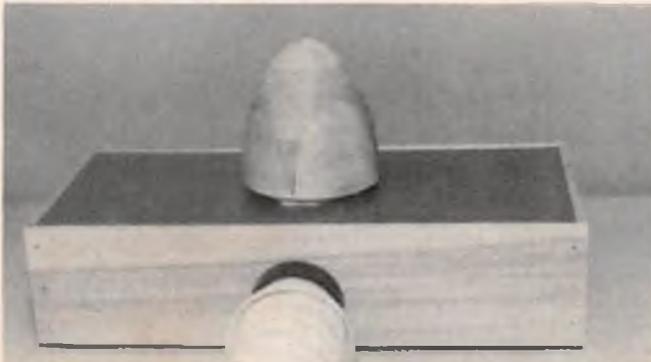


A little glue, two evenings and you're ready to start using your Formicator.

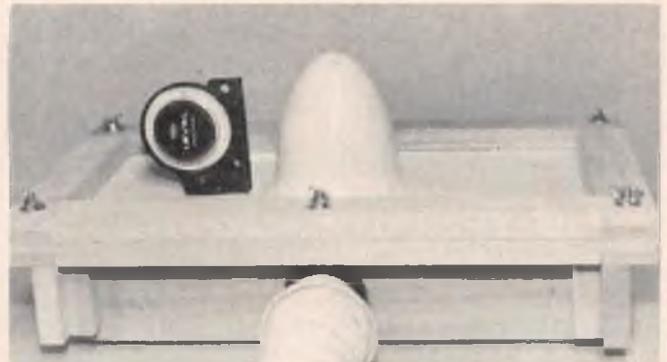
warpage or distortion during use. The perforated bed is made of aluminum and zinc plated hardware is used throughout the kit.

Building time of the Formicator is two evenings (one if you try harder) following

the well written instructions. The instructions for the Formicator in this kit are excellent; they tell you how to build it, how to make the molds, and how to use the Formicator to form (or pull) the parts. to page 94



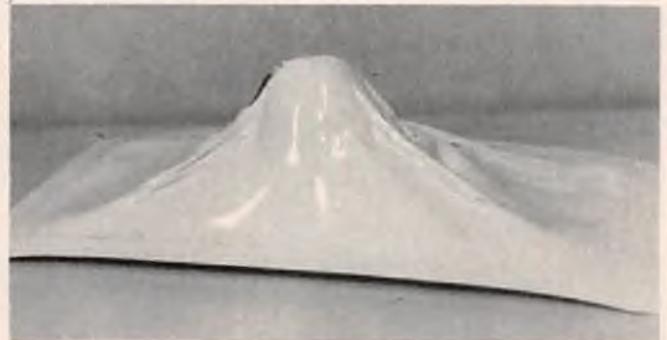
The spinner mold on the base ready to make a part.



Formed part - note that it is a good 5" high with a 4" base.



Formed part ready for trim.



Oops.



Two halves of the formed cowl.



Finished parts and their molds.

HOW-TO FLIGHT TRIM

Jim Kirkland was one of the pioneers in the development of R/C aerobatic pattern competition. This article on flight trimming a pattern aircraft was published in Model Airplane News in 1971, and in K Factor, the newsletter of the National Society of Radio Controlled Aerobatics (Betty and Suzi Stream, Editors) in 1979.

The information contained herein is basic and is still valid. Payment for this article has been made to the NSRCA to be applied to the 1979 U.S. Pattern Team World Championships Fund in memory of the late Jim Kirkland.

Flight Trim

This can be a rather frustrating experience for the novice, and is a necessary chore if any flyer is to realize the full potential of any model design. Probably more erroneous conclusions have been reached about a particular model because of inconsistent and improper flight trimming than for any other reason. Until a flyer can properly flight trim a model for competition flying it would have to be considered an impossibility for that person to properly analyze the performance characteristics of any given model or design.

To begin with, the model must be constructed as accurately as possible. Any deviations from such basics as thrust and decalage settings during construction will have to be corrected during the flight trimming process. Results from such practices are usually at least unsightly, or else require considerable effort to camouflage. So initial efforts to get these basics correct will be most beneficial during the flight trimming process.

Do not dismay. While all of the above has a direct bearing on trimming a model for flight, not many models have ever been built to such standards. In fact, not very many have ever been trimmed out to perfection, not even by the experts! A combination of model design, flight trim, flying skill and equipment reliability and accuracy, all combine with a bit of lady luck to produce a winner. So proper flight trim is only part of the expert's bag of tricks, and this can be mastered to the degree necessary to materially increase the enjoyment of flying by any RC'er. Only experience can lead to a satisfactory degree of perfection, but

The late Jim Kirkland, a highly respected pioneer champion, with his trend setting Beachcomber. Photo taken at the 1967 AMA Nationals by Dick Tichenor.



experience can best be gained while working with a pattern of basic techniques. I have found the following step by step procedure to work well with any type of model, using every step in trimming a model such as the Intruder, and only those applicable for the less complicated models.

(1) Trim for hands-off, upright level flight while using full engine power. Normally, only elevator and aileron trim is required.

(2) Trim for inverted straight flying, using only down elevator to maintain altitude. If the model has a persistent turning tendency in a given direction, trim rudder in the same direction to the turn until no turning tendency is present while flying inverted. If rudder trim was required, re-trim ailerons for hands-off, upright level flight. Repeat inverted straight flight trim, etc., until model flies straight, level and true both upright and inverted. (Hands-off upright and only a slight down elevator required when inverted.) If a lot of down elevator is required to maintain altitude when inverted, check Center of Gravity location, decalage, and thrust settings. Correct if necessary, and repeat Steps One and Two.

(3) Trim for glide conditions. Fly by upright and level with full power. Cut power to full idle. Model should continue on a straight line, with no tendency to suddenly balloon or dive. As speed decreases, the nose should gradually drop, but only a light amount of up elevator should be required to maintain a constant speed and rate of descent in the glide. If ballooning or diving occurs when power is abruptly cut to idle, then a vertical (up or down) thrust angle change is required. If a lot of up elevator is required to maintain the glide, then Center of Gravity, or incidence settings should be checked and corrected. If changes are needed, re-trim as outlined in Steps One and Two.

These three steps constitute the basic flight trim and must be achieved before proceeding further. Most major changes have now been completed with respect to Center of Gravity, decalage, and vertical thrust settings. If any changes are made to these three basics in latter trimming processes, then Steps One, Two and Three should be repeated and verified as remaining correct.

If the model is to be used in competition, or if the flyer has any interest in aerobatics, the flight trimming process must be continued if full potential is to be reached. So the next requirement in the flight trimming process is to set the deflection angles for the elevator, ailerons and rudder. Two factors are used to govern our efforts in setting up these deflection angles.

First is the need to achieve maximum benefit of the human reflex system, wherein the reflex action requirements are as even as possible on all axis of control. I choose to call this a "balanced-feel" of control where model response is the same in either direction about a given axis. In other words, no control has a more sensitive response in one direction than the other. This "balanced-feel" should also apply to the response sensitivity between controls for all three axis, particularly between elevator and ailerons. In other words, we do not want a soft feel on the elevator and supersensitive ailerons, or vice versa.

The second factor in determining deflection angle limits is maneuvering requirements about each axis of control. This is determined by either individual preference for the sport flyer, or the current rule book for competition flyers. Each control must have sufficient deflection available to perform the most demanding maneuver which uses that particular control as the primary means of achieving the desired flight reaction.

The Elevator: The requirements of

the spin maneuvers are the primary factor in setting up the elevator deflection limits. The elevator must be able to put the model into a stalled condition and hold it in a stalled condition for the duration of a spin. This is true for both upright and inverted spins, and reversals, if such maneuvers are required. Incidentally, you do not release the elevator command in a reverse spin maneuver until the spinning action has been completed in both directions!

The elevator deflection angle for most designs is approximately fifteen degrees, but may be as little as ten degrees, or as much as twenty degrees. Since limited elevator sensitivity is important for smooth execution of most all maneuvers, the deflection angles should be set as low as possible, but with an equal amount to either side of neutral.

When split type elevators, such as on the A-6 Intruder, are used it is most important that the trailing edges of the two elevator halves be in perfect alignment. Any attempts to flight trim a competition RC model by misaligning the elevator halves could best be compared to trying to correct an automobile's steering discrepancy by misaligning the rear wheels! The results would probably be similar also!

The Rudder: Any rudder deflection beyond about 35 degrees does not do much more than apply air brakes! If the rudder will not do what it is supposed to do with 35 degrees of deflection, it needs more area! The amount of deflection is determined by how much is needed to do a dead straight hammerhead stall, to either right or left, with no wind present. Any more than this will turn the spin into a real tail twister!

The Ailerons: Both the double Immelman and the three rolls are used

to determine the amount of aileron deflection. For me, this works out to be about four seconds required for the three rolls. At this point I try to achieve a "balanced-feel" between the ailerons and the elevator by either slightly increasing or slightly decreasing.

It is now necessary to adjust for proper aileron differential. I have found it easiest to determine if the differential is correct by doing a Split S from a long, straightaway climb-out. If, following a left 180 degree roll, the heading has veered to the left, there was too much differential. If the veer was to the right, there was not enough.

Loop Tracking: This is probably the biggest bugaboo of all! No wind and stable air are both a must if experience is lacking, and a definite help in any case. Inexperience could also use a helper to verify what happens and jot down this information for analysis during the relaxing periods between flights!

To trim for loop tracking requires that both inside and outside loops be flown with the model heading straight away from the pilot. Try inside loops first and use no command other than elevator to complete one loop on any given pass. Note which direction the model turned, right or left, and if a turn did occur, which wing went toward the outer perimeter of the loop. Now do an outside loop, using only elevator command, and note turn direction and wing deflection. At this point, you are interested only in whether a wing did deflect in both inside and outside loops, and if it did, was it the same wing panel in both type loops. If the same wing panel moved outward in both inside and outside loops, then that panel is heavier, and weight must be added to the lighter panel's tip.

If the same heading change occurs at the beginning of both insides and outsides, the rudder should be trimmed

to correct this heading swerve. If a change in rudder trim is necessary, the ailerons will probably need re-trimming also. If the same heading change occurs primarily as you approach the top of the insides and outsides, the problem is more likely engine thrust setting than rudder trim. In this case, right or left thrust must be added by shimming the engine mount.

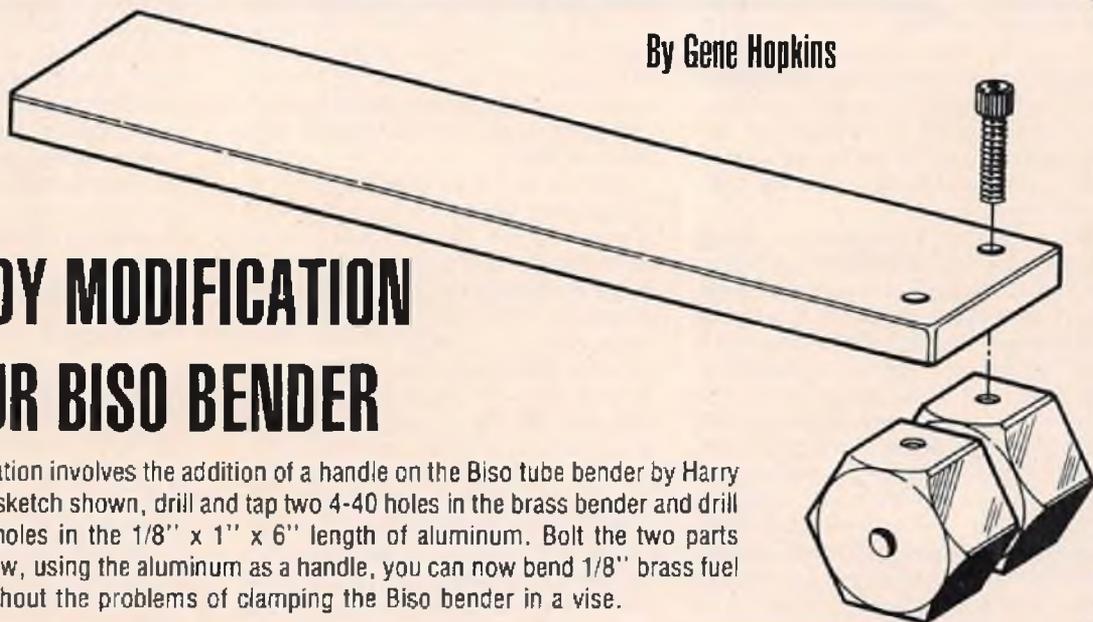
If, after following the above steps, the model will track while doing insides but will not track as well while doing outsides, raise both ailerons two turns at the control clevis. Depending on the degree of improvement, or aggravation, of the outside tracking tendency, either raise the ailerons more, or less, or change to lowered ailerons, as the results dictate. Continue this process until the model will track properly during only one inside loop and only one outside loop. If it will track through one loop, it will track through three, unless the flyer, the slipstream from the preceding loop, or wind conditions cause the model to veer. For these reasons, it is only rarely that three perfect loops can be done using only elevator commands.

Trying to analyze those first loops may be frustrating! Just remember to first learn to recognize a heavy wing and correct for this. Then recognize turning tendencies, whether caused by rudder or thrust, and correct the causing factor. Finally, after correcting the wing balance and the turning tendencies as much as possible, play around with raising and lowering the ailerons to find the best setting for loop-tracking. Only experience will teach you to recognize the primary culprit early in the trimming process. I still find an advantage in having someone around to help if a model turns out to be particularly difficult to trim. □

By Gene Hopkins

A HANDY MODIFICATION TO YOUR BISO BENDER

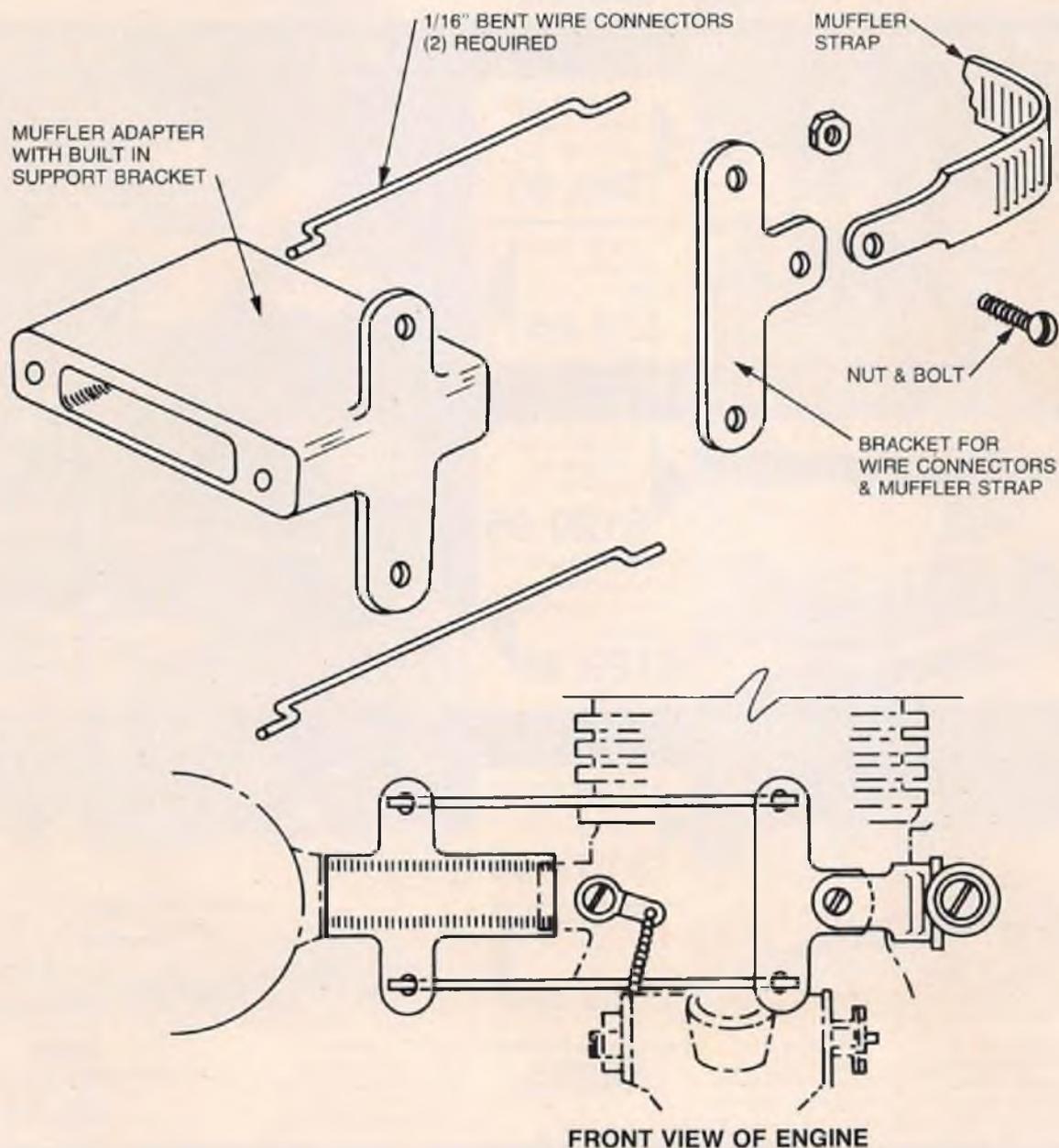
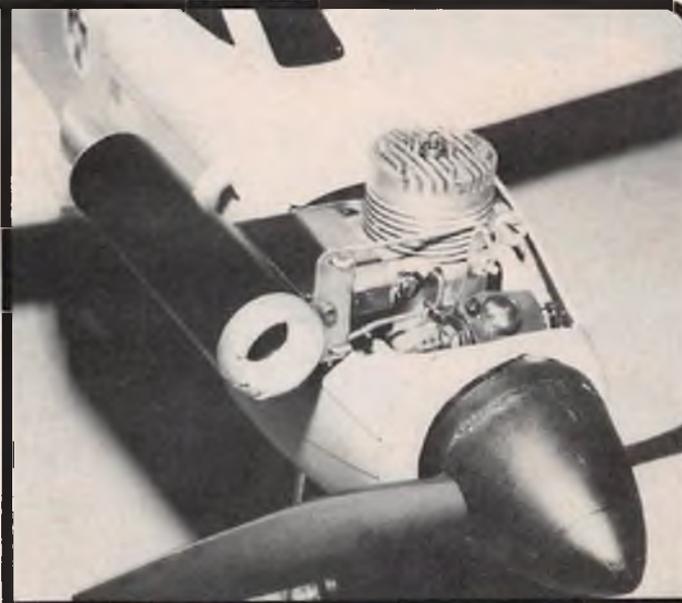
This modification involves the addition of a handle on the Biso tube bender by Harry Higley. Per the sketch shown, drill and tap two 4-40 holes in the brass bender and drill two clearance holes in the 1/8" x 1" x 6" length of aluminum. Bolt the two parts together and now, using the aluminum as a handle, you can now bend 1/8" brass fuel tubing 360° without the problems of clamping the Biso bender in a vise.



MUFFLER ADAPTER FOR THE K & B .40

By Michael Garze

This muffler adapter has been arranged to mate a Semco Muffler and a K & B .40 engine without removing the exhaust baffle. By leaving in the baffle, it will give you that low idle you are looking for. The adapter consists of two (2) brass plates with 1/16" diameter holes top and bottom plus two (2) 1/16" bent wires. One plate is fastened to muffler while the other is fastened to the muffler strap with a small nut and bolt.



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- Huge rolled Plans
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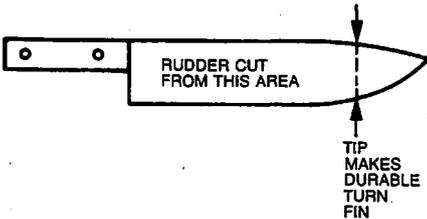
FOR WHAT IT'S WORTH

If you're a model boater, have you ever had your rudder bend and stay bent after a violent maneuver? Does it break off after hitting U.F.O.'s (unseen floating objects) in the water?

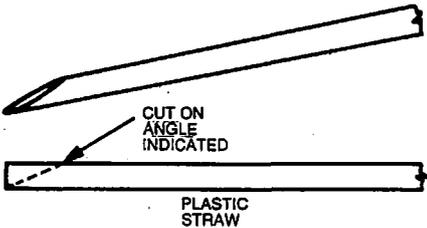
Well, then try the cure which has worked for Frank Wohlrab of Paramus, New Jersey. Frank makes his rudders from low priced Chef Knife Blades, which are purchased in supermarkets. They are made of stainless steel and tempered to spring back to shape when bent.

Cutting the knife blade to the shape of the rudder is difficult, at least with the tools at his disposal --- Hacksaw and Dremel tool with grinding wheels. But the finished rudder will not bend out of shape, or break in two easily, and so it is worth the extra effort. See sketch.

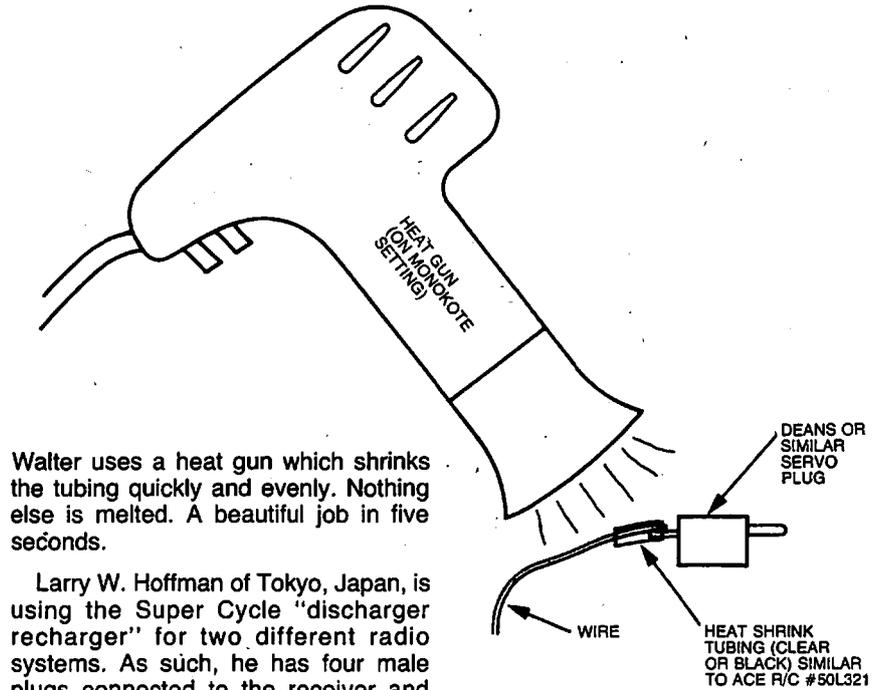
TYPICAL SHAPE OF KNIFE



During a midnight rebuilding session, E.E. Wolfe of Scottsdale, Arizona, discovered a wonderful tool for applying micro-balloons at hard to reach locations. Simply cut a plastic soda straw off at an angle as per the sketch. The straw will hold a little or a lot and will deliver the precise amount simply by tapping the straw. Spilling of the micro-balloons (or baking soda) is practically nil.



Ever follow the instructions that come with heat shrink tubing? Usually they state to shrink the tubing with a match or a cigarette lighter. This shrinks tubing unevenly at best, melts wire insulation, and plugs the body at the same time. Shrinking with a soldering iron results in a slow process and a messy one. It never fails that the iron will usually touch the tubing, which melts the tubing along with putting a mess on your iron. Why not try the method shown in the accompanying sketch sent to us by Walter A. Legan of Lakeland, Florida.



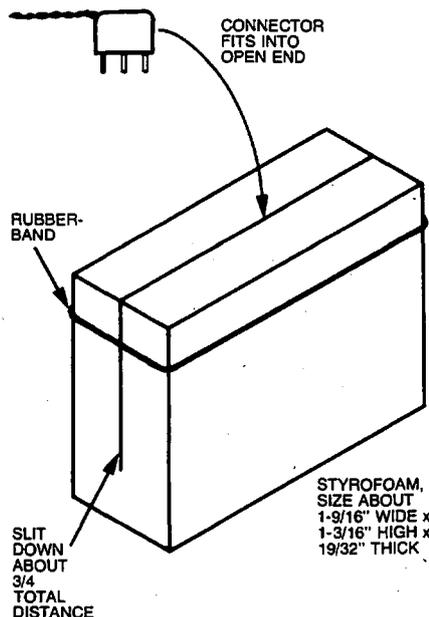
Walter uses a heat gun which shrinks the tubing quickly and evenly. Nothing else is melted. A beautiful job in five seconds.

Larry W. Hoffman of Tokyo, Japan, is using the Super Cycle "discharger recharger" for two different radio systems. As such, he has four male plugs connected to the receiver and transmitter output wires, i.e., one pair to each wire.

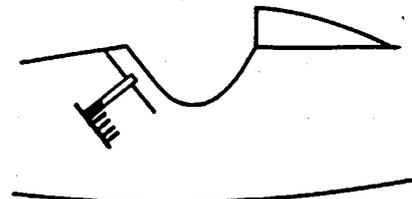
This leaves a gaggle of electrically "hot" male connectors loose on the work table when the Super Cycle is plugged in, however!

To prevent shorts, Larry cut small blocks of scrap styrofoam, slit them as shown in the diagram, and wrapped the open end with a rubberband for tension.

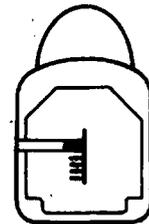
Two of these are slipped over the unused connectors while the other pair are connected to the batteries during discharge/charge operation. Simple, fast to make, cheap and easy to use! The accompanying sketch shows the details.



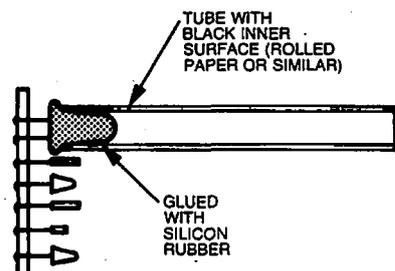
In using a low voltage alarm with a LED diode, most everyone finds it very difficult to see in bright sunlight. Stanislav Weber of Kdyne, Czechoslovakia, solved the problem by installing a dark tube over the LED. The accompanying sketches show the various methods of installation.



WAYFARER



SUPER KAOS



FOR WHAT IT'S WORTH

David E. Auxier of Dawson, Nebraska, submitted the following suggestion. When joining wing halves and dowel joints that do not fit properly, try mixing fiberglass insulation with epoxy glue. This combination makes a much stronger joint and will fill some of the imperfections. There is most likely many more uses where this mixture could be applied also.

From Michael Auger of Bramacea, Ontario, Canada, is a quick and easy method of aligning your aircraft. Most trainer type models have their wings held on by rubber bands. This method is fine but most novice pilots fail to put reference marks on the wing and fuselage so they can tell if the wing is actually on straight or not.

An easy way to check approximate accuracy at the field is to use your transmitter antenna as shown in the accompanying sketches. The antenna

makes a handy measuring tool by just extending or collapsing it to the correct distance to be measured and compare it to the other side of the aircraft. You could use this source of measuring device at the field where one doesn't usually have a 48" ruler handy.

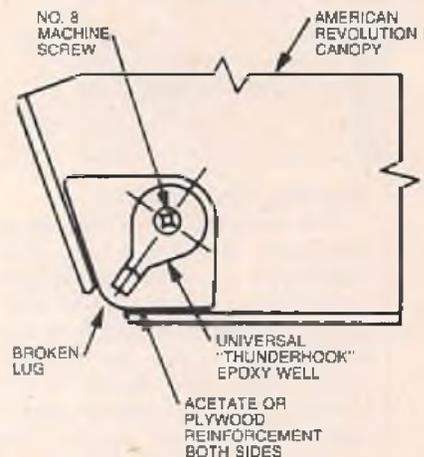
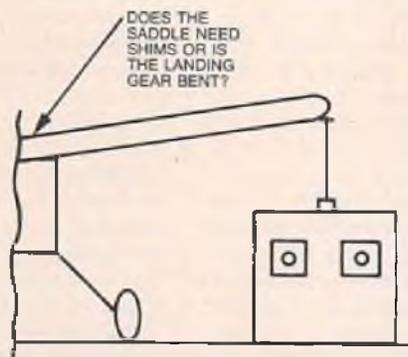
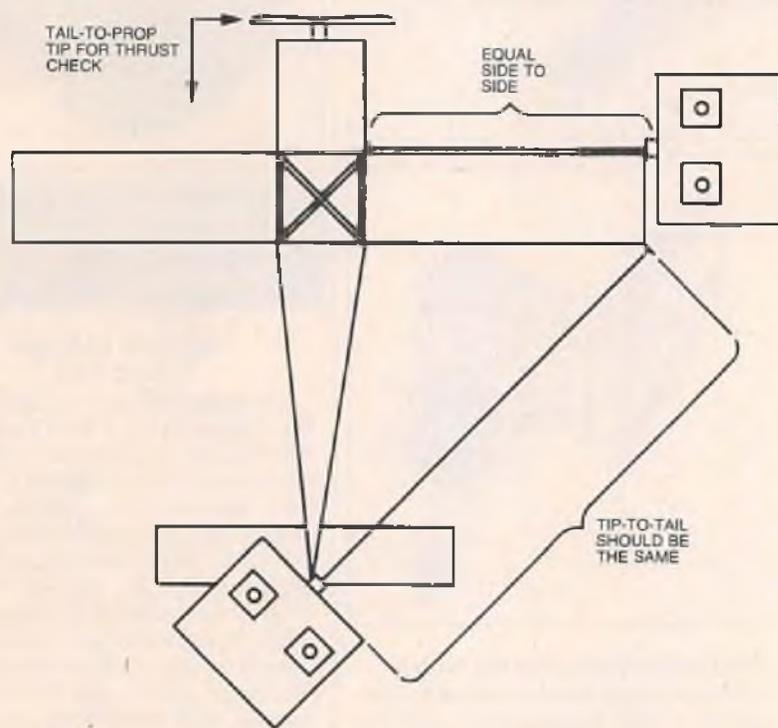
Clifford E. Kell of Cincinnati, Ohio, lost a boat after hitting a floating board. Determined not to have this happen again, Clifford came up with a splendid idea to eliminate the problem. The glass hull can be easily made unsinkable by purchasing a Froth Pack Kit at refrigeration supply stores. The kit is manufactured by Insta-Foam Products, Joliet, Ill. 60435. The kit contains two cans, two hoses and a nozzle which mixes the chemicals into foam which sets up immediately. It's very simple to block off the engine or radio area of a boat and simply fill the hull area with the foam. The additional weight is nearly immeasurable. Also, water cannot

collect in the hull during running. The foam displaces water.

It is not necessary to throw away the canopy for your American R.C. Helicopter Revolution I when the moulded-in lugs, used to rubber band the canopy down, break off. George A. Hume of Torrance, California, came up with this quick and easy method of repair. First go to your local discount hardware store and pick up a package of "Universal Thunderhooks," manufactured by Handi-Man Industries Inc., Newark, N.J. — Part #TH/459.

These are picture hooks designed to be used with expansion bolts, and are drilled to accept a 6-32 size screw.

First make yourself two reinforcements from heavy acetate or thin plywood, as shown on the sketch. Epoxy one on each side of the broken corner. Position the Thunderhook as shown and drill through the canopy with a #27 drill. Epoxy and bolt the hook in place with a #6 size screw. Epoxy over the nut to lock it in place, and your canopy is serviceable again. This repair may be applicable to the Heli-Baby also.



While building a sailplane recently, Christopher Greiner of Grosse Pointe Park, Michigan, had to run his finger down many seams of glue to make sure the joint was properly filled. Many times, Chris found himself with just a few minutes of time to devote to his building, but afterwards had the task of cleaning the glue from his fingers. The thinner came first, then wash the thinner from his hands. He finally solved the problem by taking an old pair of surgical gloves and cutting off one finger. The surgical glove finger is used on the finger that spreads the glue. When finished, just wipe the glue from the glove finger. Make sure the glue you're using does not attack the glove. So far, Chris has had one glove finger last three weeks. He still has nine more to go from one pair of gloves. □

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DREMEL ROUTER BITS

The extensive line of accessories for the Dremel Moto-Tools has just grown significantly by the addition of Dremel's #603 Three Piece Router Bit Set. The set is packaged in a convenient pouch to help protect the bits and maintain the cutting edges, and consists of a 3/32" beading bit, a 3/16" cove bit, and a 1/8" rabbet bit that can also be used for routing, inlaying, and mortising. All three bits are made of high quality steel for maximum durability and long life, their precision ground cutting edges also make for uniformity and high quality cutting. The #603 Router Bit Set is priced at \$13.00, and available everywhere Dremel tools are sold, or write to Dremel, Division of Emerson Electric Co., 4915 21st St., Racine WI 53406, (414) 554-1390.



1930 STINSON TRIMOTOR

An interesting scale kit has just been announced by Mohave Industries of Arizona! Not just another pretty twin, or a four engine bomber, but an in-between,

a three engine 1930 Stinson Trimotor, in 80" wingspan. It builds into a 9.5 lb. beauty, requiring a four or five channel radio, and having 850 square inches of wing area. The result is realistic and safe flight, even if one or more engines quit. Power required is one .35-.40, and two .15's. The kit features laminated tail and wing tips, spun aluminum cowlings, pre-cut wood parts, and full size, rolled plans. Currently available, and priced at \$166.50, the Stinson Trimotor can be purchased only from the manufacturer, Mohave Industries Inc., 2365 Northern Ave., Kingman, AZ 86401, (602) 757-2480.



TATONE MUFFLER AND MOUNT

From a name synonymous with high quality model accessories, Tatone Products, we bring you news of a new muffler especially designed for the ever popular K & B .40 R/C engine. Designated as Catalog #306, this muffler is claimed to reduce the noise level 10 to 12 decibels with little or no power loss. It is cast in aluminum for rapid heat dissipation, polished to a bright finish and comes complete with mounting strap and screws. The design is such that it will cover the two holes in the side of the exhaust stack left by the removal of the baffle. No additional plugs, fittings or adapters are required. The K & B muffler is priced at \$12.95; and can be special ordered for the

Supertigre, OS Max, and Enya .29 to .40 engines for \$1.00 additional. A newly designed engine mount for the above model engines is also available now, in both long and short beam types. These mounts are cast aluminum, with machined 90 degree beams, polished, and most important, drilled and tapped for the specified engine. Short beam models are \$6.00, long beams are \$7.00. Available at most hobby shops, or direct from Tatone Products Corp., 1209 Geneva Ave., San Francisco, CA 94112. Direct sales should include \$1.00 for postage and handling, and sales tax when applicable.



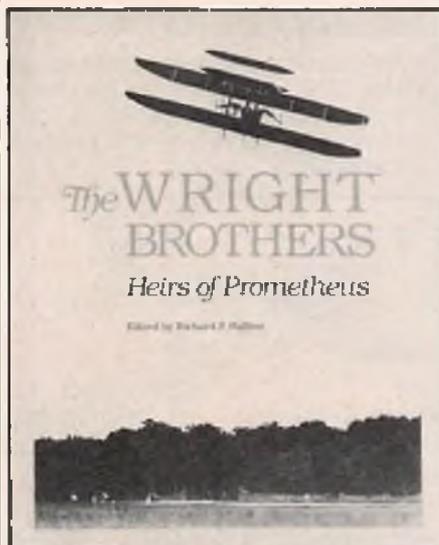
DUCTED FAN UNIT AND POD

Jet Hangar Hobbies, 12554 Centralia Rd., Lakewood, CA 90715 announced the recent acquisition and initial production of the TURBAX I Ducted Fan, formerly manufactured by J.J. Scozzi Inc., in Washington, DC. The TURBAX I has been refined from the original design for use with the K & B 9100 (7.5cc) Ducted Fan Engine. The other specifications of interest are: Length 9"; Shroud Diameter 5 1/2"; Fan Diameter 4 3/4"; and Thrust to 7 1/2 pounds. It is constructed of precision engineering thermoplastics, and machined aluminum and is designed for aircraft weighing 18 pounds. Latest features include a new lightweight turbine body designed specifically for the new front rotor K & B engine. Installation has been reduced to a simple lightweight rail mounting technique similar to conventional engines, and there is a significant weight reduction over earlier models. Throttling has been brought within conventional means through use of a front rotor engine with Perry pump and carburetor. The TURBAX I requires a minimum of mechanical assembly and flight speeds

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in excess of 100 mph are easily obtainable with proper internal engineering. Some of the kits now available for the TURBAX I are Jet Hangar Hobbies Mirage III and F9F Cougar, and Violett Models' A4 Skyhawk and F-86 Sabrejet. In view of the fact that this is a new phase of our hobby, the user is cautioned to use maximum care in construction, installation and operation of a ducted fan airplane. High engine power and prop suction require that all modelers take safety precautions beyond those normally used. A detailed procedural safety list is included with each TURBO unit. Available at your local hobby shop, or direct at \$69.95.

Jet Hangar Hobbies also has available a scale-like epoxyglass jet engine covering suitable for external pod or integral wing mounted nacelle mounting, such as seen on the Cessna Citation, Boeing 737, and Gloster Meteor. It is also suitable for use with the Midwest HE-162 kit. It is designed for the Jet Hangar Hobbies (Formerly Scozzi) Turbax I Fan Unit, and is furnished without any engine mount or any internal fittings. The front opening is 4 1/4" in diameter with a 4" diameter tail opening and a 6" maximum diameter. The length is 27 1/4", at a weight of 7 ounces. Priced at only \$24.95, this certainly looks like a perfect solution to an otherwise complicated construction problem.



WRIGHT BROTHERS

The serious aviation fan will be highly interested in a newly released book about the Wright Brothers, their accomplishments, and its effect on aviation and on world history in general. Entitled "The Wright Brothers: Heirs of Prometheus," this 224 page book, which includes 80 black and white illustrations, was edited by Richard P. Hallion, Curator of Science and Technology at the National Air and Space Museum.

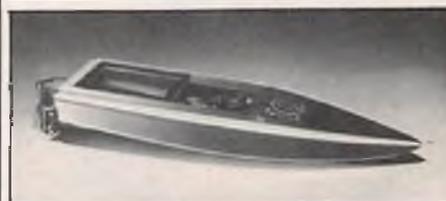
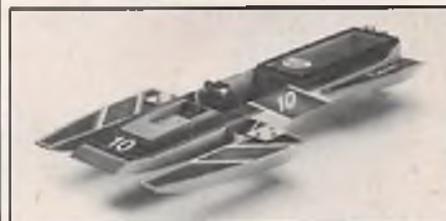
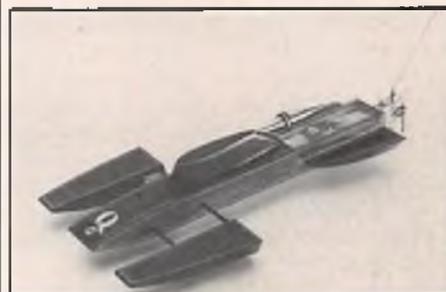
Included is material by the Wrights themselves, as well as essays by a large number of well known and highly qualified aviation historians. Details of the first three flyers, considered as the most significant of their many flying machines, and of the 1903 engine that they developed are included. The illustrations are excellent, even considering the state of the art of photography at that time. In all, this is an excellent book about both the technical as well as the historical facts about the Wrights and their experiments. Available in paperback at \$5.95, and cloth bound hard cover at \$15.00; from Smithsonian Institution Press Books, P.O. Box 1641, Washington DC 20013.



SPACE SQUIRT & TRI-PACER

Recommended as the next step for those beginners that tried its Puddle Jumper, Sterling Models, Inc., has just introduced a new and interesting land vehicle for two channel R/C systems, the LV1 Space Squirt. As easy to build as the Puddle Jumper, the Space Squirt features accurately cut balsa and plywood as well as vacuum formed parts. All hardware, including wheels, is included, as is a detailed plan and instructions. Any of the Cox .049 or .051 engines are recommended. The LV1 Space Squirt is priced at \$24.95. Another interesting 1/2A project is Sterling's new Piper Tri-Pacer, designed for 2 to 4 channel R/C. Not intended as a replacement for its big 58 1/4" Tri-Pacer, Sterling recommends the wee one as an intermediate step after a basic trainer such as the Mini-Fledgling before going to a higher performance flyer such as the Corsair. The kit includes die-cut balsa and plywood pieces, precisely vacuum-formed parts, and full plans and instructions; only \$29.95. Available now at your dealer, or inquire from Sterling

Models, Inc., 3620 "G" St., Philadelphia, PA 19134.



DUMAS BOATS

Three new boat kits, which should include a type or class for everyone, have just been announced by The Boat People, Dumas Products Inc. There is a new Quickie 40, a 30" long, 18 1/2" wide competition outrigger for 3.5 to 7.5 marine engines. Two hardware kits are available, to fit the above mentioned engine sizes. The Quickie 40 is \$40.00; the hardware kit is \$46.00. A smaller outrigger, the Li'l Rascal 10, with 22 1/2" length and 13" width for .10 engines is also available. A hardware kit for this one is \$22.50; the boat kit is \$25.00. And last but not least, there is a Dumas Short Stuff Deep Vee 10 in fiberglass, with all the performance characteristics of the wood Short Stuff for those boaters who prefer fiberglass. It is priced at \$22.50. Hardware kits, for .049 to various .10 engines, are \$16.00. All these new designs feature the high quality materials, parts, plans and instructions for which Dumas boats are well known. Check your local shop first, or inquire from Dumas Products Inc., 909 E. 17th St., Tucson, AZ 85719.

1/64" PLYWOOD

Hi Johnson, who is well known by many old time modelers for his many excellent products through the years is now doing his thing as Super Wings, 11015 Glenoaks Blvd., Pacoima, CA 91331. His main products are glider wings, fuselages, and accessories, though many of the items being manufactured by him are also of interest

showcase '79

to modelers in all phases of the hobby. For example, some of the latest offerings from Super Wings: 1/64" plywood, in various sizes, for foam wing covering. A 12" x 48" piece, #161, is priced at \$4.95. 24" x 48" pieces are #162 at \$9.89, and 48" x 48" #163 are \$17.95. 1" x 48", #160 such as required for trailing edge strips for foam cores, are \$2.95 each. All Super Wing products are available at better hobby shops; or check direct with Hi Johnson at the above address.



NEW WEBRA .61 AND RADIO BOX

Model Rectifier Corporation (MRC) has informed us that the famous Webra .61 Speed Engine, used by many of the top European and American pattern flyers is now available in an improved version. Designated as the Model 1024 R/C, this new .61 Speed Schneurie uses a new version of the famous Dynamix slide valve carburetor and also a beefed-up crankshaft with a wider intake port. The results are an RPM increase when used with the tuned pipe, and a better mid range response. The Dynamix carburetor requires the use of pressure, either muffler or a pump, and the use of the tuned pipe, #1100/7 is strongly recommended. The latter is now priced lower than before, yet still comes complete with silicon tubing and manifold.



MRC has also announced two new electric R/C car kits, by Tamiya, both using the powerful Mabuchi RS-540 motor. They are the Toyota Celica #RA1209 and the Lamborghini



Countach Competition Special, #1208. Both contain such interesting features as a choice of direct drive for faster speeds, or differential gears for better handling on curves. Prototypical handling is a reality with such standard features as proportional speed controls in both forward and reverse, aluminum alloy chassis, sandwich type front tires, and ball bearing supported front ends. Completely equipped, highly detailed kits with full building and operating instructions are \$84.98 each.



For model boaters, MRC's latest offering is a water proof radio box, complete with clear plastic top, top seals, and both pushrod and switch rod seals. The complete box kit is priced at \$19.95; a kit for the seals alone is \$1.95. Look for these new goodies at your local dealer, or contact Model Rectifier Corp., 2500 Woodbridge Ave., Edison, NJ 08817.



KNIFE AND TWEEZER KIT

A subject near and dear to all of us is tools, big and little. One source of the latter is The Aptex Corp., Box 59, Bethel, CT 06801, who has available a catalog showing its line of work holders, magnifiers, tweezers, and knives. Some are sold individually, and some, like the #400 Knife and Tweezer Kit, are available as sets. It contains a popular

size knife with 15 assorted blades, and 3 tweezers; a 4 1/2" self locking, a 4 1/2" with slide locking mechanism, and a 4 1/2" fine point tweezer. The locking tweezers are recommended for holding and clamping small parts while soldering or gluing, and the fine point type is excellent for delicate work of all types. Prices and of course the catalog are available directly from The Aptex Corp.



OILS AND CLEANERS

Chester W. Smith, P.O. Box 337, Wasco, OR 97065, is offering three surplus Air Corps products that many of us have become familiar with in one manner or another. They include Aircraft Instrument Oil, a very light viscosity oil that will not dry or gum up, and is not affected by sub-zero temperatures. It is available in one ounce containers, at \$1.50 postpaid. Another oil available is Instrument Lubricating Oil, a heavier, clear clinging oil recommended for open gears and heavy loads. Also priced at \$1.50, postpaid, for a one ounce container. And last but not least, is a Cleaning Compound Solvent, a combination cleaner, solvent and preservative for cleaning model engines inside and out. It is an excellent preservative for after running or long time storage. The one ounce container is \$2.00, also postpaid.

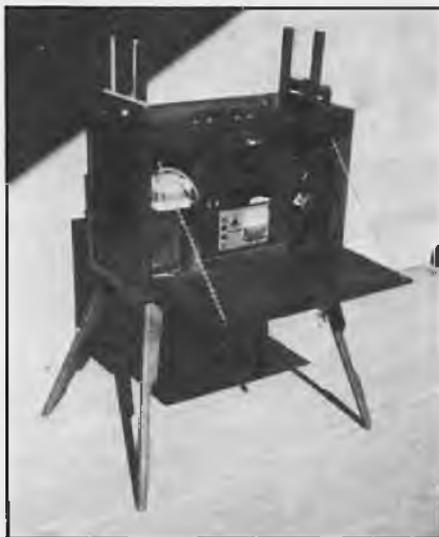


PHOENIX 8

A new competition pattern aircraft, Don Lowe's beautiful Phoenix 8, is now being offered by Aero Composites, 411 Townsend Pl., Dayton, OH 45431. Don's latest comes in both a Standard and Deluxe kit, both featuring an epoxy resin fuselage recontoured to provide the maximum possible strength to weight (19 oz.) ratio. The fuselage contains molded canopy detail, stab fillets and pushrod guides, and wing bolt recesses are molded right into the belly pan. The wing foam blocks are faced to provide accurate building alignment jigs.

showcase '79

with the proper dihedral angles pre-cut. Provisions are made for an optional flying stab installation. Other design updates include wing and stab repositioned to virtually eliminate roll coupling with rudder, and an increase in wing area to carry today's engine/pump/pipe combinations. Full size plans and construction instructions are included. Vital statistics for the Phoenix 8 are: Span 64"; Wing area 730"; Length 56.75"; Weight 8.5 lbs.; Engine .60; and at least a four channel R/C system is required. The Standard Kit is priced at \$79.95; the Delux version, which includes a complete wood package, motor mount, and control surface hardware, is \$119.95. Through your favorite dealer, or direct from Aero Composites.



FLIGHT BOX

Happiness for an R/C flyer has to be finally having all the equipment and accessories necessary, and having something to carry them in. The latter chore is the reason for the existence of the "Flight Box" by Custom Woodcraft. The "Flight Box" is designed to hold not only your airplane but all the tools and equipment necessary to operate and maintain at the field. It is equipped with four folding legs that lock up and down by the use of a machined gib. The fuselage holders raise up and lock into a slot using a strong spring for force. They are adjustable from 1 1/4" to 5 1/4" so the fuselage can be locked in while making repairs or installing the wing. The fold-out wing holders are located on the back of the box. Both fuselage and wing holders are lined with neoprene rubber and will not mar the finest finish. The power module slides out of the "Flight Box" and has a carrying handle to take it to the flight line. It holds a 12 volt battery and starter and miscellaneous small items such as plug wrench, screwdriver, etc. A DA Enterprises power panel is

available, installed, at extra cost. There is space below the panel for props, etc., and two drawers on top for other items. Space is provided for a one gallon fuel can, and transmitter. The "Flight Box" is 21 1/2" long, by 9 1/2" deep, and 16" high overall. It is constructed of birch plywood and maple hardwoods, and finished in medium pecan with a durable urethane finish. It is priced at \$79.95, plus shipping and tax. B of A, Mastercharge, check or money orders are accepted. Order from Custom Woodcraft, Star Route, Day Road, McArthur, CA 96056, (916) 336-6378



PARTS CONTAINERS

Are you one of those persons who always claims, "One of these days we're going to get organized?" If so, the time has come, and Delta Parts Containers are just the thing to speed you on your way to efficiency and order. They come in three sizes, all of which feature lock on caps attached to the base to prevent their loss. The write-on tops can be used to identify the contents. The three sizes are 3/4" x 1 1/2" (PC-790-S), 1" x 2" (PC-790-M) and 1 1/2" x 1 1/2" (PC-790-L). The cost is only \$3.00 per dozen, in any size, or assorted. Check your local hobby dealer first, or order direct from Delta Manufacturing, 27 Race Car Court, Lorimer, IA 50149. A complete catalog of all Delta's race car products is available for \$1.00 in US, or \$3.00 foreign, sent via Air Mail.



ALPHA 15 AND LCD CLOCK

The Alpha 15, a larger version of its popular 1/2A Alpha, is now available from Ace R/C Inc. This Tom Runge design is a sturdy, easy to build trainer and sport plane for three or four channel R/C and a .15 to .25 engine. Even with the smaller engines, enough power is available for take-off from grass fields,

and for loops and rolls. The Alpha 15 doesn't have any bad snap or stall tendencies and has excellent slow flight characteristics. The kit features a plywood fuselage, and built up wing for maximum sturdiness and durability. Included is a complete hardware kit, and steerable nose gear, formed main gear, and all control linkages. The span is 50", area is 425 squares. Designated as #50L213, the Ace Alpha 15 is \$39.95.



Another totally unique product has just been announced by Ace R/C, an LCD (Liquid Crystal Display) clock measuring only 1/4" x 1" x 2". This makes it small enough to fit anywhere, even attached to your transmitter to monitor flight time. Even being this small, it has programmable features, it can be set to read hours and minutes normally, or to alternate between hours/minutes and month/day every two seconds. It is powered by two readily available watch batteries which run it for over 1 1/2 years. To be called the "Mity Time" LCD Clock, it comes with your choice of two bases, one in black with a P-51D Mustang screened in white, and the other in plain chrome suitable for custom engraving. Recommended for gifts, trophies, or as a practical treat to yourself, the "Mity Time" Clock is priced at \$30.00. For further info, write Ace R/C Inc., Box 511, Higginsville, MO 64037.



FUEL FILTER

If you aren't using a fuel filter, you should be. One of the latest to appear is "The Final Filter," by DuBro Products. This in-line filter is claimed to have twice as much fuel filtering capacity as most filters now available. It is made with extremely fine 130 micron polyester screens that takes out even the smallest particles, yet does not restrict fuel flow. It is made of durable and lightweight

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ANNOUNCING

- RC Helicopter books
- RC Helicopter accessories
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- 'Hughes 500' fuselage for Heli-Baby
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SHOWCASE '79

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aluminum, only 1¼" long. Cleaning can be done by simple back flushing when ever necessary. The Final Filter is recommended for use between the tank and engine and/or in your fuel can line. Only \$1.75, from DuBro Products, Inc., 480 Bonner Rd., Wauconda, IL 60084.



HOT STRIPE

A new concept in striping tapes, an iron-on type, called "Hot Stripe" has been introduced by Top Flite Models. Claimed to be thinner than other similar tapes, Hot Stripe is flexible enough to apply on intricate curves and circular designs, yet requires only low heat for permanent application. It can be applied over foam, paint, plastic, fiberglass, and all types of covering materials. Hot Stripe is simple to apply, yet permanent and fuel proof. It is available in blue, yellow, red, gold, black and white, all in 40 foot rolls. Widths and prices are: 1/16 at \$1.98; 3/32 at \$2.69; 1/8 at \$2.69; and 1/4 at \$3.69. For more information on easily and efficiently finishing your models, and a 12 page catalog, send 50¢ to Top Flite Models, Inc., 1901 N. Narragansett Ave., Chicago, IL 60639.

SUPER FLOATS

Our November 1978 issue contained an article entitled "Dick Hansen's Super Floats," by a gentleman of that name, describing how to build and use what most Northwest US R.O.W. flyers consider the best float design ever. The article is complete, including everything from cutting foam float cores using

to page 98

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- Two improved micro servos.
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Cox/Sanwa's 8020, 8022, and 8031 systems are available on all seven 72-75 MHz frequencies. And they come complete with transmitter, receiver, servos, and full accessory pack including servo trays.

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8022



(8020 not shown)



8031

RCM PRODUCT TEST

Royal Products
NO. AMERICAN B-25



Over the last couple of years, twins have increased considerably in popularity in both sport and scale flying. Perhaps overlooked in the introduction of new twin kits is Royal's B-25 which has been on the scene for a number of years.

Our initial impression of high quality was maintained throughout construction. The kit consists of high quality balsa and plywood. The die-cutting of plywood and pre-shaping of balsa parts is superb. The parts match to plans is also excellent and no engineering problems were encountered in construction.

Much of the worry associated with engine alignment is eliminated by the plywood jig which frames the engine mounts. At the same time this jig serves as a wing dihedral brace and crutch for the engine nacelles. Even so, the major part of construction is the wing and nacelle assembly. Care must be exercised if warps are to be avoided and the wings evenly matched. Construction pleasure would be enhanced if the instruction manual and plans provided much more detail. As presently written --- the average builder is likely to face many opportunities to ruin his project unless help is available from an experienced builder.

The B-25 comes complete with aluminum cowls which match the firewall perfectly. For added realism they can be notched to simulate cowl flaps. Pre-formed landing gear is furnished, however, retracts can be fitted with a little extra work. We used Rhom-Airs after reversing the main gear cylinders to provide wheel clearance. Other accessories included were bellcranks, control horns and wing bolts. Although Royal provides an excellent "green house" for the bombardier, our version was converted to a B-25J with a solid nose. This version was flown by the 345th bomb squadron in the Pacific.

Now about flying --- this is a big model but **don't** overpower it. Two .35's or .40's will provide more than enough power for superb flying. With two K & B .40's on a grass runway expect lift-off in about 100-125 feet. Once in the air and with gear up, you can throttle back to about 2/3 power and enjoy that "special sound" that only twins provide. Landing is no problem if you just remember one rule --- don't try a go-around on one engine. If one should quit, then take what you can get without jamming the throttle forward. That's a pretty good rule for any twin.

All in all, the Royal B-25 appears to be a very reasonably priced model considering the engineering involved in its development and the quality of materials provided. It is an excellent kit for an experienced builder. With more detailed plans and instruction booklet, it would be a good twin project for any good flyer.

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			NA			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

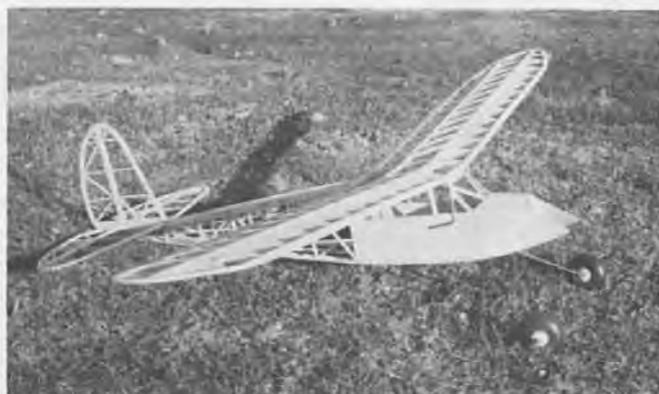
Name	No. American B-25
Aircraft Type	AMA or Sport Scale
Manufactured By	Royal Products 790 W. Tennessee Ave. Denver, Colorado 80223
Mfg. Suggested Retail Price	\$99.95
Available From	Mfg. & Retail Outlets
Mfg. Recommended Usage	Sport or Stand-Off Scale
Wing Span	71 Inches
Wing Chord	11 Inches
Total Wing Area	750 Square Inches
Fuselage Length	54 Inches
Radio Compartment Dimensions	(L) 13" x (W) 3" x (H) 2 1/2"
Wing Location	Mid-Wing
Airfoil	Semi-Symmetrical
Wing Planform	Double Taper
Dihedral (each tip)	Gull Wing
Stabilizer Span	25 1/2 Inches
Stabilizer Chord (incl. elev.)	7 1/2" (Avg.)
Total Stab Area	191 Square Inches
Stab Airfoil Section	Flat
Stabilizer Location	Top of Fuselage
Twin Vertical Fin Height	9 1/2 Inches
Vertical Fin Width (incl. rud.)	6" (Avg.)
Mfg. Rec. Engine Range	.40-.60 Cu. In.
Recommended Fuel Tank Size	8 Oz.
Landing Gear	Tricycle
Recommended No. of Channels	4-6
Recommended Control Functions	Rud., Elev., Throt., Ail., Ret.
Basic Materials Used In Construction:	
Fuselage	Balsa
Wing	Balsa
Tail Surfaces	Balsa
Hardware Incl. In Kit	See Text
Plan Size	38" x 59" (2 sheets)
Building Instructions on Plan Sheets	Yes
Instruction Manual	Yes (4 pages)
Construction Photos	No
Kit Includes	Die-Cut Parts
Mfg. Rec. Flying Weight	144 Oz.
Wing loading based on rec. flying wt.	27.65 Oz./Sq. Ft.

RCM PROTOTYPE

Weight, Ready To Fly	152 Ounces
Wing Loading	29.17 Oz./Sq. Ft.
Covering & finishing materials used	See Text
Engine Make & Disp.	(2) K & B .40's
Muffler Used	No
Radio Used	Kraft Series 78
Tank Size Used	8 Oz.

RCM PRODUCT TEST

M & P QUAKER 54



The Quaker 54 is a scaled down RC version of the old time free-flight Flying Quaker originally kitted by Megow Models of Philadelphia. This resurrection of the famous model was designed by Dick Mathis and is kitted by M & P, Box 338, Lone Oak, Texas, 75453.

The Quaker 54 with its 54" wingspan is about 2/3 the size of the original but still retains the same outline, and stick and stringer type of construction, beefed up, as required, for radio control and the moderate overstress generated by the additional weight of the radio gear.

The fuselage is constructed of 3/16" square balsa longerons and cross braces from the cabin area rearward, surrounding a 3/16" balsa side piece from the nose to the cabin area rear brace. This method of construction gives the strength of full length longerons while still giving additional structural rigidity in the critical nose area. To provide still more beef, the bottom of the fuselage from the nose to the rear of the cabin is sheathed with 1/8" sheet balsa. Fuselage shape is obtained through two plywood and two balsa formers. One of the plywood formers is used as a firewall while the other is slanted to the rear to provide a solid base for the landing gear. As in many old time free-flights, the landing gear legs are angled forward, which not only provides some propeller protection, but also adds to the character of the model.

The wing is constructed completely of balsa and is built in three pieces --- the center section and two outer panels, epoxied together with adequate bracing to withstand moderate stresses. If the model is to be used for aerobatics or high stress maneuvers, we suggest the use of hardwood spars, spar webs and plywood dihedral braces. As designed,
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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

SPECIFICATIONS

Name QUAKER 54
 Aircraft Type Sport Old Timer
 Manufactured By M & P
 P.O. Box 338
 Lone Oak, Texas 75453

Mfg. Suggested Retail Price \$29.95
 Available From Both Mfg. & Retail Outlets
 Mfg. Recommended Usage Basic Powered Trainer
 Wing Span 54 Inches
 Wing Chord 7 1/4 Inches
 Total Wing Area 390 Square Inches
 Fuselage Length 39 Inches
 Radio Compartment Dimensions (L) 8 3/4" x (W) 2 3/4" x (H) 4 3/4"
 Wing Location High Wing
 Airfoil Flat Bottom
 Wing Planform Constant Chord
 Dihedral (each tip) 3 1/2"
 Stabilizer Span 16 Inches
 Stabilizer Chord (Incl. elev.) 6 1/2" (Avg.)
 Total Stab Area 117 Square Inches
 Stab Airfoil Section Flat
 Stabilizer Location Top of Fuselage
 Vertical Fin Height 8 Inches
 Vertical Fin Width (Incl. rud.) 6" (Avg.)
 Mfg. Rec. Engine Range09-.15 cu. In.
 Recommended Fuel Tank Size 2-4 Ounce
 Landing Gear Conventional
 Recommended No. of Channels 2-3
 Recommended Control Functions Rud., Elev., Throt.

Basic Materials Used in Construction:

Fuselage Balsa & Ply
 Wing Balsa
 Tail Surfaces Balsa
 Hardware Included in Kit See text
 Plan Size 30 1/2" x 56" (1 sheet)
 Building Instructions on Plan Sheets No
 Instruction Manual Yes (4 pages)
 Construction Photos No
 Kit Includes Shaped Parts
 Mfg. Rec. Flying Weight 35 Oz.
 Wing loading based on rec. flying wt. 12.9 Oz./Sq. Ft.

RCM PROTOTYPE

Weight, Ready To Fly 37 Ounces
 Wing Loading 13.5 Oz./Sq. Ft.
 Covering & finishing materials used See Text
 Engine Make & Disp. Enya .15
 Muffler Used Tatone
 Radio Used Ace Digital Commander
 Tank Size Used 4 Oz.

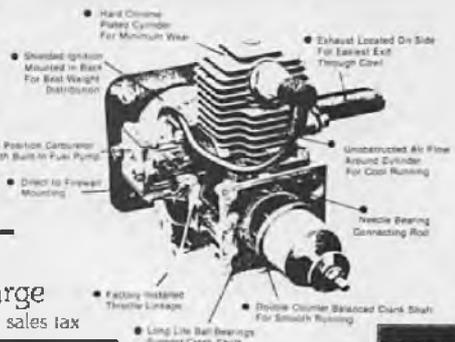
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QUAKER 54

from page 91

the wing has adequate strength for normal prototype flying and its four spar design with braced wing tips give it adequate rigidity and warp resistance.

The tail surfaces are built entirely of balsa strip with sufficient diagonal bracing for a good stiff structure.

Hardware included was minimal, consisting of two sets of control horns, plastic for the cabin windows, and a formed wire landing gear. We did not find this a hardship since we had the required hinges, clevises and wheel collars on hand.

Our test model was covered in transparent MonoKote, red on the fuselage and vertical tail and yellow on the wing and horizontal tail. It was powered by an Enya .15 with a Tatone muffler with about 3 degrees of downthrust added to reduce looping tendencies on take-off. Control is through an Ace Digital Commander with Bantam servos and a 450 ma battery pack. A Sullivan SS4 tank was used which gave more than adequate duration for the Enya .15, particularly since this model needs a lot less than full throttle for flight.

The best way to describe the flight characteristics of this bird is one word — gentle. Although not a sailplane, it has a remarkable glide, inherited, probably, from its ancestors in the days of free-flight. It is slow and stately and gives the pilot time to relax and enjoy the flight. As built, we have done loops and slow rudder rolls but, since we did not beef up the wings for aerobatics, we limited ourselves to these two maneuvers. Even then we played the throttle to reduce overstress due to high speed or excessive G forces. Take-offs are a breeze. As soon as the throttle is opened the wheels start to roll, the tail rises, and rudder control is attained.

With the .15 engine in our test model, about 3/4 throttle gave a good smart climb-out after a short take-off run. Once in the air we reduced to about 2/3 throttle for climb and flew level at 1/3 to 1/2 throttle. After the powered portion of the flight, it seemed as if she would glide forever. Once trimmed for the glide, only rudder was necessary to make it land where you wanted it. Wheel landings (reminiscent of the old free-flight days) didn't even require elevator control. Three point landings usually result in a nose high float across the field before a gentle squat on the Trexler's.

For the old timer, or for the short timer who wants "to relive the days of yesteryear," we highly recommend the Quaker 54. □



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An electrical check is not sufficient, batteries should be inspected visually also. Specially designed case for quick, easy, inspection of your nicad battery. Catch corroded cells, weak or broken connections and pinched wires before they cause a crash. Easy to install. Not necessary to remove wires or connectors from your present cells. Available in sq. or flat type for 500 ma cells, flat type for 450 ma cells.

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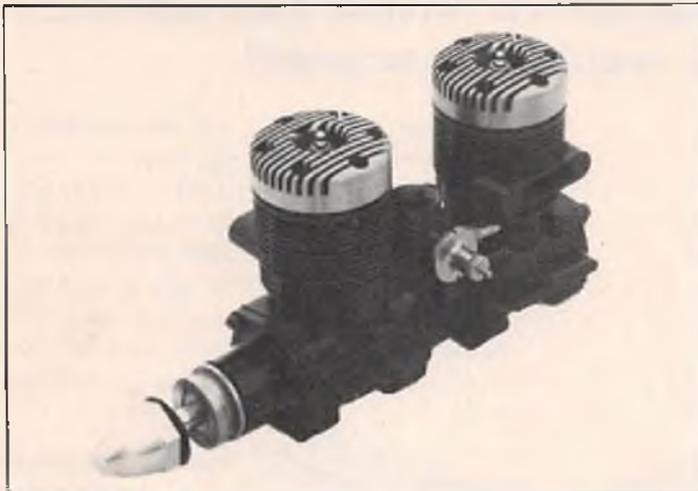
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SPECIFICATIONS

Displacement	19.9 ccm (1.20 cu. in.)
Weight	970 grams (34 1/2 oz.)
Length	6-3/8 in.
RPM Range	1800 to 14000
Horsepower	3.13

Suggested list price \$350

(Specifications subject to change without notice. Glow plugs not included.)

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FORMICATOR

from page 76

Read and follow the instructions and you will have quality formed parts. After you have built the Formicator you will need a good vacuum source (shop or household vacuum) and the kitchen oven --- **not a microwave oven!**

Follow the instructions and build a mold of the part or parts you want to form. Remember, vacuum forming is intended to make multiple or spare duplicate parts, and it is a waste of building time to make a mold for only one piece (**except** when fabricating a custom part, such as a canopy or cowl, where a mold must be made). Also, as in my case, it was easier to make a mold of the spinner on the lathe and pull the part than to have carved one. The cowl was formed because the fuselage was made of plastic. On small item, make several molds (as many as practical) to be pulled from the 8 1/2" x 17" sheet.

When making a mold for a canopy do not fill and polish the mold. If the mold is too smooth or filled too much, moisture will be trapped under the heated plastic and blushing will occur. The molds need not be ultra sophisticated, just smooth.

The molding operation is quite simple --- follow the instructions, they will tell you the right way to do it.

In conclusion, the Formicator is a low cost vacuum former (retail \$39.00) that a hobbyist can afford and utilize. Follow the instructions, they do an excellent job of covering all aspects of the Formicator. Wear your pot-holder mittens and have fun. □



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Under the OS 90 marine pictured on the left, is a new 72 page World Engines catalog and price. These are available for \$1.00. It lists the OS and Supertigre engines in current production and the parts for each engine. This is a handy document to have if you are operating an OS or Supertigre engine. You can show this catalog and part number to your dealer when you are asking him to order a part from us. Or, if you order the part directly from us, you can nail it down by giving us our catalog number. We have also included things like crankshaft/thread sizes, mounting dimensions, list of carburetors and carburetor parts, and a list of all the domestic items that are available to our dealers from World Engines.

O.S.

OS 90 RSR MARINE

This engine will be available from World Engines sometime in August. The retail price will be approximately \$299.95. The engine is equipped with the 7E throttle with flywheel and a water cooled head. Also, a water cooled cylinder jacket, Rear induction. A forward facing pipe elbow will be available for tuned pipe users.



1979

World Engines

Catalog Num

WORLD'S

Products Available From:

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Covina Hobby Center
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Covina, CA. 91722

Evet's Model Shop
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Santa Monica, CA. 90405

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1935 Ocean Ave.
San Francisco, CA. 91127

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San Francisco, CA. 94118

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San Francisco, CA. 94108

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Palmdale, CA 93550

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Bristol, CT. 06010

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4734 Milwaukee
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West Side Hobby
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Belleville, IL. 62221

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Bremen, IN. 46506

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Corydon, IN. 47112
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2015 Ewing St. Rd.
Seymour, IN. 47274

Westside Hobby Shop
Old US 30 W. (at city limits)
Plymouth, IN. 46563

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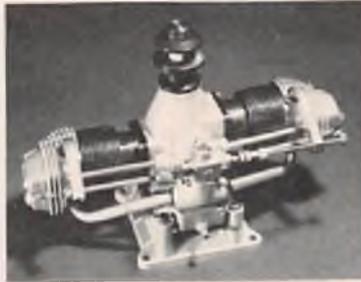
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Concordia, KA. 66901

Modeler Hobby Shop
1725 S. Hillside
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OS TWIN



Prototypes of the OS 120 four cycle twin first appeared in the early spring of '78. We displayed one of these at the 1978 Toledo Show. A later and nearer to a production version was shown this year at the 1979 Toledo Show and we are advised that a very small production run will be shipped to us in July 1979. This engine has two .50 cu. in. cylinders for a total displacement of 1.20 cu. in. Glow plug ignition is used. The cam to work the push rods on the engines is driven by a gear

ed cam drive driven by the crankshaft. Improvements that are obvious from the early prototypes are improvements in the production die casting in the rocker covers, in the rocker rod guides and, in general, on the appointments of the engine. We do not anticipate that OS will ever build huge quantities of this engine, however, we hope to be able to supply the market from stock by, say, Christmas in 1979. The retail price has now been established - \$695.00.

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SHOWCASE '79

from 88/84



patterns furnished, to covering and installation. For those of you not familiar with foam cutting techniques, or not having the equipment to do so, these floats are now available from DJ's Hobbies, 2025 NW Circle Blvd., Corvallis, OR 97330. They are priced at \$6.50 per pair, postpaid, and include instructions on mounting and set-up. □

PIT STOP

from page 71/70

had McCoys new can muffler mounted in front of the left rear tire. On the whole, the K & B's were faster and quicker than the OPS. Not a whole lot — but enough. The English were running their normal 40 to 50% nitro with special oils, and we were running 10 to 30% nitro with castor oil.

Saturday was the final 2 rounds of qualifying. Two men just simply stole the show in qualifying. They were in a class by themselves, and the rest of us were in another class. In the 2nd qualifying round, Bill Jianas just literally tore the track up, turning an incredible 33.2, but right on his tail was Rick Davis with 32.9!! Phil Booth, from England, had 3rd best with 31.6 and Arturo and myself were tied at 31.5. The final round was a repeat performance with Jianas again on top with 32.8 and Rick again in 2nd with 32.0. 3rd spot went to Jack Jacobs with 31.9 and Arturo 4th with 31.6.

Sunday was time for the Main Events. With TV coverage the previous 2 days, there was a good crowd of spectators on hand. The "C" Main had some International flavor with Ted Longshaw from England and Patrick Gabiani from Monaco. But this race belonged to Will Petty who drove a very fast, error free race to win it, with a hard charging Joe Zimmerman right behind to take 2nd and Oswaldo de la Rosa, from Venezuela, in 3rd.

The "B" Main featured a father daughter team of Dave and Debbie Preston from England, and also Wally Bailey from England. Unfortunately, Debbie lost an engine after 4 laps and Dave lost his after 54 laps. After 5 laps,
 to page 100



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- .25 44.95
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- .61 PDP 84.95

(All engines have ball bearings. Add \$7.98 for .40 and .60 mufflers.)

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- Jig pre-built fuselage, you only add tail-feathers and other minor finishing
- A truly "forgiving" trainer - requiring only 3 ch. operation to have .40 size flying ease

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- Craft Air Windrider 34.95
- Craft Air-Sailaire 89.95
- Legionair 140 84.95
- Legionair 132 71.95
- Legionair 100 57.95
- Shuttle 78 33.95
- Shuttle 100 39.95
- Shuttle 132 49.95
- Aquila 47.95
- Square Soar 14.95

Butterfly II, \$49.95 39.95
 All Others - Call For Price

ACE KITS

- Ace Up Start (17.95) \$13.95
- All Star Biplane (24.95) 19.95
- Pacer (19.95) 12.95
- Wizard (18.95) 13.95

FLIGHT GLASS

- Saturn Basic \$59.95
- Saturn Delux 79.95
- P51 Special 59.95
- P-51 Delux 89.95

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 - Kraft 7C... CALL FOR BEST PRICE ON RADIOS ?
 - Kraft 5C... ?
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 - Kraft-KP4... ?
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IF WE DON'T GOT IT WE'LL GET IT FOR YA'

A WIDE ANGLE LENSE SHOT OF THE 140" WING SPAN MAESTRO MEGAN. Photo by TOM CULMSEE

AT LAST

THE MAESTRO MEGAN!

FUSELAGE & CONTROLS - The Maestro Megan utilizes the fiberglass Maestro series fuselage and control system: rudder, elevator, coupled flaps and ailerons (flaperons) and top & bottom spoilers. (Requires 3 or 4 channels.)

WING - The Megan wing is supplied with a basic (a) 128" span plus parts & materials to construct plug-in wing tip extensions that yield a total span of (b) 140".
Wing Area - (a) 1,216 sq. in., (b) 1,300 sq. in.
Aspect Ratio - (a) 13.5 to 1, (b) 15 to 1
Wing Loading - (a) 8 oz per sq ft, (b) 7.5 oz per sq ft.
Airfoil - The new Eppler 193 that is sweeping Europe!

FLYING WEIGHT - 68 oz.

ONE OF THE BIGGEST SURPRISES about the Megan is that it is ONE OF THE EASIEST HIGH-PERFORMANCE OPEN-CLASS COMPETITION SAILPLANES TO FLY while at the same time being the most SOPHISTICATED. The Megan has the ability to HANG IN ON DEAD AIR OR LIGHT LIFT with the slowest floaters, CRUISE AND PENETRATE with the lead sleds and OUT MANEUVER AND OUT PERFORM them all. WHILE THE MEGAN HAS ONLY BEEN ON THE MARKET FOR A FEW MONTHS IT HAS CREATED AN INSTANT SENSATION WITH MAJOR CONTEST WINS!

PRICES EFFECTIVE MAY 1, 1979.

Full Megan Kit ... \$144.95,	Megan Wing Kit ... \$85.00
Full Mk 111 Kit ... \$129.95,	Mk 111 Wing Kit ... \$70.00
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SEND 2 U.S. STAMPS FOR OUR CATALOG AND NEW PRICE LIST. THE DOGSON DESIGNS FACTORY AT CAMANO ISLAND, WA. (U.S.A.), IS THE SOLE MANUFACTURER AND DISTRIBUTOR OF DOGSON DESIGNS PRODUCTS. DO NOT BE FOOLED BY FOREIGN IMITATIONS AND NAMESAKES!



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PIT STOP

from page 98/70

Curtis Husting had the lead until 22 laps when he lost a steering servo. Rod Galloway then took over the lead and held it all the way to the win with Alejandro Manrique, from Venezuela, right behind to take 2nd, Steve Sanders in 3rd and Wally Bailey 4th.

The "A" Main was next! Rick Davis got a great start and took over the lead, but in 5 laps Jianas passed Rick for the lead. The 2 of them then raced together for 30 laps. I was in third place with Phil Greeno fourth. On the 35th lap Jianas and Davis were coming up to lap Keith Plested, but Keith spun out and Davis hit Keith first and then Jianas hit Keith, taking Keith out of the race. About the 50th lap I started having radio range problems and Mike Rowland and Phil Greeno both passed me. Jianas started to pull away from Davis, but about the 65th lap Jianas and Arturo both lost the rubber from a front wheel. Jianas continued running on 3 wheels but Arturo pulled his car off the track. Davis then took over the lead and started pulling away. I found my radio range problems were because I had my transmitter antenna pointed horizontally at the car. As soon as I pointed the antenna vertically the car was good again and I passed Jianas, who was really running extraordinarily well for only having three tires, and a short time later I passed Greeno again to take, over third. Rick Davis went on to win with an 80.5 lap total. Mike Rowland, who seemed to get stronger as the race went on, was a close 2nd at 79.3. I was a half a lap back at 78.8, Greeno right behind at 78.6 and Jianas right behind Greeno, on 3 wheels, at 78.4! A really close, exciting Main Event.

To diff or not to diff? Half of the cars in the Main had diffs and half didn't. The 1st, 3rd, 5th, 7th, and 10th place cars had solid axles and the 2nd, 4th, 6th, 8th, and 9th place cars had diffs, which is about as even as you can get. The AMPS diff was on the 2nd, 4th and 6th place cars and the PB diff on the 8th and 9th cars.

I was talking with Phil Booth, from England, after the race and Phil said "Gene, how come all your K & B's didn't blow up?" I said, "Phil, it seems as though you had more problems with the OPS than we had with K & B." He said, "That's right. We had to turn our OPS's much faster than we've ever turned them, to keep up with you, and they didn't hold up." I don't believe the race was won or lost on horsepower because the cars were all fairly close on horsepower. The last thing Phil did was inquire about the McCoy race at Thorp Raceway on June 9 & 10. He said he was 95% sure they were going to run in it. That should be another good race. □

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SHAWNEE MISSION R/C CLUB

Calendar of Events 1979

4th Annual SMRCC Spring Novice Pattern Contest, C.D. Richard Meyer May 6, 1979

SMRCC Spring Fun Fly C.D. Pat Little May 20, 1979

SMRCC Father's Day Metcalf R/C Static Display June 15, 16, 17, 1979

SMRCC Spectator Day June 24, 1979

Annual SMRCC Pattern and Scale Competition, C.D. Charles Swain July 15, 16, 1979

SMRCC Glider Competition August

Richard Gebauer AFB Open House Good Neighbor Day R/C Static Display September 1, 2, 1979

SMRCC Fall Fun Fly C.D. Pat Little October 14, 1979

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A way that eliminates long hours in the
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WELCOME TO TOWER

WHO IS TOWER HOBBIES ? Tower Hobbies is the largest, finest, fastest, friendliest, and the most progressive Radio Control Mail Order Company in the United States. Tower Hobbies is not a little hobby shop that sells mail order as a sideline, but rather we are a highly specialized and efficient volume merchandiser. Tower's quantity purchasing and efficient order processing add up to fantastic savings and excellent service for our more than 50,000 active customers. Very simply, Tower Hobbies is the only RC supply company you'll ever need!

REPUTATION - Tower Hobbies has been courteously and honestly supplying modelers since 1971. Tower is a reliable company that you can depend upon for excellent quality, low prices, and outstanding service. Don't take a chance dealing with those little "here today - gone tomorrow" companies when you can deal with the best at no extra cost. Tower Hobbies is NUMBER ONE because we know that you are the most important part of our business. And that is something we never have nor ever will forget!

DISCOUNT PRICES - Tower Hobbies is the most competitive company in the hobby. Your hobby supplies cost you less from Tower because our volume purchasing and sales allow us to work closer than anyone else in the business. We would rather sell 10 radios at \$10.00 profit each than to sell one radio at \$100.00 profit - and that means super savings for you! Tower sells only brand new, brand name merchandise and we sell it at super discounts. Can you think of any reason why you should pay more for exactly the same product elsewhere?

FAST SERVICE - Tower Hobbies is the home of fast service! As soon as we receive your mail order or take your order over the phone we begin to process it immediately. We check your file for make a new one for new customers), check over your order, computer process it, check it again, pick it, pack it, and then ship it RIGHT AWAY! You receive exactly what you ordered in a carefully wrapped package that is courteously delivered by United Parcel Service (or Parcel Post if requested) within 1 to 5 days depending upon where you live. You never have to leave home - no heavy traffic, stuffy crowds, or discourteous salespeople when you deal with Tower Hobbies!

TOLL FREE PHONES - Tower Hobbies was the first to offer Toll Free "800" phone service to its customers. With the Toll Free lines you can call Tower at no charge to yourself to place orders, check on availabilities, and check current prices. Your telephone is a straight connection to the largest and finest R/C inventory in the United States - it's fast, easy, and free of charge.

COMPUTER POWER - Tower was the first and as far as we know still the only mail order company in the hobby to keep track of inventory, remember backorders, and process all orders with a computer. This enables us to keep errors to an absolute minimum which means that you don't have the headache of receiving wrong merchandise, being billed incorrectly, or having your backorders forgotten or misplaced. Tower processes your order quickly and correctly this time, next time, and everytime!

EXTENSIVE INVENTORY - Tower Hobbies has the largest and most complete inventory of radio controlled model airplane supplies and related accessories in the United States. Tower carries over 145 manufacturers lines including: Airborne, Ace, Aerotrend, A.F.I., Air-Forms, Airtronics, A-Justo-Jig, Ambroid, Andrews, American RC Helicopters, Associated, Austin Craft, B&D, Badger, Banner, Bolink, Bridi, Cass, C.B. Associates, Corefilm, Coverite, Cox, Craft-Air, Custom Retracts, D&R, Dada, D.A. Enterprises, Devcon, Dodgson, Dremel, Du-Bro, Dumas, Econokote, Edson, Enya, Eveready, Exhib'air, Fliteglas, Fox, Fusite, Futaba, Gas Model Products, Gee Bee, Goldberg, G.M.C. Models, Grish, Hallico, HB, Hobbypoxy, Hot Stuff, House of Balsa, Hobby Products, Jemco, Jensen, Jet Hangar Hobbies, K&B, K&S, Kavan, Kraft, L&L, Lanier, Latrax, Leisure, L.R. Taylor, Mark's Models, M.E.N., Microflame, Michigan Hobby Hangar, Mile High Models, Midwest, Milman, Miller, Model Dynamics, Monokote, M.R.C., Steve Muck's, Bud Nosen, Octura, Ohio Superstar, OPS, Orline, O.S. Max, Pactra Aerogloss, Panavise, Pacer, Peerless, Perry, Pica, Powr-Mite, Prather, Proctor, Power Pacer, Quadra, R&S, R/C Buyers Guide, RCM, Rocket City, Rev-Up, Robart, Rhom, Rossi, Royal, RTC Models, S&O, Sanwa, Schluter Helicopters, Scozzi, Sealector, Semco, Sig, Simmons, Skyglas, Slimline, Solarfilm, Soarcraft, Sonic Systems, Southwestern, Span Aero Products, Spickler, Su-Pr-Line, Southern RC, Sta-Brite, Stafford, Sterling, Supertigre, Sonic Tronics, Sullivan, Sureflite, Tarno Aero Engines, Tatone, Titebond, Top Flite, Tower Hobbies, Trexler, Universal, V.K., Vortac, Webra, Williams Bros., Wing Mfg., Wilhold, World Engines, Wescraft, X-Acto, and Zinger!



The front office file area is a busy place! Over 50,000 active customer files fill up 100 file cabinets. Can we make a file for you?



The warehouse final checking and packing area processes over 500 packages each day. You'll enjoy receiving packages from Tower!



Good afternoon - Tower Hobbies! Part of our phone staff answering our Toll Free lines. We want to take your orders, answer questions etc.



Our computer operators enter your order on the terminals. The computer quickly and accurately generates an errorless invoice just for you.



Now where did those rear valve ABC schneurlies with Perry pumers go? Tower has the largest and finest RC inventory selection available.



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TOWER HOBBIES

P.O. BOX 778 CHAMPAIGN, ILLINOIS 61820

\$\$ SUPER SPECIALS OF THE MONTH \$\$

The following Tower Hobbies pages represent super savings for you on hundreds of popular items; specially selected for you from our huge, several thousand item inventory. This page gives you complete information on how to place your order with Tower Hobbies, and how to obtain any other information that you may need relative to that important purchasing decision.

The special stock numbers must be used for the super special prices to be honored. Tower will do everything possible to keep all special items in stock throughout the special; however, if necessary, Tower reserves the right to cancel and/or place limits on any or all items. For your convenience, Tower will accept backorders for only those items which we will be able to deliver within a reasonable amount of time. All of our super special prices are subject to change if the manufacturers retail prices change during the sale period.

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Ordering your modeling supplies from Tower Hobbies is just as fun and easy as sitting in your favorite lounge chair. You'll never have to worry about fighting a crowd, and when you deal with Tower Hobbies you're always assured of getting low, low sale prices, the best selection, and the best help and advice that you can possibly get ANYWHERE in the world. There are two easy ways to order:

BY TOLL FREE PHONES

When you place your order over the phone we will ship it to you C.O.D., and you pay for it when it's delivered to your door.

When you phone in your order, please have the stock numbers written down ready to give to the order taker.

800-637-7686 CONTINENTAL UNITED STATES (EXCEPT ILLINOIS)

800-252-3336 ILLINOIS RESIDENTS ONLY

The "800" WATS lines are open weekdays from 9:00 A.M. to 5:00 P.M., Monday through Thursday evenings 5:00 P.M. to 9:00 P.M., and 10:00 A.M. to 5:00 P.M. on Saturdays. Closed Friday evenings and Sunday.

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If you have a Tower order form, please use it. If not, then just use any piece of paper or stationery. Write down all of the items that you want along with their special stock numbers and prices. Total them up (Illinois residents add 5% sales tax) and add \$2.00 for postage, handling, and full insurance, to obtain the grand total. Obtain a money order, certified check, bank check, or write a personal check for the grand total amount (personal checks may be delayed to allow for clearance). Foreign orders add \$10.00 (excess will be refunded with order). Date of postmark determines special period eligibility. Send your order along with full payment to:

TOWER HOBBIES
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HOW TO GET INFORMATION FROM TOWER

The following list gives our other phone numbers and a brief description of why and when to call them. Please write these down for future reference, or just save this page.

217-384-1010: This number can be used by anyone from anywhere in the world to PLACE AN ORDER with our phone sales staff. Primary usage comes from foreign customers or from Alaska, Hawaii or Puerto Rico, however, anyone can use it.

217-384-1097: This number is a HOT LINE direct to the desk of Bill Baxter, who is our resident RC expert. If you have a technical question or a problem you need help with then call Bill on this number. It is answered on Monday through Friday from 9:00 A.M. to 5:00 P.M. only.

217-384-7217: This number is a HOT LINE direct to our main office. If you should have a question about an order such as when it was shipped, then call this number. Our office staff will immediately look up whatever you need to know and give you an instant answer to your question or problem, Monday through Friday, 9:00 A.M. to 5:00 P.M. only.

REMEMBER, THESE ARE ONLY A FEW OF THE SEVERAL THOUSAND DIFFERENT ITEMS THAT TOWER HOBBIES STOCKS. IF YOU NEED AN ITEM THAT DOESN'T APPEAR IN THIS ISSUE, GIVE US A CALL TO SEE IF WE HAVE IT; CHANCES ARE GOOD THAT WE DO. BY ALL MEANS COMPARE OUR PRICES BEFORE YOU BUY ELSEWHERE; YOU'LL BE DOLLARS AHEAD!!

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- ... You want to check on current prices
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- ... You want to do business with the BIGGEST AND THE BEST!

ORDERING INFORMATION GUIDE



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These Specials Are Good Until The 15th Of The Month Of
This Issue. All Special Prices Are Subject To Change If
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TOWER IS DEDICATED TO OFFERING YOU THE VERY BEST VALUE AND SERVICE THAT IS POSSIBLE! IN KEEPING WITH THIS PHILOSOPHY, WE HAVE RESEARCHED THE INDUSTRY WITH PAIN-TAKING CARE TO FIND OUT EXACTLY WHAT YOU WANT IN A RADIO CONTROL SYSTEM.

YOU WANT QUALITY! That's why we took our Radio Control System Formulas exclusively to Kraft Systems, Inc., of California to be manufactured to our exact specifications. Kraft quality is absolutely unparalleled by anyone else in the world. Kraft's outstanding success is attributed to their experience, high standards for materials and production, and quality control systems. Kraft means quality in every detail. For example, our rugged servos are made of tough ABS plastic which helps them live longer. Our sockets are gold plated beryllium copper, crimp connected to machine-cut and stripped wire to assure you reliable conductivity. The plastic plug body extends over the wiring insulation to prevent stress at the junction between the pin and the wire. Not only is this wiring method inherently more reliable than soldered connections, it also insures uniform quality. Tower Hobbies is the most reputable RC distributor in the business. Tower Hobbies and Kraft Systems make an unbeatable combination! Just ask any one of the thousands of modelers who own one of our fine digital proportional radio control systems!

YOU WANT VALUE! Tower Hobbies radios give you absolutely the maximum amount of radio for the least amount of money -- and that's value! There is nothing cheap about a Tower radio. The design is the latest, the manufacturer is the finest, the quality is peerless, and the service is second to none. So how then can the price be the lowest in the industry? Simple. Tower's tremendous buying power allows us to create economies due to volume -- and there are no middlemen between us and the manufacturer to artificially jack up the price. You're paying the bottom dollar price for the top of the line product.

YOU WANT PRECISE, TOTAL CONTROL! All of our receivers have double tuned R.F. sections to minimize harmonic type interference and all have special noise rejection circuitry permitting their operation even under the most adverse conditions. Both Tower systems feature a dual function meter that allows you to check RF and absolute battery voltage. This allows you to monitor your flying time and to check for possible cell malfunction. This deluxe feature is usually found only on systems in the \$500.00 price range. All of our servos use an integrated circuit amplifier to produce centering and tracking accuracy better than 1/2%, virtually zero drift with changes in temperature and voltage, uniform duty cycle in both directions, smoothness, and excellent damping characteristics. The reference potentiometer element is driven directly from the output drive. This is extremely important for servo accuracy! Our control sticks give you a true, accurate feel for precision flying, and the popular closed gimbal configuration protects the transmitter from the elements for a longer life. We were thinking about your desire for precise, total control when we designed our powerful, yet light weight airborne systems! This gives you greater maneuverability, and faster climbing, acceleration, and top speed potential.

YOU WANT PRESTIGE! Radio Control Modelers represent an artistic breed of people who demand quality detailing, and can appreciate the most subtle esthetic appeals. Tower radios were designed with this in mind, of course. There is just something very elegant about that rich ivory color accented with black trim pieces. That's in keeping with the total quality feel of Tower radios -- that first class feeling. With Tower Hobbies radio control systems you go first class in quality, performance, and appearance. When you show up at the field with a Tower radio, everyone will know that you're a person who demands only the finest value. Your choice of a Tower radio shows you're a smart shopper!

YOU WANT FLEXIBILITY! Tower radios will give you the widest range of applications and the greatest performance that you could possibly ask for. The top of the line Tower 6 channel system is perfect for all radio control applications from 1/4A to pattern ships. The top of the line Tower 3 channel system is perfect for small aircraft, gliders, boats, and cars; lightweight, yet very rugged. The Tower 6 and Tower 3 components are fully compatible with the previous Tower 5 model as well as the entire line of Kraft Systems radios (except for the "A" Series). This gives you the greatest accessory and feature availability in the industry -- interchangeable flight packs, servos, trays, output arms, or almost anything else from the Kraft line-up of outstanding products.

YOU WANT ASSURANCE! Even in consideration of the meticulous care that goes into every Tower radio, you know that nothing on Earth is truly perfect. Our Tower radio control systems are warranted against defects in materials and workmanship for 180 days from the date of purchase. There are six Tower Hobbies Service Centers across the United States authorized to perform warranty repair work. If you should need repair work after the warranty period, any one of dozens of Authorized Kraft Service Centers can perform such work for you.

ORDER NOW! Both systems are in stock for immediate delivery on the 72 MHz frequency of your choice. Call Toll Free right now for immediate COD delivery, or send your order in the mail along with the purchase amount plus \$2.00 for postage, handling, and insurance. If you are not 100% satisfied with your Tower radio after receiving it, then simply send it back in original condition within 10 days for a full purchase price refund.

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TOWER SIX CHANNEL SYSTEM - The Tower 6 channel transmitter comes in the popular 2 stick closed gimbal configuration. Standard equipment includes a fully proportional fifth channel, toggle switch sixth channel, choice of four KPS-14 or KPS-15 servos, lightweight slimline high range receiver which is very convenient to install, nicad transmitter battery pack, powerful 550 MAH nicad receiver battery pack, charger, switch harness with external receptacle for charging convenience, servo trays, full servo accessories, and a dual function meter that indicates both RF and absolute battery voltage. The Tower 6 channel system has an airborne pack weight of only 11.9 ounces with the 14's and 13.5 ounces with the 15's.

With KPS-14's - ONLY \$199.95 (Stock No. RCM205)

With KPS-15's - ONLY \$209.95 (Stock No. RCM121)



GET A TRANSMITTER NICAD
BATTERY NOW AND MAKE YOUR
TOWER HOBBIES 3 CHANNEL
ALL NICAD! ONLY \$14.98!
STOCK No. RCM203
RADIO AND NICAD BATTERY MUST BE
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TOWER THREE CHANNEL SYSTEM - The Tower 3 channel transmitter comes in the popular single stick closed gimbal configuration. Standard equipment includes a fully proportional third channel, two KPS-14 servos, lightweight slimline high range receiver which is very convenient to install, powerful 450 MAH nicad receiver battery pack, charger, switch harness with external receptacle for charging convenience, servo accessories, and a dual function meter that indicates both RF and absolute battery voltage. The dry cell transmitter (battery not included) can easily be converted to nicad operation by adding a nicad pack. The Tower 3 channel system has an airborne pack weight of only 7.9 ounces.

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RETAIL \$210.00

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RETAIL NOW ONLY \$2.38
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R/C LONG GLOW PLUGS

These excellent glow plugs feature an idle bar. Made by the world's finest plug manufacturer especially for Tower. 6 plugs per package. The best buy anywhere!



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\$7.50 RCM002

COX READY TO FLY SPORTAVIA 30% OFF
THE PERFECT TRAINER



This ready-to-fly foam design has been acclaimed by many flyers to be undoubtedly the best trainer ever for the first-flight beginner. Its 70" span, slow flight, and unbelievable stability make it a beginner's dream. It comes complete with a Cox .049 engine and all hardware installed. Molded cavities inside the fuselage are designed so the Sanwa No. 8020 2 channel radio drops right into place. With very little change any 2 channel works great. Factory finished in gleaming white with pressure sensitive decals. No building required. Be in the air in less than 1 hour. Radio not included.

RETAIL \$84.95 NOW ONLY \$59.48 RCM014

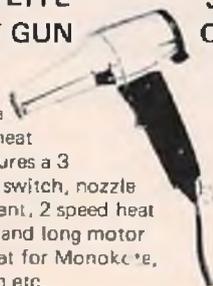
STERLING 39% OFF
1/2 A CORSAIR



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\$31.95 RCM003

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\$29.95 RCM005

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This 2 channel favorite comes with 2 micro servos which will fit into the smallest airplanes, gliders, cars, or boats. It is designed to drop right into the Sportavia and Centurion. 11 pencil batteries are required.

RETAIL NOW ONLY \$69.98
\$99.95 RCM105

FUTABA 30% OFF
FP-2GS 2 CHAN. RADIO



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This fiberglass tunnel hull with pickle fork bow is 27" long and is very competitive. Add the K&B .21 outboard engine and a 2 ch. radio and go!

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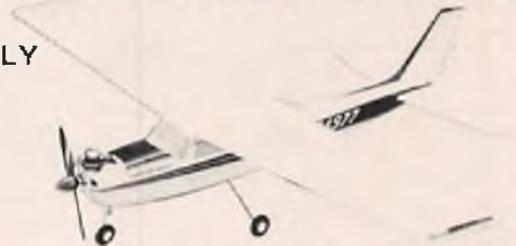
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This water cooled 3.5cc competition engine is the ultimate in outboard engines. It offers the superior control characteristics of outboard drive.



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READY TO FLY CESSNA CENTURION



30% OFF

Like the Sportavia, this all molded foam scale Centurion with 36" span comes complete with a Cox .049 engine, prop, push rods, horns, and all other fittings already installed. The Sanwa No. 8020 radio drops right into place, but with very slight modification any 2 channel radio will fit easily into this kit. Great for the beginner who wants the most airplane for the least amount of money. Radio not included.

RETAIL \$64.95 NOW ONLY \$45.48 RCM001

K&B .61 RC 40% OFF
W/MUFFLER No. 6525



Features a new crankshaft that eliminates the necessity of enlarging the hole in propellers. A top performing pattern engine that competes with the best.

RETAIL NOW ONLY \$57.88
\$96.50 RCM012

ZAP ZAP ZAP ZAP 44% OFF



Zap is a Super Cyanoacrylate adhesive that is super fast setting. Large size comes with extra applicators. Limit of 6 per order.

RETAIL NOW ONLY \$1.98
\$3.50 RCM013

DU-BRO 36% OFF
KWIK FILL FUEL PUMP



36% OFF

RETAIL \$10.95
NOW ONLY \$6.98 RCM010

HOUSE OF BALSA 31% OFF
P.51D (.29-.40)



This outstanding all balsa sport, stand-off scale ship is beautiful. 49" span. Requires a .29-.40 size engine and a 4 channel radio.

RETAIL NOW ONLY \$44.98
\$64.95 RCM011

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TOP FLITE 30%
SEALING IRON OFF



This sealing iron is great for covering with Monokote, Solarfilm, etc. It features adjustable temperature, teflon shoe, and a handy shape. Excellent quality.

RETAIL NOW ONLY \$13.98
\$19.95 RCM202

DREMEL 41% OFF
MODEL 381
MOTO-TOOL
WITH FULL
ACCESSORIES



The Model 381 is the ultimate in hand grinders. It features variable speed control, ball bearings, and full accessories.

RETAIL NOW ONLY \$42.98
\$72.95 RCM015

MILLER No.2017 40%
SPRAY SET OFF



Complete set includes a precision built genuine piston type air compressor, 12 ft. air hose, 16G siphon type spray gun & 14G air brush both with open & fine spray nozzles.

RETAIL NOW ONLY \$46.78
\$77.95 RCM016

QUADRA 2 CU. IN. 29%
ENGINE OFF



Develops 2 horsepower! An engine suitable for large models with its scale-like sound and realistic performance. Comes with muffler, mount, and Tillitson pump/carb.

RETAIL NOW ONLY \$99.98
\$139.95 RCM017

DEVCON 36% OFF
5 MINUTE
EPOXY IN
ECONOMY
9 OZ. SIZE



Now in squeeze bottles for your convenience. Limit of 3 per order.

RETAIL NOW ONLY \$3.98
\$6.25 RCM018

DREMEL 572 36%
MOTO SHOP OFF



This deluxe saw features a complete accessory set of blades, discs, etc. and flexible shaft. Limit of 1.

RETAIL NOW ONLY \$60.98
\$94.95 RCM019

GOLDBERG 40%
FALCON 56 OFF



This all time best seller is now redesigned with ailerons. 56" span. Uses a .15 - .35 engine, all balsa construction. An excellent trainer.

RETAIL NOW ONLY \$28.78
\$47.95 RCM020

K&B .40 RC ENGINE 40%
No. 8011 OFF

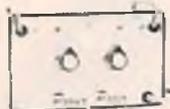


THE MOST
POPULAR RC
ENGINE EVER
MADE!!

Features a unique design for high power; and a Perry carburetor for excellent throttle response and easy adjustment - from a slow smooth idle to a roaring top speed.

RETAIL NOW ONLY \$43.48
\$72.50 RCM009

POWER PACER 22%
BATTERY OFF
TESTER



A new ni-cad battery tester, cyclor, and charger. Works great!

RETAIL NOW ONLY \$46.98
\$59.95

RCM023 9.6 volt
RCM024 6 volt

GOLDBERG 40%
SKYLARK 56 OFF
MK II



Fun to fly sport airplane with pattern capabilities. 56" span. 30 to .40 size engine, all balsa construction. New improved design!

RETAIL NOW ONLY \$29.98
\$49.95 RCM025

SULLIVAN ELECTRIC
STARTERS



Hi-torque, hi-rpm 12 v. starters. Those heavy duty, long life starters develop more torque and rpm's than any other starters!

RETAIL NOW ONLY \$23.98
\$38.95 RCM026

Dix. model has V-groove in drive cone for starter belt. Starts copters, airplanes, boats, and cars.
RETAIL NOW ONLY \$27.28
\$41.95 RCM182

BOLINK
ELECTRIC CAR



This 2 ch. 1/12 scale electric car comes already assembled with .05 motor, nicads, & charger. Goes over 25 miles per hour!

RETAIL NOW ONLY \$79.98
\$99.95 RCM027

Bolink kit for above car - must be assembled.
RETAIL NOW ONLY \$59.98
\$79.95 RCM280

CRAFT-AIR 33%
FIELD BOX OFF



It's ready to use, not a kit, made of lightweight indestructible polyethylene. 22" long & holds everything. A SUPER BUY!

RETAIL NOW ONLY \$19.98
\$29.95 RCM028

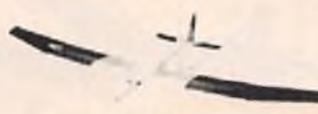
CRAFT-AIR 35%
HI-START OFF
HEAVY DUTY

Features reel, tubing, towline, parachute, stake, tow ring, and strong construction. For sailplanes of 100" wingspan and larger.



RETAIL NOW ONLY \$27.98
\$42.95 RCM029

AIRTRONICS 30%
OLYMPIC II OFF



This 99.9" span trainer is capable of contest competition. All balsa with pre-cut parts. An excellent quality sailplane.

RETAIL NOW ONLY \$34.98
\$49.95 RCM030

S & O BATTERY 33%
TESTER OFF



Tests 8 cell transmitter and 4 cell receiver nicad packs under load. Extremely accurate scales. Detects bad cells and/or abnormal current drain.

RETAIL NOW ONLY \$19.98
\$29.95 RCM031



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**FOX .40 RC
SCHNEURLE**

**40%
OFF**



The economical Fox .40 RC Schneurle features a restyled exterior, steel thrust washer, improved carb suction, and lightweight pistons. Very good power!

RETAIL NOW ONLY \$27.58
\$45.95 RCM136

**BRIDI RCM
TRAINER 40**

**32%
OFF**



This popular all balsa trainer has a 52" span. Requires a .35 to .49 size engine and a 4 ch. radio. A high quality kit!

RETAIL NOW ONLY \$37.38
\$54.95 RCM034

**COX TD .049
STD. ENGINE**

**38%
OFF**



A super hot 1/8A engine ideal for free flight, control line, 1/8A RC, and more.

RETAIL NOW ONLY \$15.48
\$24.95 RCM035

**PEERLESS
POP BUGGY**

**25%
OFF**



Designed for a .15-.21 size engine and a 2 ch. radio. 19" length. Body is made of tough ABS plastic. Built-in pull cord starter.

RETAIL NOW ONLY \$104.98
\$140.00 RCM280

**12 VOLT
MOTORCYCLE
BATTERY**

**50%
OFF**



These are high quality, heavy duty motorcycle batteries that are perfect for all electric starters. Brand new.

Electrolyte not included

RETAIL NOW ONLY \$11.98
\$23.95 RCM037

**12 VOLT
BATTERY
CHARGER**

To go with your 12 volt motorcycle battery, or any other 12 volt battery, we now have this high quality charger that does a perfect job. Safe and easy to use. Works great with battery at left. UL approved.

RETAIL NOW ONLY \$6.98
\$13.95 RCM038

**SCHLUTER
HELI - BOY**



The best RC helicopter ever made! Requires a .60 size engine and a 4 ch. radio. Collective pitch is standard. Features no - belt starting. Can be started with a Sullivan Electric Starter and a starter extension.
CALL FOR LOW PRICE!

**ANDREWS
AEROMASTER**

**35%
OFF**



The world's most popular RC biplane! This balsa kit has a 52 1/2" span. Uses a .60-.78 size engine and a 4 channel radio.

RETAIL NOW ONLY \$51.98
\$79.95 RCM065

**DA ENTERPRISES
SERIES IV
POWER PANEL**

**36%
OFF**



The all-in-one power panel!

This quality panel distributes power from your 12 v. battery to starters, plugs, pumps, etc., & allows you to fast charge your radio at the field.

RETAIL NOW ONLY \$22.48
\$34.95 RCM033

**K&B .61 RC W/PERRY
PUMP & CARB & MUFF**

40% OFF



Equipped with a Perry Pump/Regulator and a larger Perry Carburetor specifically designed to be used with the Pump/Regulator system. Easy to start. Number 6635

RETAIL NOW ONLY \$74.98
\$125.00 RCM042

**BRIDI RCM
TRAINER 60**

**32%
OFF**



This popular all balsa trainer has a 58" span. Requires a .40 to .60 size engine and a 4 ch. radio. It makes a great trainer.

RETAIL NOW ONLY \$42.78
\$62.95 RCM043

**40% OFF FOX .45 RC
BALL-BEARING
SCHNEURLE**

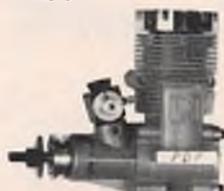


Tests show this to be one of the most powerful .45's on the market. Puts out over one horse. Starts easily- idles well- extremely durable.

RETAIL NOW ONLY \$38.98
\$64.95 RCM044

**HB .61 RC PDP
No. 6400**

**30%
OFF**



This powerful, high quality engine comes with a Perry carb and features Perry Directional Porting for increased power.

RETAIL NOW ONLY \$83.48
\$119.26 RCM143

**SIG KADET
WITH AILERONS**

**28%
OFF**



The Kadet is an excellent trainer! This balsa kit has been improved to include ailerons! 57" span. Requires a 3-4 ch. radio and a .19-.35 size engine. Easy to follow plans and accessories included.

RETAIL NOW ONLY \$28.78
\$39.95 RCM256

**LANIER
COMET II**

**36%
OFF**



This popular trainer comes almost-ready-to-fly. 63" span. Designed for a 4 ch. radio and a .50-.61 engine. The Comet II makes a great trainer!

RETAIL NOW ONLY \$39.98
\$62.50 RCM047

**ASSOCIATED
RC 200 KIT**

**39%
OFF**



See Tower Hobbies Catalog P. 118 for available bodies. 22" body length. Features ballbearings for rear axle & clutch, glass chassis, disc brakes. Kit comes complete less engine, body, and radio. Best gas car anywhere!

RETAIL NOW ONLY \$119.98
\$195.00 RCM048

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**K&B .40 RC W/
PERRY PUMP &
CARB NO. 8360** **40%
OFF**



Features Perry Pump/Regulator and a larger Perry Carb specifically designed to be used with the Pump/Regulator system. Adds 1000 RPM's!
RETAIL NOW ONLY \$62.98
\$105.00 RCM049

**ASSOCIATED RC 12E
ELECTRIC CAR KIT** **30%
OFF**



This rugged 1/12 scale race car kit is the ultimate in electric competition. The basic RC12E kit No. 3000 does not include motor, batteries, or body.
RETAIL NOW ONLY \$37.78
\$54.00 RCM245
Kit No. 3012 with engine and 6-cell batteries.
RETAIL NOW ONLY \$69.98
\$102.00 RCM246

**PICA
DUELIST 2/40** **35%
OFF**



This easy to fly, all balsa kit is an ideal twin engine trainer. 67" span. Uses two .23-.40 size engines and a 4 or 5 channel radio.
RETAIL NOW ONLY \$58.48
\$89.95 RCM051

**JENSEN DAS
UGLY STICK** **35%
OFF**



This all balsa kit is the ideal trainer. 60" span. Uses a .45 to .61 size engine and a 4 ch. radio. Very stable.
RETAIL NOW ONLY \$44.98
\$69.50 RCM052

**MRC PORSCHE
934 TURBO** **30%
OFF**



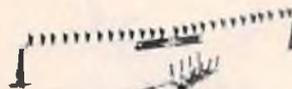
This electric RC favorite is 1/12 scale & 15" long. It features a high output electric motor, 2 forward & 2 reverse speeds, precise scale detailing, & a rugged ABS plastic body. Requires any 2 ch. radio.
RETAIL NOW ONLY \$45.48
\$64.98 RCM074

**MIDWEST
ATTACKER** **35%
OFF**



This all molded styrofoam kit builds fast and flies great. 48" span. Uses a .19-.35 engine. Very popular.
RETAIL NOW ONLY \$27.98
\$42.95 RCM054

A-JUSTO-JIG **33%
OFF**



This complete wing & fuse jig holds alignment within .1%. Allows you to make up to a 6 foot wing. Fuse jig fits on without tearing down your wing jig.
RETAIL NOW ONLY \$39.98
\$59.95 RCM055

**DREMEL 580
TABLE SAW** **39%
OFF**



Multi-purpose table saw especially designed for hobbyists. Rips, cross cuts, miters, straight cuts, dadoes.
RETAIL NOW ONLY \$60.98
\$99.95 RCM056

**MIDWEST
CARDINAL
A.R.F.** **35%
OFF**



This all foam trainer has a 46" span. Uses a 2-3 ch. radio, & a .049 to .15 size engine. Rugged and flies great.
RETAIL NOW ONLY \$21.38
\$32.95 RCM057

**STERLING
PUDDLE
JUMPER MK II** **38%
OFF**



This airboat has a plastic hull and cabin with balsa and plywood parts. It uses a 2 channel and a .15 to .35.
RETAIL NOW ONLY \$25.98
\$41.95 RCM058

**LATRAX CORVETTE
W/RADIO** **25%
OFF**
Won a 1st & a 2nd in the ROAR NATS!



Add 8 AA pen cell batteries to the radio, charge the car for 15 minutes, & you're ready to race!
THIS IS A FANTASTIC VALUE!
Comes with a powerful 2 ch. radio (w/wheel stick) already installed, 6 cell nicad battery pack, & a quick charger. 16" length. Runs up to 30 mph! Electronic speed control.
RETAIL NOW ONLY \$114.98
\$152.00 RCM244

**O.S. MAX .60 FSR
RC W/ MUFFLER** **32%
OFF**



This is a front rotor, Schneurler ported ball bearing RC engine that comes complete with a muffler. O.S. Max is known for high quality!
RETAIL NOW ONLY \$88.98
\$129.95 RCM243

**BRIDI
UFO** **28%
OFF**



The ultimate in pattern! 64 1/2" span. Designed for a .60 pump & pipe, & a 4-5 ch. radio. Epoxy-glass fuse & fin, foam wing & stab. Includes fixed gear & engine mount.
RETAIL NOW ONLY \$93.58
\$129.95 RCM048

**STAFFORD TWIN
COMANCHE** **30%
OFF**



This museum scale twin is always in high demand. 72" span. Requires two .40 size engines and a 4-6 ch. radio. This balsa kit includes precision molded fittings.
RETAIL NOW ONLY \$97.98
\$139.95 RCM062

**DUMAS BIG
SWAMP BUGGY** **36%
OFF**



This rugged and stable airboat runs on water, dry grass, or snow. Really moves out with a .40 and speeds with a .60. Lots of fun!
RETAIL NOW ONLY \$22.38
\$35.00 RCM063

**X-ACTO
No. 5087
KNIFE &
TOOL
CHEST** **30% OFF**



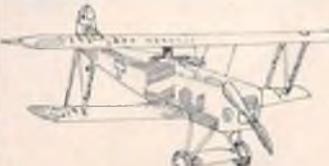
Contains Nos. 1, 2, & 5 knives, complete asst. of blades, gouges, routers; plus X-Acto planer, sander, hobby-craft saw, spokeshave, balsa stripper, pin vise, screwdriver, asst. drill bits. Comes in a large fitted wood chest.
RETAIL NOW ONLY \$20.98
\$29.95 RCM004



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<p>HB .40 RC PDP No. 4200 29% OFF</p>  <p>This powerful, high quality engine comes with a Perry carb and features Perry Directional Porting for increased power. (HB .61 RC PDP pictured)</p> <p>RETAIL NOW ONLY \$59.98 \$84.34 RCM142</p>	<p>ZINGER WOOD PROPS 35% OFF</p>  <p>Two popular sizes—Stock up now on these high quality props!</p> <p>10X6 WOOD PROPS(6) RETAIL NOW ONLY \$5.48 \$8.40 RCM021</p> <p>11X7 WOOD PROPS(6) RETAIL NOW ONLY \$6.28 \$9.60 RCM022</p>	<p>FOX 1.2 CU. IN. OPPOSED TWIN 30% OFF</p>  <p>One of the finest 2 cylinder model airplane engines ever produced! Develops over 3 horses! The Fox Twin is a smooth running power plant.</p> <p>RETAIL NOW ONLY \$174.98 \$250.00 RCM234</p>	<p>TOP FLITE F4U-1A CORSAIR 40% OFF</p>  <p>61" span. Requires a 4 ch. radio & a .60 size engine. Balsa sheeting for wings and stabs, hardware, and nylon fittings are included.</p> <p>RETAIL NOW ONLY \$59.98 \$99.95 RCM277</p>
<p>ORLINE FOKKER D VII 30% OFF</p>  <p>A gentle and stable trainer. 72" span. Requires a .60-.80 size engine and a 4 ch. radio. Balsa and ply parts. Hardware pack includes horns, hinges, pilot, and more!</p> <p>RETAIL NOW ONLY \$68.28 \$97.50 RCM279</p>	<p>MRC RTF HAWK TRAINER 25% OFF</p>  <p>You can be ready to fly this foam trainer within one hour. Comes with an Enya .15 engine already installed with muffler. Uses a 2 or 3 ch. radio.</p> <p>RETAIL NOW ONLY \$73.48 \$98.00 RCM069</p>	<p>MRC FMC COMBAT VEHICLE 20% OFF</p>  <p>This 1/12 scale electric RC vehicle has 2 forward & 2 reverse speed control. Big output electric motor for indoor or outdoor quiet running. Excellent detailed scale! Requires a 2 ch. radio. 15" length.</p> <p>RETAIL NOW ONLY \$59.98 \$74.98 RCM070</p>	<p>ROBART SUPER PUMPER MKII 40% OFF</p>  <p>This "in-line" fuel pump is a simple, easy, and reliable way to pressurize any engine. Fits into fuel line. Limit of 2.</p> <p>RETAIL NOW ONLY \$10.78 \$17.95 RCM277</p>
<p>MRC LEOPARD ELECTRIC TANK 20% OFF</p>  <p>18" length. Takes 40 degree inclines with ease. Movable latches, swiveling periscope, and authentic decals. Operates forward, reverse, left or right. It turns on a dime.</p> <p>RETAIL NOW ONLY \$139.98 \$174.98 RCM072</p>	<p>COX READY TO FLY CUB TRAINER 30% OFF</p>  <p>RADIO ALREADY INSTALLED! Designed for the 1st time RC pilot! Single channel proportional radio system and Cox .020 engine already installed! Rugged foam construction. Has a 28 3/4" wingspan.</p> <p>RETAIL NOW ONLY \$69.98 \$99.95 RCM233</p>	<p>GOLDBERG HANDI TOTE 30% OFF</p>  <p>This flight box is compact yet has room for everything you need.</p> <p>Most popular flight box ever made!</p> <p>RETAIL NOW ONLY \$11.88 \$16.95 RCM006</p>	<p>PICA WACO 33% OFF</p>  <p>This balsa and plywood kit has a 60" span. Uses a 4-6 ch. radio and a .40-.60 size engine. All nylon fittings, wire landing gear, and struts included.</p> <p>RETAIL NOW ONLY \$53.58 \$79.95 RCM165</p>
<p>MRC MARTINI PORSCHE 30% OFF</p>  <p>This 1/12 scale RC electric racer has 2 forward & 2 reverse speed control, high output electric motor, & scale detailing. Requires any 2 ch. radio. Batteries not included. 15" length.</p> <p>RETAIL NOW ONLY \$47.58 \$67.98 RCM073</p>	<p>SOFTGLAS 22% OFF</p>  <p>SEALER - FILLER - PRIMER</p> <p>NEW</p> <p>The new, complete sealer-filler-primer for balsa wood models. Sands as easily as primer! Easy to apply. Dries hard, fast, and flexible.</p> <p>RETAIL NOW ONLY \$6.98 \$8.95 RCM077</p>	<p>MIDWEST SWEET STIK 40% OFF</p>  <p>54" span. Uses a .19 to .45 size engine. Requires a 4 ch. radio. This is a small version of the famous Ugly Stik. It's an excellent, ultra simple trainer.</p> <p>RETAIL NOW ONLY \$25.78 \$42.95 RCM078</p>	<p>GOLDBERG SR. FALCON 40% OFF</p>  <p>The Sr. Falcon is the standard big trainer. 69" span. Uses a 4 ch. radio and a .35 to .60 size engine. Every design element is engineered for simplicity and fast building.</p> <p>RETAIL NOW ONLY \$38.98 \$64.95 RCM079</p>

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*Radio
Sale!*

MODEL	RETAIL	NOW ONLY	STOCK NUMBER
KRAFT KRAFT KRAFT KRAFT KRAFT KRAFT			
KP-2AW (Wheel) w/14IIA's	\$129.95	\$88.98	RCM080
KP-2AW (Wheel) w/15IIA's	135.95	92.98	RCM267
KP-2A (2 Stick) w/14IIA's	129.95	88.98	RCM081
KP-2A (2 Stick) w/15IIA's	135.95	92.98	RCM268
KP-2AS (1 Stick) w/14IIA's	129.95	88.98	RCM082
KP-2AS (1 Stick) w/15IIA's	135.95	92.98	RCM269
KP-4A w/KPS-14IIA's	299.95	187.98	RCM083
KP-4A w/KPS-15IIA's	311.95	196.58	RCM270
KP-6A w/KPS-14IIA's	329.95	204.98	RCM084
KP-6A w/KPS-15IIA's	341.95	211.98	RCM271
KP-5C w/14II's or 15II's	375.43	267.98	RCM085
KP-5CS w/14II's or 15II's	375.43	267.98	RCM086
KP-7C w/14II's or 15II's	515.43	367.98	RCM087
KP-7CS w/14II's or 15II's	515.43	367.98	RCM088
KPS-14II Servo	44.95	34.88	RCM089
KPS-15II Servo	44.95	34.88	RCM090
KPS-18 Servo (Super Mini)	54.95	43.98	RCM222
KPS-14IIA Servo	39.95	27.98	RCM272
KPS-15IIA Servo	39.95	27.98	RCM273

FUTABA	FUTABA	FUTABA	FUTABA	FUTABA
FP-2GS	109.95	69.98	RCM091	
FP-2F w/S-7's or S-20's	149.95	98.98	RCM092	
FP-2F w/S-18's or S-22's	129.95	86.98	RCM274	
FP-2E w/S-7's	149.95	98.98	RCM093	
FP-2E w/S-22's	129.95	86.98	RCM275	
FP-3S w/S-18's	144.95	94.98	RCM094	
FP-3S w/S-20's	169.95	109.98	RCM208	
FP-3FN w/S-18's or S-22's	219.95	139.98	RCM095	
FP-4FN w/S-18's	289.95	179.98	RCM096	
FP-4FN w/S-16's or S-20's	319.95	199.98	RCM097	
FP-5FN w/S-18's	319.95	204.98	RCM276	
FP-5FN w/S-16's or S-20's	359.95	222.98	RCM098	
FP-6FN w/S-18's	339.95	209.98	RCM099	
FP-6FN w/S-16's or S-20's	369.95	234.98	RCM100	
FP-7GN w/S-15's	579.95	369.98	RCM101	
S-18 Servo	29.95	22.48	RCM247	
S-16 Servo	39.95	29.98	RCM103	
S-7 Servo	39.95	29.98	RCM104	

MRC. Call For Low, Low Prices!!

SANWA	SANWA	SANWA	SANWA	SANWA
No. 8020 2 Channel	99.95	69.98	RCM105	
No. 8044 4 Channel w/4 Minis	279.95	177.98	RCM248	
No. 8054 5 Channel w/4 Minis	299.95	189.98	RCM249	

STOCK NUMBER	DESCRIPTION	RETAIL	NOW ONLY
RCM107	Airtronics Aquila	\$74.95	\$52.48
RCM251	Badger 200-1 Air-Brush Kit	32.95	21.38
RCM209	Bridi Dirty Birdy 40 - wood	59.95	40.78
RCM114	Bridi Dirty Birdy 60 - wood	84.95	57.78
RCM210	Bridi Dirty Birdy 60 - glass	124.95	89.98
RCM115	Bridi Sun Fli 4 20	29.95	20.38
RCM116	Bridi Super Kaos 40	55.95	37.98
RCM118	Bridi Super Kaos 60	69.95	47.58
RCM124	Coverite Balsarite	3.20	1.98
RCM125	Cox Electric Ferrari	119.95	83.98
RCM128	Craft-Air Butterfly II	49.95	32.48
RCM212	Craft-Air SD-100 Glider	59.95	35.98
RCM129	Craft-Air Windrifter Glider	47.95	28.78
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 607 East Abram St.
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RADIO SPECTRUM

from page 63/61

wipers. I have now discontinued the cleaning/lubing steps. Inspection shows cleaning to no longer be necessary.

I actively race Quickies (5th in '78 Sempra) and Q.M. (1st in 1978 Sempra), but no longer clean pots --- even for myself!

My Quaker Old Timer has now logged just over 30 air hours with a sport engine --- without servo jitter/problems. Really, a better mousetrap!

Sincerely,
 Stu Richmond

We also have had many letters asking where to get them. By now you may have seen ads for Giezendanner USA, P.O. Box 818, Pottstown, Pennsylvania 19464. I believe this is run by old buddy

Dick Penrod. Previously, I think most of the guys have been getting them from ProLine Electronics, 10632 N. 21st Avenue Suite 11, Phoenix, Arizona 85029. We've also had a few letters asking where they can have them installed. I can't help you there. Any offers out there?

I kid Stu Richmond a little about Mode I because of an article he wrote some time ago praising its virtues. I had



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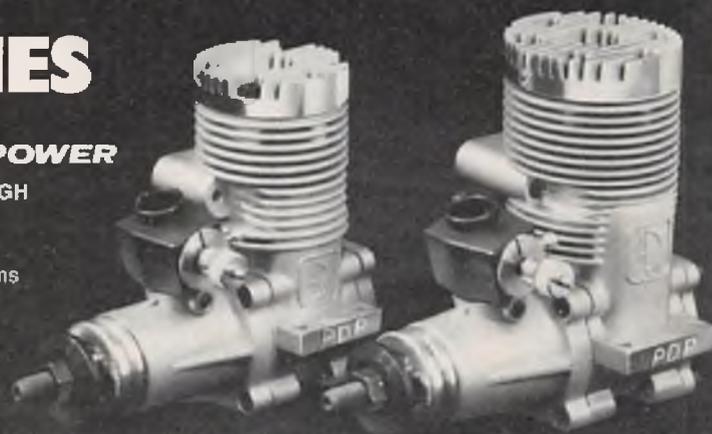
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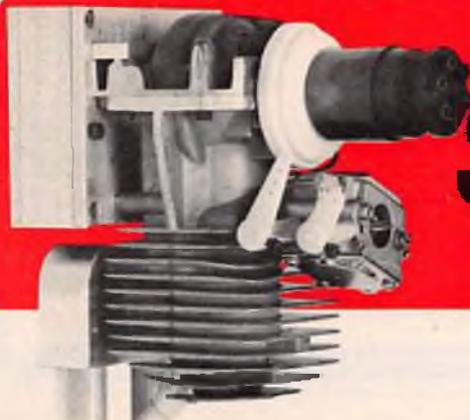
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rebutted it saying single stick was probably the best with Mode II being second. Obviously there are arguments both ways but I now have a new input. I fly Mode II and on my old transmitter I put the rate switches on the right side because I already had landing gear and roll button switches on the left. This usually meant letting go of the right stick, (ailerons and elevator) while throwing the rate switches. This in turn meant

doing it right after or right before a maneuver while level, which screwed me up more than once. On the Kraft FM transmitter I've been flying, I put the aileron rate switch on the left side (haven't added elevator rate, yet) and it is a big improvement. I can throw the switch in the middle of a turn around with no problem. Don't know how I ever got along without it over there. Sorry it doesn't help Mode I pilots.

Electric Motor Speed Control

We probably get more requests for electric motor speed controls than any other electronic circuit. This one is a little easier than most.

Dear Jim:

I would like to solicit your help on a circuit problem. My father and I are building a Graupner 22" model boat powered by an electric motor. We are using a Cox Sanwa digital proportional

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3-channel radio control unit and would like to control the forward and reverse speed.

The motor operates from 15-VDC. Current drain is 100 ma. Do you have a suitable circuit that we could utilize to accomplish this either directly from the receiver or from one of the miniature servos?

Looking back in an RCM 1976 issue, I note a circuit using a servo AMPIC, but I wasn't sure this would be suitable and besides it didn't allow for the reversing feature. No doubt you have since solved this problem with newer circuitry.

Sincerely,
 Andy Graham

Mississauga, Ontario Canada

This is simpler than most because of the low current requirement. A standard servo amp would handle it except, the 15 volts is too much for the integrated circuit. Therefore you will need external transistors. See Fig. 1.

You will want more deadband than a normal servo amp so you have a fairly broad "off" position. I would start with Res about 470 ohms. Increase it to increase deadband. You set the off position by means of the 5K pot tied to pin 1. You may not want it in the middle of the throttle stick travel on the transmitter but maybe closer to the

normal slow position. This would give you more forward than reverse speed. You set the full speed ahead by means of the 50K pot on pin 8. You want peak motor current just as you hit full throttle. Come back one notch and you want the motor current to drop. An ammeter in the 15 volt line or a scope is required here. If you don't like the direction, reverse the motor leads. This basic circuit can be used with other motors as long as the transistors are large enough to handle the current. Those shown are good to 500 milliamps.

Don't ask for a circuit like this using other integrated circuits. I hate to tell you to page 118

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8068 6ch. Medalist Series	299.99



SERVO

Micro	20.99
Std., High Torque, or Mini	33.00

Tatone

Engine Test Stand w/Tank

No. 80

\$5.99

TOP FLITE

2 SPEED HEAT GUN

\$18.99

SEALECTOR

CUSTOM IRON

\$17.65

DU-BRO

Kwik-Fill Fuel Pump

- Hand operated
- Pumps in and out

SALE \$6.80 No. 191



dumas

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1310 Pay'n Pak	26.65
1312 Atlas Van Lines U-76	35.20
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1315 Drag 'n Fly Mork II	27.95
1421 Competition Deep Vee 21	30.15

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2310 For PT-109	10.90
2311 For 1203 or 1205	36.75
2312 For Shelly Foss	40.25
2317 For Drag Fly 20 MK II	46.70
2321 For Camp. Deep Vee 21	32.20
2322 For Pay'n Pak	21.95
2328 For Ar. Van Lines U-76	34.30
2329 For C.G. Utility Boat	31.50
2004 6 volt motor	16.99
2005 12 volt motor	16.99
2022 Speed control for 6v mtr.	15.99
2023 Speed control for 12v mtr.	15.99

MISC ACCESSORIES

6 volt 4 ampere gell battery	11.99
6 volt 4 ampere wet cell	8.99
6 volt charger for above	8.50

ZINGER MAPLE PROPS

Dia. Pitch	6/pkg	ea.
7 4,5,6,7	5.19	.96
7-1/2 4,5,6,7	5.19	.96
8 4,5,6,7	5.62	1.04
8-1/2 4,5,6,7	5.62	1.04
9 4,5,6,7	5.62	1.04
10 4,5,6,7	5.99	1.12
11 5,6,7,7-1/2,7-3/4,8	6.91	1.28

TOP FLITE PROPS

Super Maple	6/box	ea.
9 x 6	5.25	1.00
10 x 6	5.67	1.08
11 x 6, 7, 7-1/2, 7-3/4, 8	6.51	1.24
12 x 6	7.56	1.44

See our catalog listing for additional Zinger and Top Flite props.

SALE ENDS JUNE 15, 1979

(after which regular low prices will resume)
PHONE ORDERS: 201 - 825 - 2212

Mon. - Fri. 9 a.m. to 5 p.m., Sat 10 a.m. to 1 p.m.

Sale prices on left page and above star bordered area, supercede regular low prices in balance of ad or catalog.

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

Master Charge **VISA**

(\$10. min.)
Must have expiration date

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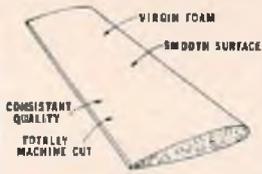
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SOUTHERN TIGER TAIL	\$10.99
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DIRTY BIRDY	\$10.99
TALBU	\$10.99
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KWIK FLI (STRAIGHT)	\$10.99
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SUPER KADS 80	\$10.99
SUPER KADS 80	\$10.99
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PHOENIX 6	\$10.99
PHOENIX 7	\$10.99
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CORRAN	\$14.99
J & J TROUBLEMAKER	\$14.99
VIPER	\$14.99
INTEGRA II	\$10.99
RCM U.F.O.	\$10.99
R.C.M. REVENGER	\$14.99

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TOP FLITE P-41	\$14.99
TOP FLITE P-40	\$10.99
WING ZERO	\$10.99
VN CHEROKEE	\$14.99
ROYAL ZERO	\$10.99
DAVE PLATT SW-100	\$10.99
MIDWEST CARD SCORRE	\$14.99
SG J-3 CUB CLIPFO	\$10.99
SG J-3 CUB STANDARD	\$10.99
ROYAL TOM	\$10.99
STERLING J-3 CUB	\$10.99
MIDWEST HE 142	\$11.99

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NEW ERA II	\$ 8.99
ANDREWS MINIMASTER	\$ 8.95
RCM SPORTSTER	\$ 8.99
BASIC TRAINER	\$ 8.99
LOVE MACHINE	\$ 8.99
DRONE	\$ 8.99
MIDWEST TRN SQUARE	\$ 8.99
STERLING CITARRIA	\$ 8.99
BOX FLY	\$ 8.99
HEADMASTER	\$ 8.99
JR. BOX FLY	\$ 8.99
RCM TRAINER 40	\$ 8.99
1 TRAK MASTER	\$ 8.99
QUICKIE 500	\$ 8.99
LITTLE STICK	\$ 8.99
SWEET STICK	\$ 8.99
LANCER	\$ 8.99
FLEEDING	\$ 8.99
FALCON 56	\$ 8.99
SKYLARK 56	\$ 8.99
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H-RAY	\$ 8.99
SG KOMET	\$13.99
SG KADET	\$ 8.99
MARCH	\$ 8.99
SCLO	\$ 8.99
M.A.N. TRAINER 40	\$ 8.99
SWIFTEE 100	\$ 8.99
SPINKS ACRDMASTER	\$ 9.99
DEBOLT JENNY	\$11.99
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SG ROMANIDER	\$10.99
WING ZERO COMPENDER	\$13.99
GAZZARATI	\$10.99
RCM TRAINER 40	\$10.99
SPORTMASTER	\$10.99
LILY STICK	\$10.99
SR. FALCON	\$10.99
TRAK MASTER	\$10.99
SKYLARK 52	\$14.99
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PHIL KEAFF SUPER-FLI	\$ 8.99
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STERLING LANCER SL-42	\$10.99
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BUILDING A STRAIGHT WING ISN'T EASY AND IT TAKES A LOT OF TIME AND PATIENCE. OUR WING KITS SOLVE THIS BY OFFERING FAST AND EASY ASSEMBLY PLUS THE ADDITIONAL STRENGTH OF FOAM AND STRESS SKIN CONSTRUCTION. IF YOU HAVE A FAVORITE SHIP THAT NEEDS A NEW WING OR ARE BUILDING A NEW BIRD, TRY ONE OF OUR WINGS. WE HAVE OVER 150 DIFFERENT

CLIP & SAVE
GOOD FOR \$1.00 ON \$20.00 PURCHASE OR MORE. DIRECT ORDERS ONLY

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GOOD FOR \$2.00 ON \$30.00 PURCHASE OR MORE. DIRECT ORDERS ONLY

WING'S EXCLUSIVE CUTTING METHOD, DEVELOPED BY RALPH ANDRAE, MAKES OUR CORES SUPERIOR TO OTHERS.

ADD \$4.00 TO ANY WING AND GET THE FOLLOWING OUTSTANDING VALUE:

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- GLASS REINFORCEMENT TAPE FOR CENTER SECTION .16
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- PACKAGE OF HINGES 1.29
- WING HOLD DOWN BOLTS 1.80
- COPPER CLIP CUT WIRE .28

\$17.87

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SKYLARK MK	\$0.05
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NOTE: WRITE FOR SPECIAL QUANTITY DISCOUNTS FOR CLUBS & MANUFACTURERS.

FREE WING LOADING CHART IN EVERY KIT

STYROFOAM BLOCKS no. 258

1 LB. DENSITY VIRGIN EXPANDED BEAD BLOCKS, 3 1/2" x 1 1/2" x 5/8" FOR MAKING WINGS, FUSELAGE AND STABS \$12.00 EA. 1 FOR \$30.00

More quality products from WING MFG.

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LOW PROFILE NYLON WING BOLT 1/8-20 x 2" WITH HEX KEY HEAD FOR FASTEST AND CLEANEST REMOVAL OF WING. COMES WITH ALLEN WRENCH AND NYLON WASHERS TO PREVENT CRUNCHING WHEN WING IS BOLTED DOWN. INCLUDES 4 BOLTS, 4 WASHERS & WRENCH.

ITEM #215 8 Pieces set \$1.89

WING SKIN ADHESIVES
These are all fast drying adhesives with excellent bonding strength.

Spray Adhesive
4 oz. Can for Small Wing \$2.99
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1" WIDE ALL-PURPOSE BRISTLE BRUSHES WITH WOOD HANDLES
IDEAL FOR APPLYING WING ADHESIVE, EPOXY & POLYESTER RESIN. CAN BE CLEANED MANY TIMES WITHOUT BRISTLES CURLING. HANDLES WON'T MELT IN SOLVENTS LIKE PLASTIC BRUSHES.

PKG. OF 6 FOR \$5.49 no. 818

3/8" WIDE PURE BRISTLE ACID BRUSHES WITH METAL HANDLES
IDEAL FOR APPLYING EPOXY, RESINS, FILLERS, ETC.

PKG. OF 6 FOR \$1.00 no. 815

CUSTOM WINGS CUT-- \$75.00
SEND TO & ROOT AIRFOIL ALONG WITH FULL SIZE PLAN VIEW OF WING (MAXIMUM WING SPAN 72" - MAXIMUM CHORD LENGTH, 14"). ALL CUSTOM WINGS MUST BE PAID FOR WITH ORDER.

NO. 345
LIGHT WEIGHT BIRCH AIRCRAFT PLYWOOD WING SKIN. HAS A SMOOTH SURFACE WITH NO OPEN GRAIN, BENDS AROUND LEADING EDGES EASILY. 11 TIMES STRONGER THAN BALSA. 48" x 48" x .018 THICK \$19.95 SHEET

THE FINEST WING COVERING MATERIAL AVAILABLE!

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RCM WARRIOR	\$16.95
MIDWEST PLY SPECIAL	\$16.95
RCM RODIO	\$16.95
JACK STAFFORD	\$16.95
ACRO SPORT	\$16.95
SG LIBERTY SPORT	\$16.95
RCM BASIC BPT	\$16.95

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HOW TO ORDER: SPECIFY TYPE OF WING AND SEND CHECK OR MONEY ORDER FOR REQUIRED AMOUNT. ADD \$1.50 PER KIT FOR POSTAGE & HANDLING IN U.S.A.

ILLINOIS RESIDENTS ADD 5% SALES TAX

ADDITIONAL \$.96 HANDLING CHARGE ON C.O.D. ORDERS

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WING MANUFACTURING
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CRYSTAL LAKE, ILLINOIS

SEND \$56 FOR COMPLETE PRODUCT CATALOG

RADIO SPECTRUM
from page 114/61

how much time I spent before I picked this one. Besides the Cox/Sanwa uses the Exar XR2261.

I had a couple of more subjects to cover this month but we got a little long winded, so I'll save them till next time. Till then, keep 'em flying. □

AVATAR
from page 60/56

the fuselage sides together and jig them perpendicular to the work surface directly over the plan. Install bulkhead F5 and F6 and jig the sides so that they are vertical and follow the curvature of the plan. Add the lower bulkhead F4B and the 3/16" bottom sheeting. When dry, remove the assembly from the work

surface and add the remaining top fuselage planking.

Drill out the motor mount allowing 3/4" from the rear of the spinner to the mounting face and install the mount to F2. Cut out the motor access opening in the fuselage side to fit your motor/muffler combination. Square off the front face of the fuselage and epoxy F1 to the fuselage when you have the

to page 122

NOW AVAILABLE! Epoxy Fiberglass Radio Box

NEW!

Prather Deep Vee
Designed by George Campbell

FEATURES...

- Factory joined deck and hull
- Epoxy fiberglass hull
- 3/8" hard maple motor mount rails
- Plywood Bulkheads
- Foam Flotation
- Complete Instruction Booklet with Photos

AVAILABLE SEPARATELY:

- Running Hardware Kit
- Hatch Cover
- Rudders
- Flex Cable and Stub Shaft (.150" and 3/16")
- High Speed Bearings (Thrust and Needle)
- Brass Shaft Logs (for .150" and 3/16" cable)
- Stainless Steel Ferrules (for .150" and 3/16" cable)

WHY CHOOSE A PRATHER DEEP VEE?
The hull and deck are factory joined for ease of assembly and true alignment. The epoxy fiberglass construction provides strength and warp resistance. The advanced hull design combined with a proven running gear package delivers performance and reliability.

PRATHER PRODUCTS 1660 RAVENNA AVENUE, WILMINGTON, CALIFORNIA 90744

THIS MONTH'S SPECIALS FROM ORANGE COAST HOBBIES

"Join the Helicopter Revolution"



- REVOLUTION
- REVOLUTION II
- HELIBOY

CALL OR WRITE ORANGE COAST HOBBIES FOR PRICES

COMPLETE LINE OF PARTS AVAILABLE FOR AMERICAN R/C HELICOPTERS AND SCHLUTER HELIBOY



ASSOCIATED 12E "ELECTRIC"

1/12 SCALE 8-CELL ELECTRIC R/C RACE CAR

FULL LINE OF ASSOCIATED PARTS AND ACCESSORIES AVAILABLE

\$84.88

Complete kit including body



RC 100... **\$89.88**

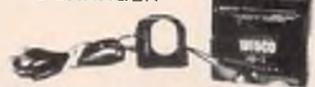
RC 200... **\$119.95**

1/8th Scale Bodies **\$14.49**

Front Rubber (#832) 6 Pr./ **\$29.99**

Rear Rubber (#2401) 6 Pr./ **\$26.99**

WISCO \$16.95
12V 5A WET CELL BATTERY and CHARGER



12 Volt 4 Amp Solid-Gel Battery SALE
\$16.98



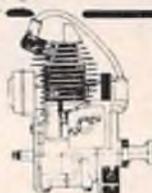
K&B ENGINE \$50.88



21 R/C (3.5 cc)

QUADRA \$99.88

2 cu. in. for those big birds! Retail \$149.95



BRIDI SOAR BIRDY

14.88

- 78" Wing Span
- 55% sq in Wing Area
- 7 1/4" Wing Cord



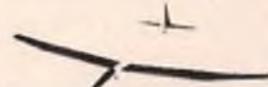
MIDWEST

Little Stick



\$19.95

Aquila or Wanderer
Rotationally molded fuselage of unbreakable duralene



AQUILA FUSELAGE KIT **\$23.95**
(Includes canopy, bell crank & wire)

MARK'S MODELS Wanderer \$12.99



Wanderer 99 \$22.95

SUREFLITE CESSNA SKYLANE 182... OR PIPER J3 CUB \$24.88



\$21.88



ENGINES

HB 12 R/C-muffler	\$29.88
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LARGE KITS, HEAVY BOXES, ADD ADDITIONAL	\$1.00



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H.T.D. "DELUXE" **\$24.88**
For boats and helicopters

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Our hobby specialists are constantly testing and seeking new and exciting items. From month-to-month you'll find our ads have a product mix that will include the well known values you need as well as new and exciting products that measure up to our standards. We're R/C mail order specialists who will keep you up to date on products, up to the minute on value.

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If you can show us that a product we advertised in this magazine appears elsewhere in "this" issue at a lower price, we'll match it. That's a promise. And of course, if any product is not exactly as represented when you receive it, ...send it back within 14 days. No questions asked... as long as it's in resaleable condition and packed in the original box.

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Watch for our monthly ads. Keep your eye on Consumers Hobby Corp. We're more than a mail order service, we believe in the future of R/C modeling, we believe it should grow and be affordable to everyone. And to do that we're going to offer values that will let you get the most enjoyment out of your hobby, the most value for your dollar.

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RADIOS



FUTABA	LIST	CHC	COX/SANWA	LIST	CHC
FP-2GS	\$ 99.95	\$ 69.98	8020 2Ch 2ST	\$ 99.95	\$ 69.98
FP-3S S20	159.95	104.98	MRC		
FP-4FN-S18	279.95	173.98	772-10	119.95	83.98
FP-5FN-S16	369.95	214.98	774-10-4	279.98	188.98
			765-42	349.95	227.98

PLANES

BRIDI



RCM TRAINER .40	SUPER KAOS .60	LIST	CHC
RCM TRAINER .40		\$54.95	\$35.98
• FOR .20 - .40 ENGINES, 4 CHANNELS • 50" WING SPAN			
SUPER KAOS .60		89.95	45.98
• FOR .60 ENGINE, 4 - 5 CHANNELS • 58 1/2" WING SPAN			

ENGINES

O.S.	LIST	CHC	SUEVIA
.15 RC	\$ 39.95	\$27.95	1.5 RC Schneurle w/Muffler
.25 RC	44.95	31.95	LIST
.35 RC	53.95	36.85	\$296.95
.40 RC	74.95	51.95	CHC
.60 FSR RC	129.95	85.95	\$159.98
ENYA			
.15 RC	\$148.98	\$29.98	
.29 RC	59.98	38.98	
.35 RC	62.98	40.98	
.40 RC	106.98	64.98	
.60B III RC	137.98	80.98	

HIROBO HELICOPTERS

Aerospaiale SA-341G Gazelle	LIST	CHC	
1/6.4 scale kit with high speed stability of the prototype. Rotor head gyro system, Collective Pitch, Ducted Fan Tail Rotor. *63" Main Rotor *59" Fuselage *Full Equipped Weight 10.36 Lbs. *For .60 engine, 4 ch.	\$479.00	\$239.98	
Bell UH-1B Iroquois 60H	118.4 scale model kit of the Iroquois Bell UH-1B. Sensitive mobility. Collective Pitch. Reliable. Stability and control *63" Main Rotor *54 1/2" Fuselage *Full Equipped Weight 10.58 Lbs. For .60 engine, 4 ch.	\$459.00	\$229.98
Bell UH-1B Iroquois 40H (Not pictured)	*57-3/4" Main Rotor *47 1/2" Fuselage. Complete with Assembly and Flying Instructions *Full Equipped Weight 8.38 Lbs. For .40 - .45 engine, 4 ch.	\$429.00	\$179.98
Aerospaiale SA-341G Gazelle	LIST	CHC	
Bell UH-1B Iroquois 40H (1/10 Scale)	LIST	CHC	
Bell UH-1B Iroquois 60H	LIST	CHC	

R/C CARS

TAMIYA RA-1003 TYRELL P34 FORD	LIST	CHC	TAMIYA RA1201 PORSCHE 934	LIST	CHC
LIST \$77.98	CHC \$55.98		LIST \$74.98	CHC \$51.98	
TAMIYA R/C Cars Not Pictured	LIST	CHC			
RA1202 Porsche 935	\$77.98	\$56.98			
RA1204 XR311 Combat	84.98	59.98			
RA1205 Lamborghini	77.98	59.98			
RA1208 Porsche 936	68.98	55.98			

SPECIAL PURCHASE 15 U/Control Gas Model Engine Complete w/Muffler (not shown) CH-001 List \$249.95 CHC Super Special \$139.98
SG 1/8 Scale Race Car with X-21 Superlign engine and clutch. Competition Series meets all ROAR regs. (Body not included) CHC-002 List \$279.95 CHC Super Special \$99.98
Marine Outdrive Unit die cast zinc, scale model of the Volvo Pentia Aquamatic Outdrive. For engines from .40 to 1.8 cu. in. All metal gear drive. CHC-003 List \$179.99 CHC Super Special \$129.98

CHC SUPER SPECIALS



AVAIL. FOR KRAFT, COX/SANWA, MRC, WORLD, ETC.
CHC MINI SERVO'S CHC BATTERIES

SERVO'S ASSEMBLED	LIST	CHC
CH-1000 Rotary D&R Bantam, Assd. for Precision & Speed Size: 1.5" x 1.45" x .73" Wt. 1.3 ozs.	\$27.95	\$17.98
CH-1100 Rotary Dunham Servo, Assd. for Power & Strength Size: 1.5" x 1.45" x .73" Wt. 1.4 ozs.	28.95	18.98
BATTERIES		
CH-1200 Regular 500 mA.H. Quick Inspection, Nylon Case Size: 2.2" x 1.25" x 1.25" Wt. 4 ozs.	\$13.98	\$ 7.98
CH-1400 Micro - 225 mA.H, Nylon Case Size: .85" x 1.45" x 1.45" Wt. 2 ozs.	14.98	8.98

PLEASE INDICATE YOUR SYSTEMS' MAKE.

LANIER



COMET II	LIST	CHC
	\$62.50	\$39.98

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IM-1150 Hand Fuel Pump LIST \$11.50 CHC \$ 4.98
Clip for mounting on side of fuel can, rotating knob for effortless cranking, no worry about battery failure.

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For all planes and cars. 12v. motor, highest torque and RPM's, pressure grip.

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Gere Sport	39.95	29.98
New Era	49.95	36.98

A-JUSTO-JIG	List	CHC
Full House	59.95	38.98

BADGER AIRBRUSHES	List	CHC
#200-1 Kit	32.95	22.98
#200-3 Deluxe Kit	42.95	28.98
#150 IL Poster Kit	63.00	42.98

BRIDI KITS	List	CHC
Super Kaos .40	55.95	36.98
Dirty Birdy .40	59.85	38.98
Kaos .60	66.95	43.98
Super Kaos .60	69.95	45.98
Basic Trainer	39.95	26.98
Trainer .20	34.95	23.98
Sportster	39.95	26.98
Trainer .10	27.95	18.98
Sun-Fli 4-20	29.95	19.98
Classic .40	54.95	36.98
Tweedy Bird	39.95	26.98
Quickest 500	42.95	28.98
15-500	39.95	26.98
Trainer 60	62.95	40.98
P-51 Mustang	134.95	95.98
Brown B-2	134.95	98.98
Chipmunk	124.95	88.98
Sirus	134.95	95.98
AT-6 Texan	134.95	95.98
Super-Fli	92.95	64.98
T-28	134.95	95.98
Spitfire	134.95	95.98
Shrike	184.95	129.98
Waco	89.95	70.98
F-7 Tiger Cat	198.95	138.98
Cosmic Wind	139.95	102.98
Corben Ace	129.95	89.98

CRAFT-AIR	List	CHC
Buht-Bull Pup	34.95	25.98
Butterfly II	49.95	31.98

DREMEL	List	CHC
#271 Moto-Tool Kit	49.95	31.98
#281 Moto-Tool Kit	59.95	36.98
#381 Moto-Tool Kit	69.95	42.98
#572 Deluxe Moto-Shop	89.95	57.98
#232 Moto-Flex	69.95	44.98
#580 Table Saw	89.95	57.98
#261 Moto-Tool Kit	49.95	31.98
#571 Moto-Shop	69.95	44.98

SULLIVAN	List	CHC
Deluxe Elec. Starter	39.95	24.98

SUREFLITE-ARF	List	CHC
Skylark 182 #109	37.95	23.98
Piper Cub J-3 #116	37.95	23.98
Spitfire #122	37.95	23.98

TOP FLITE	List	CHC
P-51B Mustang #RC-16	74.95	43.98
P-40 Warhawk #RC-17	74.95	43.98
P-39 Airacobra #RC-18	74.95	43.98

ENYA	List	CHC
.09 RC	42.98	25.98
.19 RC	53.98	34.98
.45 RC BB	106.98	54.98
.60 RC BB G-8	144.98	90.98
.19 RC X Sch. w/Muf.	104.98	65.98
.25 RC X Sch. w/Muf.	109.98	68.98
.40 RC X Sch. w/Muf.	149.98	93.98
.45 RC X Sch. w/Muf.	159.98	99.98
.49 RC X Sch. w/Muf.	155.98	97.98
.60 RC XF Sch. w/Muf.	234.98	147.98

FOX	List	CHC
.15 RC Sch.	37.95	21.98
.19 RC	34.95	19.98
.25 RC	34.95	19.98
.29 RC	37.95	21.98
.36 RC	37.95	21.98
.15 RC Sch. 2 BB	57.95	37.80
.60 RC EAGLE	69.95	39.98

GOLDBERG	List	CHC
Falcon 56 MK II	44.95	26.98
Skylark 56 MK II	49.95	29.98
Skylark 62	59.95	35.98
Shoestring	49.95	29.98
Sr. Falcon	59.95	35.98

MRC-RTF	List	CHC
Cessna 177 w/En. 35 & Muffler	449.95	274.98
Cherokee w/En. 40 & Muffler	499.95	309.98
Hawk Tr. w/En. 15	98.00	72.98

M.E.N.	List	CHC
Trainer 20	31.95	21.98
Buzzard Bombshell	53.95	36.98

MIDWEST	List	CHC
Sweet Stick #128	42.95	24.98
Cardinal #125	32.95	21.98
Chipmunk #126	33.95	20.98
Attacker #134	42.95	25.98

MRC-R/C TANKS	List	CHC
Sherman #RT1601	156.98	107.98
Leopard #RT1602	199.98	137.98
Balt./Chgr. #RC-11	29.95	24.98

BUD NOSEN	List	CHC
Aeronca Champ	99.95	69.98
Gere Sport Biplane	129.95	89.98
Jenny	129.95	89.98
Trainer	79.95	55.98

WEBRA	List	CHC
.40 RC	#1022RC 134.65	70.98
.61 RC	#1020RC 181.30	94.98
.10 RC FR Sch.	#1008RC 110.65	68.98
.20 RC FR Sch.	#1019RC 117.25	72.98
.40 RC FR Sch.	#1034RC 156.30	81.98
.61 RC FR Sch.	#1024RC 217.20	113.98
.91 RC FR Sch.	#1037RC 253.65	132.98
.61 RC RV Sch.	#1026RC 227.00	118.98
.40 RC Marine	#1035RCW 186.75	97.98
.61 RC RV Sch. M	#1026WR 269.20	140.98
.91 RC Sch. Mar.	#1039RCW 296.40	155.98
.61 RC Sch. Heli	#1028HC 216.90	113.98

IM	List	CHC
Engine Test Bench & Stand w/Thr. Lever & Fuel Tank	54.95	36.98

K&B	List	CHC
.35 RC #7861	34.95	21.98
.40 RC #8011	67.50	39.98
.40 RC Press. #8360	95.00	53.98
.19 RC #6712	50.00	29.98
.61 RC w/Muf. #6525	90.00	52.98
.61 RC Press #6535 w/Muf.	115.00	67.98
.21 Out. Mar. #8382	99.50	64.98
.21 In. Mar. #8384	69.50	44.98
.40 RC Sport #8060	75.00	44.98

KRAFT	List	CHC
.61 RC Sch. w/Perry carb & Muffler	99.95	73.98
KP-5C Sch. 2St. 4 Servos	375.43	272.98

LANIER-ARF	List	CHC
Cessna #LA119	48.50	30.98
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Comet 35 #LA154	52.50	36.98
Caprice C #LA116	73.50	47.98
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OS MAX	List	CHC
.20 RC w/Muf.	42.95	28.95
.30 RC w/Muf.	50.95	35.95
H.60F RC BH w/Muf.	99.95	68.95
.10 FSR RC w/Muf.	35.95	26.95
.25 FSR RC w/Muf.	59.95	40.95
.40 FSR RC w/Muf.	89.95	61.95
.45 FSR RC w/Muf.	104.95	74.95
.21 FSR RC - Car	62.95	47.25
.10 FSR RC Mar w/Muf.	42.95	32.25
.21 FSR RC Mar.	64.95	48.75
.20 RC Mar.	52.95	39.75
.30 RC Mar.	57.95	43.45
.40 RSR RC Mar w/FW	99.95	74.95
.45 RSR RC Mar. w/FW	109.95	82.95
.60 RSR RC Mar. w/FW	139.95	104.95
.65 RSR RC Mar. w/FW	142.95	107.25
.30 RC Wankel w/Muf.	119.95	85.95
.60 FSR RC Press. w/Muf.	159.95	109.95
.60 4 Cycle RC	225.00	154.95

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Spitfire #RC1	79.95	51.98
T-28-B #RC2	79.95	51.98
FW 190 #RC3	79.95	51.98
Waco	79.95	51.98
Dualist	89.95	58.98

	List	CHC
.09 RC Diesel #1003ARC	50.70	25.98
.15 RC Diesel #1005RC	52.40	27.98
.40 RC Mar. w/FW #1023RCW	161.80	84.98
.40 RC Sch. Heli #1038HC	155.70	81.98
.61 RC Sch. Mw/FW #1025RCW	248.40	130.98
.40 Pylon Sch. #1036P	173.80	91.98
.109 RC Sch. Mar. w/Gear Red. #1008RCW	167.60	87.98
.20 RC Sch. Mw/FW #1019RCW	133.35	69.98
.61 RC Mar. w/FW #1021RCW	215.30	124.98
.61 RC Sch. RE w/SV Carb. #1030RC	225.80	131.98

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AVATAR

from page 118/56

correct clearance all around (about 1/16" between the rear face of the spinner and F1).

Go ahead; you're entitled, start chopping away at this (Ugh) heavy box and sand to the contours and cross-sections as shown.

FINAL ASSEMBLY:

Install the maple wing bolt block to the fuselage (undrilled), and add the wing bolt reinforcement plate to the underside of the wing as shown. Accurately locate and drill the wing for the 1/4" diameter dowel and insert it allowing for the 1/32" plywood wing fillet base. Assemble the wing to the fuselage and measure the distance from each wing tip to a point at the rear of the fuselage and, when the wing is accurately positioned, lock it in place and drill through both the wing reinforcement plate and the maple wing bolt mounting block in the fuselage with a #10-32 tap drill. Disassemble, enlarge the holes in the wing for both clearance and tap the wing bolt mounting block.

For a real neat wing fillet, try this: wrap the wing center section with Saran Wrap or the backing from Super MonoKote that you've been saving for something. Cut out and glue the 1/32" plywood wing fillet bases to the fuselage wing saddle using a relatively slow drying glue (such as white glue) and pin or tape them in place. Then bolt the wing to the fuselage. Next, add the 3/32" thick plywood rear fillet piece to the fuselage flush with the under surface of the wing and let dry. Disassemble and, with a spatula, make a fillet with Epoxolite to the approximate shape shown. Let this firm up for awhile, then, using your fingers as a radius tool (wetted with dope thinner), form the radii of the fillet removing any excess material. With this method, I've achieved fillets with almost no sanding required.

Reassemble the wing to the fuselage and add the fairing block to the lower wing surface using real soft balsa. After sanding the fairing block to match the fuselage contour and cross-section, I usually glue a piece of 1/32" thick plywood to each face to keep them neat and free of nicks.

We can now add the tail feathers to this peacock. Reassemble the wing to the fuselage and add the tail group. This step is another of those "if you don't do it right, there won't be a second flight." So — measure, re-measure, then glue it on. After it is dry, measure again and, if it isn't right, saw it off and do it again. Add the fuselage fin fairing blocks and sand to shape to match the fuselage, then fair in the intersection of the fuse/fin with Epoxolite using the same method as used in making the wing fillets.

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Windspiel Models

AVATAR

from page 122/56

At this point, you should "side to side" balance your bird. (You do want a balanced bird, don't you?) with a side mounted motor and muffler hanging off it, the imbalance is significant. I suspend the plane with string under the prop shaft and under the top rudder hinge, and add steel wood screws as required to the outer rib (screwed through the rib and into the left wing tip block).

FINISHING:

Since there are so many choices and each is worthy of a separate article, I won't go into great detail here except to say that all my versions of Avatar were covered with a combination of Super MonoKote and Superpoxy.

The wings, ailerons, elevators, and rudders, were covered with Super MonoKote. The fuselage and fins were hysol resined, primed with Super Poxo Primer and sprayed with Super Poxo for the final finish. The wing tips and elevator tips were also finished with Super Poxo. This combination is a really good compromise between ease of application/durability and weight.

Just one of the reasons for the choice of a Super Poxo finish on the fuselage was to get a "super clean" canopy installation, and it goes like this --- hysol resin the complete fuselage and fin using lightweight glass cloth for added strength, if you prefer; then wet sand the entire assembly. Add the roll-over bar to the cockpit and completely finish the cockpit area under the canopy only. After trimming and fitting the canopy and windshield, completely mask the outside surfaces of both pieces with masking tape except for about 1/16" all around where they attach to the fuselage. Clean the inside surfaces of each piece with detergent and tape the rear canopy portion to the fuselage in a couple of places. Then glue (Wilhold R/C 56 works great) the unmasked portion of the canopy to the fuselage all around and let dry. Do the same with the windshield, gluing it to the roll-over bar also. Run a fillet bead of Hobbypoxy "Stuff" all around the unmasked portion of the canopy and windshield and lightly sand smooth. With the masking tape still in place, completely finish priming and painting the fuselage.

Remove the masking tape and you should have a canopy that looks like it "grew" out of the fuselage.

BALANCING:

Since the model is already "side to side" balanced, we only have to balance for fore and aft CG location. My versions of Avatar handle beautifully with the CG as shown on the plan and there was no

to page 126

INTRODUCING: CESSNA 182

IT'S AEROBATIC,
YET IT'S A TRAINER
. . . AND IT'S SCALE



Looking for a good scale ship to get you started? Perhaps you need something a bit out-of-the-ordinary for scale competition? Our Cessna 182 is a big, stable airplane; ideal as a scale trainer on only a .40 engine. Put a .60 under the cowl and fly circles around the competition. The semi-symmetrical airfoil makes the 182 groove, yet it's as docile as a kitten. For total scale realism, add the optional flaps. Trike gear for pleasant ground handling.

The kit is all-balsa, with lots of hardware and molded parts for speedy construction. The clear plans and special illustrated construction booklet make it a kit that anyone can build.

SPECIFICATIONS

- 72" span
- 702 sq. in. area
- 5-7 lbs. flying weight
- Power:
 - .40 (as a trainer)
 - .60 (for aerobatics)
- Four channels
(flaps optional)



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Photo of actual model taking off

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AVATAR

from page 124/56

difficulty in achieving this balance point with the equipment located as shown. However, different choices of motor, muffler, airborne pack and finish will affect this. The servos can be moved forward from where they are shown and there is room for the battery pack under the fuel tank, if needed, and, of course, there is always the option to (Ugh) add lead as required when all else fails.

FLYING AND TRIMMING:

My versions of Avatar are set up with 5/16" up and the same amount of down on each aileron; 3/8" up and the same amount of down on the elevator and "all I can get" on the rudder, just short of interfering with the elevator when hard-over. This amount of travel is more than required for the pattern maneuvers so that, in the case of a "good" loop or roll, full stick throw is not required, but it's there for the "hot dog" maneuvers which really turn me on.

If built relatively true and with the CG close to where it's shown on the plan, your bird should require only minor trimming to bring it "right on." However, if you experience any real difficulties, I suggest you study Chapter One of RCM's Flight Training Course, Vol II. □

SUPER GNAT

from page 49

their instruction manual and receive a new plywood fuselage skin and bulkheads at no cost.

Our total time in building the "Super Gnat" was 6 hours. The tail surfaces, including the "flash fastener," went together very fast with no problems. The fuselage was covered with metallic blue Flite-Kote, the tail surfaces with white MonoKote, the wing sprayed with white lacquer.

The finished model is both attractive and strong. The radio used was a MACS, available from several Southern California hobby shops. The completed weight was 22.75 oz., and no additional weight was necessary to achieve the proper CG. In flight, the Super Gnat rated excellent on the slope, but only average on the flat due to lack of wing area. There is a 99" wing shown on the supplement sheet and it is available from the manufacturer. It consists of a 33" center section that the existing panels plug into. This center section can be scratch-built if you prefer.

In summation, if you're looking for a fast building, good looking, rugged small sport sailplane that's also easy to transport, you won't go wrong with a Super Gnat. □

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SPITFIRE MK-9

Still the best combination of looks and performance you can buy. Nobody ever designed a more elegant ship than the Spitfire. The model flies superbly and has won countless stand-off scale contests. The standard kit builds into a MK-9 Plan includes details for other Marks, like the beautiful MK-22. Kit features: Machined and diecut balsa, formed LG, nylon fittings, metal parts & moldings. Two full-size plans: complete radio & retract gear installation shown. Isometric diagram & illustrated instructions make building easy and fun. Six-color accurate decals. Span 65". Area: 714 Sq". 4 to 6 channel. Engine: .40 to .60



THE WACO

We chose the Waco F-3 as our biplane flagship because it best represents the "Golden Era" of the 1930's, when flying was an adventure. Add to this, easy, snag-free building and safe, gentle flying—the result of the thorough kit engineering and careful prototype development that are features of all Pica Kits—and you have a satisfying building and flying experience ahead of you. Kit features: Top-quality diecut and machined balsa and plywood. Full size plans. Separate instruction book with isometrics. Decals. Injection-molded (Not vacuum-formed) plastic cowl, cowl blisters, and wheel pants.



FW 190 D-9

The qualities that make a model a NATS winner are the same ones that Sunday sport-scale fliers look for. Exceptional appearance to start with, of course. The FW 190's stark and sinister shape has always excited modelers. But even more important are friendly flying qualities. Our designs have always emphasized safety at low speeds, and the FW 190 has inherited the ability to fly from 80-90 mpg right down to a near-hover for landing. The wide-track gear makes it an ideal first "tail-dragger." Kit features: Full-size plans showing radio and retracting gear installation. Color schemes (and decals) for THREE different FW 190's. Separate 16-page instruction booklet with cutaway diagrams and in-depth flying hints. Diecut and machined balsa nylon fittings, formed wire cowl, canopy, etc. Span: 65". Area: 730 Sq". 4 to 6 channel. Engine: .60



T28-B

Plenty of dihedral (7°) for lateral stability. Radial cowl prevents speed buildup in a dive. Large stabilizer and long tail moment give wide CG position tolerance. Special airfoil and washout maintain stability down to a very low speed. Tricycle LG makes good rough-ground handling and easy landings. Bright color schemes help pilot orientation in flight. Large flaps incorporated in basic design. Over 700 sq. ins. for light wing loading even when loaded with options. Kit features: Our now-famous detailed plans (2 sets) showing flaps, retracts, RC equipment, etc. Beautiful 3-sheet detailed fuelproof decals. Machined & diecut balsa, formed wire Nylon fittings (flap hardware included), canopy and the best cowling ever put in a kit. Span 65". Area 710 sq". 4 to 6 channel. Engine .60



CESSNA 182

Perhaps you need something a bit out-of-the ordinary for scale competition? Our Cessna 182 is a big, stable airplane, ideal as a scale trainer on only a .40 engine. Put a .60 under the cowl and fly circles around the competition. The semi-symmetrical airfoil makes the 182 groovy, yet it's as docile as a kitten. For total scale realism, add the optional flaps. Trike gear for pleasant ground handling. The kit is all-balsa, with lots of hardware and molded parts for speedy construction. The clear plans and special illustrated construction booklet make it a kit that anyone can build. Span: 72". Area: 702 Sq". 5-7 lbs. flying weight. 4 channel. Power: .40 to .60



DUELLIST 2/40

The Duellist 2/40 has been designed as an easy-to-fly and safe handling twin engined R.C. model. Combining elegant appearance with simple structure, it's ideal for the modeler who has progressed through the usual trainers and pattern or low wing sport ships. As such, it offers a further level of enjoyment in the R.C. hobby, and a new accomplishment in flying skills to the builder. Wing span: 67". Wing chord: 14". Total wing area: 795 sq.". Fuselage length: 56". Stabilizer span: 27". Vertical fin: 10-1/4". Rec. engine: .23-.40 Rec. fuel tank: 8 oz.. Gear: Fixed or retract. Channels: 4 (5 wire). Control functions: Ailerons, Elevator, Throttle, Rudder. Construction: Balsa. Plan sizes: 35" x 67". Instruction manual and construction photos included. Kit includes: Die cut balsa, shaped parts, hardwood, plywood, aileron torque rods, hardware and sample fillet. Flying weight: 6-8 lbs.



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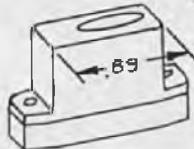
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	Marks Wonder	\$19.95	\$12.27
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BIG IS BEAUTIFUL

from page 55/54

idea and recommended here recently as a means of saving your model if for any reason you lose throttle control or if the idle is a bit too high and you are flying a real 'floater'. To have the ability to shut the engine down in an emergency could be of real value and may save the bird.

Bill's idea of using the 180 degree servo makes sense and is something that had not occurred to me. The additional movement will give better mid-range control which, on some of the gas engines, would be a big plus where a small movement will give a large increase in rpm. I use EK radios and they have a throttle detent on them which I have gotten used to and don't wish to disable. I use the detents to get close to what I want and then use the trim to make fine adjustments in rpm. It works pretty well, but Bill's use of a 180 degree servo would do the same thing and give better control on the throttle than might be the case with a standard servo.

Anyway, Bill, thanks for reminding me that it won't hurt to review some of the basics from time to time for the benefit of the newcomers to Super Scale.

Anybody else out there with a good idea in the back of their mind, don't be shy about sharing it with the rest of us. I have learned a great deal from those who write me and am pleased to be able to share it with so many others through the pages of RCM.

This column is a bit lengthy, so will close for now and hope to have you with us again next month. □

RC FLYING AND THE LAW

from page 53

reviewed the code, we are reprinting the two portions most relevant to radio controlled modeling.

OFFICIAL AMA SAFETY CODE General

(1) I will not fly my model aircraft in competition or in the presence of spectators until it has been proven to be airworthy by having been previously successfully flight tested.

(2) I will not fly my model higher than approximately 400 feet within 3 miles of an airport without notifying the airport operator. I will give right of way to, and avoid flying in the proximity of full scale aircraft. Where necessary an observer shall be utilized to supervise flying to avoid having models fly in the proximity of full scale aircraft.

(3) Where established, I will abide by the safety rules for the flying site I use, and I will not willfully and deliberately fly

to page 132



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RC FLYING AND THE LAW

from page 130/53

my models in a careless, reckless, and/or dangerous manner.

Radio Control

(1) I will have completed a successful radio equipment ground range check before the first flight of a new or repaired model.

(2) I will not fly my model aircraft in the presence of spectators until I become a qualified flyer, unless assisted by an experienced helper.

(3) I will perform my initial turn after takeoff away from the pit, spectator, and parking areas, and I will not thereafter perform maneuvers, flights of any sort,

or landing approaches over a pit, spectator, or parking area.

Take the time now to review these provisions. Keep in mind that the AMA headquarters recently reminded all new and renewing members that compliance with the safety code is essential in order that the AMA carrier honor a claim made under the policy.

In brief, under "General," the first insists that the aircraft be airworthy before it is used in competition or the presence of spectators. The second is derived from an advisory circular put out by the Department of Transportation, Federal Aviation Administration a few years back stating what they called "Model Aircraft Operating Standards."

This came out of work done with the FAA by executives of the AMA and relates to the potential danger of full-scale aircraft and models meeting in the sky. The full statement of these "operating standards" is as follows:

MODEL AIRCRAFT OPERATING STANDARDS

Department of Transportation
Federal Aviation Administration

(1) Purpose

This advisory circular outlines safety standards for operators of model aircraft, and encourages voluntary compliance with these standards.

(2) Background

Attention has been drawn to the increase in model aircraft operations, and the need for added caution in the case of free-flight and radio controlled types to avoid creating a noise nuisance or a potential hazard to full-scale aircraft and persons and property on the surface.

(3) Operating Standards

Modelers, generally, are concerned about safety and do exercise good judgment when flying model aircraft. However, in the interest of avoiding undue criticism from affected communities and airspace users, compliance with the following standards is encouraged by operators of radio controlled and free-flight models.

(a) Exercise vigilance for full-scale aircraft (get other people to help if possible) so as not to create a collision hazard.

(b) Select an operating site at a sufficient distance from populated areas to avoid creating a noise problem or a potential hazard.

(c) Do not fly higher than 400 feet above the surface.

(d) Do not operate closer than three miles from the boundary of an airport

to page 136

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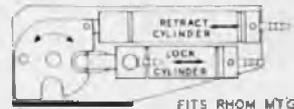


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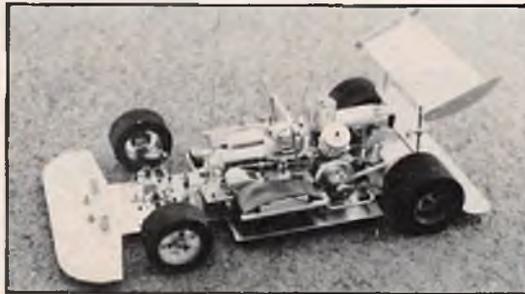
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from page 132/53

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unless permitted to do so by the appropriate air traffic control facility in the case of an airport for which a control zone has been designated, or by the airport manager in the case of other airports.

(e) Do not hesitate to ask for assistance in complying with these guidelines at the airport traffic control tower, or air route traffic control center nearest the site of the proposed operations.

William M. Flener
 Director, Air Traffic Service

The lowest that a full-scale aircraft is supposed to fly in an open, relatively unhabited area (which is where a good deal of our R/C flying takes place), is 500 feet above the surface. Therefore limiting our flight to 400 feet, potentially there is a hundred feet of safety between the lowest a full-scale aircraft can fly and the highest a model is supposed to fly. The problem of course is that full-scale aircraft have altimeters while the modeler's "altimeter" is his judgment. But at least you know what that requirement is and you should, perhaps the next time you're flying, ask experienced pilots to demonstrate how high up 400 feet is if you are in doubt.

In the third general requirement, you agree that you will abide by the safety rules of the flying site and in any case will not willfully and deliberately fly in a dangerous manner. The essential idea is that if you damage someone's property or person, you will be covered if it was simply the result of your negligence, that is your lack of due care under the circumstances, but will not be covered if you failed to reasonably attempt to meet the rules of this safety code, that is, by flying dangerously.

Turning to the provisions relative to radio control, you will note that what is said is the obvious and straightforward. The point, once again, is that if you want that insurance to cover you in the event of a claim against you then you had better have complied with these safety code regulations pertaining to radio control. If you haven't, then you run the risk of being denied coverage, and that is true regardless of whether you paid your AMA dues or not.

With the setting out of this official AMA Safety Code and Model Aircraft Operating Standards, there is no excuse for any reader who respects their hobby, the lives and property of others as well as their own pocketbook not to know what is required of them in order to be legal in their R/C flying. How about giving yourself a mental test to see whether you remember the six points involved. You owe that much to yourself,

to page 138

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RC FLYING AND THE LAW

from page 136/53

your fellow modelers and those who depend on you not to injure them or destroy their property.

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SUPER RACK

from page 52

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Capable of holding everything from Half A to sixty size aircraft, as well as all your radios, Super Rack fills the bill for anyone with a 6' corner and a basement full of airplanes. □

THE R/C WIFE

from page 51

tossed it in the trash can at the field. Well, I couldn't bear to see that gorgeous fuselage and tail sticking out of the can, so I went over and pulled it out to have a look. It sure looked fixable to me, so I started picking bits and pieces of epoxy glass out of the trash. About this time Ed came strolling over.

"Throw it away," he said. "You'll never fix it." (What's this? A challenge?!?) I kept picking.

"It'll be easy to fix," I said. "Besides, I can't bear to leave it."

"It will never fly straight even if you do fix it."

"I'll be careful to build it straight," I said stubbornly.

"Well, you aren't putting that piece of junk in my van," he told me, and that settled that. Amid cries of, "You show him, Phyllis!" I put it in the van, took it home, and re-glassed the jigsaw puzzle. I added a new foam wing, and it looked as good as new to me. Ed was skeptical, but he tested it for me. It flew great. Since then he hasn't criticized, my building.

All in all, Ed figures he's lucky I'm involved in the hobby, too. That way he doesn't have to contend with too much wifely opposition when he drools over a new kit or dreams up a new design. I guess that's why we have twelve planes, with a ducted fan F-86 on the way.

to page 140

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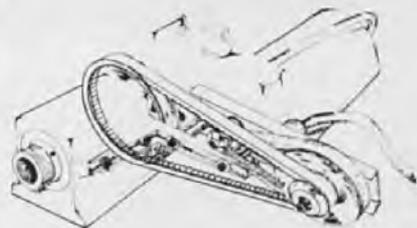
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THE R/C WIFE

from page 138/51

Fellow fliers find it comical when we go down to the local hobby shop. Instead of me, the wife, grumbling about the money we spend on model's I'm forever seeing something we need. It's the female shopper's instinct, I guess. We'll have gotten everything on our list, and there I'll be, pulling cards of bolts or clevises off the rack. "In case we need them," I say, or "We're getting low on these."

"Oh, for pete's sake." Ed'll moan, "I can't get out of here for less than \$50

anymore! Will you quit buying more junk?" (Just wait until it's 10:00 at night and he needs that package of threaded couplers I just picked up . . . Boy, will I make him beg!)

Our home life reflects our hobby, too. For instance, it's not unusual for Ed to have a plane on the workbench, for me to be fiddling with one on the kitchen table, and for my son to be building a U-Control model in his room. Also, since I'm a teacher, my time is limited and I tend to shift my priorities a bit. "Clean T-shirts? Oh, sorry, Ed; you see I wanted to get this wing sheeted . . ." He usually takes it pretty well. (At least my excuses are novel.) "Dinner? Oh gosh! I forgot

about dinner . . . But I **did** get your Skybolt painted . . . Guess we'll have to eat out."

Vacations are interesting in our family, too. Last summer we set out in our van to go 1500 miles to El Paso to visit Ed's dad. There was no question of tucking a plane in to take along. We took five. A Buzzard Bombshell, a Zonker canard, and three of Ed's originals made the trip. In fact, we hadn't finished one of them when we left, and we ended up MonoKoting the wing at a campsite in Texas. From the looks we got, you would have thought those campers had never seen a wing covered before.

to page 144



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(16) 3/32x3x36	(4) 3/32x4x36
(15) 1/8x3x36	(4) 1/8x4x36
(8) 1/4x3x36	(2) 3/16x4x36
(8) 3/16x3x36	(2) 1/4x4x36
(2) 3/8x3x36	(1) 3/8x4x36
(2) 1/2x3x36	(1) 1/2x4x36
(1) 3/4x3x36	
(1) 1"x3x36	

Order now

3-inch Assortment

(7) 1/16x3x36	(1) 3/8x3x36
(8) 3/32x3x36	(1) 1/2x3x36
(5) 1/8x3x36	
(4) 3/16x3x36	
(4) 1/4x3x36	

\$14.58

4-inch Assortment

(5) 1/16x4x36	(2) 1/4x4x36
(4) 3/32x4x36	(1) 3/8x4x36
(4) 1/8x4x36	(1) 1/2x4x36
(2) 3/16x4x36	

\$15.57

NEW Addition to our balsa line

Balsa 36-inch stick Assortment

(10) 1/8x1/8	(10) 1/4 tri stock
(10) 1/8x1/4	(10) 3/8 tri stock
(20) 3/16x3/16	(5) 1/2 tri stock
(20) 1/4x1/4	(4) 1x1/4 aileron stock
(8) 1/4x1/2	
(10) 5/16x5/16	(4) 1-1/4x5/16 aileron stock
(5) 3/8x3/8	

only \$19.99

If purchased with any of our boxed balsa **SAVE \$2.00** *only \$17.99*

Be kind to your engine - Use ZINGER PROPS

9x5, 6, 7	doz.	\$10.50
10x4, 6	doz.	\$10.80
11x7, 7 1/2, 8	doz.	\$11.50

All maple, true pitch. Airfoiled tips. You get smooth power, less vibration. Stock up now!

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RADIO S-U-U-P-E-R SALE

KRAFT RADIOS

*KP2A	\$87.77	*A Series radios ordered w/KPS-15A Servos, add \$10.00
*KP2A Wheel	\$87.77	
*KP6A w/14A Servos	\$204.99	
KP5C w/14 or 15 II Servos	\$269.00	
KP7C w/14 or 15 II Servos	\$369.00	



FUTABA RADIOS

2 CHANNEL

FP2F Wheel w/2 Servos, Dry	\$99.99
FP2E Dual Stick w/2 Servos, Dry	\$99.99

4 & 6 CHANNEL

FP4FN w/4 S-18 Servos, all NiCad	\$185.99
FP4FN w/4 S-16 Servos, all NiCad	\$204.99
FP6FN w/6 S-18 Servos, all NiCad	\$217.99
FP6FN w/6 S-16 Servos, all NiCad	\$236.99



New CONTEST 8

- Snap Roll buttons (2)
- Dual Ball Bearing Servos
- Plug-In Modules
- Mixing on 3 channels
- And many more features

Sale
\$535.00

SERVO S

S-18 Servo	\$22.50
S-16 Servo	\$29.99
S-7 Servo, water tight	\$29.99
S-15 Ball-bearing Servo, specify radio	\$39.99

LOGICTROL RADIOS

Nimbus 4 channel	\$209.00
*Champion 5 channel, all NiCad	\$239.00
*Super Pro 7 channel, all NiCad	\$275.00

*1-yr. written warranty



The reliable ones! I/C servo amplifiers for greater control, accuracy & faster response.

R/C ENGINE SALE

List	Sale
\$ 50.00 K&B .19	\$ 30.00
\$ 73.50 K&B .40	\$ 43.50
\$105.00 K&B .40 w/pump	\$ 63.00
\$ 96.50 K&B .61 w/muffler	\$ 57.90
\$125.00 K&B .61 w/pump & muffler	\$ 75.00
\$160.00 K&B #9100 for ducted fan	\$ 96.00
\$ 39.87 HB .12 w/muffler	\$ 27.99
\$ 43.23 HB .15 w/muffler	\$ 30.25
\$ 50.18 HB .20 w/muffler	\$ 35.15
\$ 56.00 HB .25 w/muffler	\$ 39.20
\$ 83.34 HB .40 PDP, no muffler	\$ 59.00
\$119.36 HB .61 PDP, no muffler	\$ 83.50
\$172.00 OPS .60 Rear Exhaust*	\$129.00



Save! Most Popular R/C SAILPLANES

Craft-Air Piece O' Cake	\$16.99
Cox Olympic II	\$34.99
Bridi Soar Birdi	\$13.99
Craft-Air Drifter II	\$13.99
Craft-Air Winddrifter	\$28.99
Craft-Air SD-100	\$35.97
Craft-Air Viking I or II	\$48.99
Legionair Shuttle 78	\$33.60
Legionair Shuttle 100	\$39.60
Legionair 132	\$72.99
Legionair 140	\$82.99
Mark's Wanderer	\$13.99
Mark's Wanderer 99	\$21.99
Mark's Windward	\$19.77
Mark's Windfree	\$26.98
Midwest Silent Squire	\$24.97
Pierce Paragon	\$48.95
Pierce Ridge Rat	\$27.95



Mark's Models BIRD OF TIME

118" span, for expert builders/flyers. This model holds the #1 slot on the U.S. team going to the World Soaring Championships in Belgium in '79.

SAILPLANE ACCESSORIES

Craft-Air Std Hi-Start	\$23.99
Craft-Air H-D Hi-Start	\$27.90
Craft-Air Std Rubber, 100'	\$15.99
Craft-Air H-D Rubber, 100'	\$18.99
Parachute	\$ 3.88
Prather Sunshield	\$ 2.66
Craft-Air Spoiler Kit	\$ 2.77

Craft-Air



BUTTERFLY II

\$30.99 Gentle trainer with slow cruising speed. And a sporty flyer at full throttle. 99" span, for 3 channel radio.

NEW

FOX 20cc Opposed 1.2 C.I. TWIN

Simultaneous firing configuration, opposite piston motions cancel out vibration. Smooth running, develops a little over 3 HP. @ 14,000 RPM.

FOX EAGLE II

Rear or Side Exhaust

Your 60 airplanes deserves the best! For high power output & durability, this is it!

*Please check availability of OPS engines

THE HOBBY MARKET

Airplane Savers
Specify radio

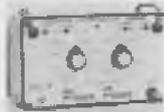


\$15⁹⁹

Craft Air

Dual Range ESV

Predict available flight time from receiver & transmitter NiCads. Use on 4 to 8 cell.



\$48⁹⁹

R. L. Taylor

POWER PACER

NiCad tester/charger/cycler gives accurate reading, spots trouble. Please specify radio.

THE HOBBY

Jay



Dave



Prather Deep Vee Boat

For sport or racing **\$69⁹⁹** plus postage

Epoxy fiberglass hull & plywood bulkheads take rough water!

Running Hardware Kit ... \$39.99
Hatch Cover \$13.99

L&L Electronics IGNITION SYSTEM

2.0 volt jack



charge jack **\$13⁹⁹**

Solid state, rechargeable, portable! Automatic glow driver.



On-Board IGNITION SYSTEM

Maintains stable ignition temperature, reduces stall-outs. Solid state, rechargeable.

\$13⁹⁹

Sig SUPER CHIPMUNK

\$45⁴⁵

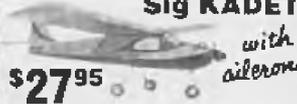


Kwik Bilt

Plastic sheet — balsa construction.

FATHER'S DAY SPECIALS

#1 Selling Trainer! Sig KADET



\$27⁹⁵

with ailerons

57" span, great maneuverability. Will fly hands off!

Accessory pack — everything except engine, covering & glue \$9.80

Bridi pattern kit

\$59⁹⁹



63" span

Jim Kimbro's 60-size DECEPTION

designed for tuned pipe Balsa fuse & fin, foam wing & stab with sheeting. With hardware.

For R/C or FF OLD TIMERS



- M&P 7' Quaker \$36.99
- M&P Dalair Sportster \$44.99
- Tyro Playboy Sr \$35.99
- MEN Buzzard Bombshell \$35.98

Kraft KP4A Sport Series Radio (all NiCad) with 4 KPS 1411A Servos



\$184⁹⁹ COMPLETE
1-yr. written warranty

Top Flite HEAT SEAL IRON & HEAT GUN

\$33⁹⁹

Iron designed to work in and around compound curves. Heat Gun gives even distribution, provides scratch-free finish.

DuBro PROP DRIVE UNIT

\$64⁹⁹

Smooth running, belt driven unit for slow, powerful flight. For scale & sport realism. Completely assembled. Extra belt, \$3.99



\$76⁹⁹
HAWK TRAINER
READY TO FLY! Complete with MRC-Enya 151VTV engine installed. 48" wingspan. (Radio not included).



- RCM 40 Trainer \$36.65
- RCM 60 Trainer \$41.99
- Super Kaos 40 \$37.32
- Super Kaos 60 \$46.66

COVERITE
Silk Spun or Super, \$5.75 each
3 for \$16.99
Permagloss, \$6.79
3 for \$19.99
Day Glo, \$7.50
3 for \$21.99

HEMOSTATS Straight or Curved Nose
\$5⁹⁹
Better than long nose pliers, gets in the tight spots!



KOUGAR

\$33²⁵

New accessory pack for Kougar with everything needed to build kit, except covering & glue \$10.60

From Southern R/C
Designed for enclosed tuned pipe



BOOTLEGGER or TIGER TAIL III

\$58⁸⁸*
STANDARD KIT with glass fuse, foam wing & stab, firewall.

\$83⁸⁸*
FULL KIT with wing & stab sheeting, tip blocks, rudder, ailerons & hardware with glass fuse & foam cures.

* plus \$5 postage

Southern R/C FLIGHT CADDY
\$9⁹⁹
The best wooden flight box, easy assembly

Buld better with DREMEL
#381 Variable Speed with accessories **\$42.99**
#572 Saw with accessories **\$60.99**
Others in stock

Logictrol International CAPTURED TOW HOOK
\$2⁹⁹
Designed to concentrate load near pivot point, prevent premature release. Fail safe!



RACERS

FORMULA I

Prather Little Toni \$79.16
Model Merchant Midget Mustang \$79.16

QUARTER MIDGET

Prather Little Toni \$56.99
Model Merchant Midget Mustang \$56.99

QUICKIE 500 RACING

Big State Haffast 500, the ultimate in '500' racers \$28.88

Sporty .40 model Sig KIWI
\$29⁷⁵
54" span. Strong, easy construction.

Robert AUTO MIX
\$7²⁵
Smooth at any rpm

SUPER PUMPER Mark II
\$12⁵⁶

Rhom RETRACTS
Dependable retraction
Trikes **\$79.99**
Mains **\$57.99**
Corsair Mains \$74.99
FW-109 Mains \$59.99

Flite Line SKOOTER II
\$19⁹⁹
Easy to assemble sport plane. 48" span. For .19 to .40 engine.

Devcon EPOXY
3/\$10⁹⁹
9-oz. size 5 or 30 minute
For building & for repairs.

Prather FUEL LINE
\$10⁷⁷ 30-foot roll
Stays tight on fittings, won't kink or get hard. Buy the best, you'll eliminate fuel problems.



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SUPER MONOKOTE

OPAQUE: red, white, orange, yellow, dove grey, clear, aluminum, blue, dark blue, chrome or olive drab.
TRANSPARENT: yellow, red, orange or blue.

3 rolls
\$15.97

METALLIC 3 rolls \$18.97 ECONOKOTE Single roll \$4.17

Cream \$5.60 or 3/\$15.97
Aztec Gold \$6.50 or 3/\$18.97
Maroon \$5.60 or 3/\$15.97
Copper red \$6.50 or 3/\$18.97

FATHER'S DAY R/C SPECIALS

SUPER SANDER

3 sizes
1-foot \$ 3.96
2-foot \$ 9.99
3-foot \$10.99

Aluminum tube with handle. E-Z Flex Metalite Cloth bonded to bottom. Easy to guide, sands smoothly.

Model Merchant



ARF
60-size

REVENGER

65" span laminar-flow wing. Kit is excellent. Building time is minimal, pre-sanded. Check availability.

\$119
plus postage



Justo-jig Full House
\$39.99

Build accurate wings fast and easy, eliminate warps. Builds up to 6' wingspan. Adapters convert to fuse-jig.



Deluxe
MITRE
SANDER
\$19.99

Sands dihedral angle into center sections of foam or built-up wings. Does butt & edge bevel, square up & more. Easy to build kit.



SIG KITS

Colt \$16.05
Kavalier \$31.45
Smith Miniplane \$38.45
Skybolt \$48.95



Southern R/C

CORDLESS
STARTER
PACK No hook-up wires, starter contains battery in stand.
\$29.34
Starter not included

Check this "forgot-to-buy" list

Craft-Air Field Box	\$18.99	Ohio Supstar Softglas ..	\$ 6.99
C.B. Scale Tail Wheel ..	\$ 5.19	Ohio Supstar Fastape ..	\$ 6.25
Robart Incidence Meter	\$10.99	R/C Long or Short Plugs,	
Prather Prop Gauge	\$22.99	doz	\$10.99
Prather Spinner		DuBro Fuel Pump	\$ 6.99
Balancer	\$ 4.99	Bulk "T" Pins, 1/2 lb.	\$ 4.99
Hot Stuff, regular	\$ 2.25	12-vt. Wet Cell Battery ..	\$13.99
Hot Stuff, 2-oz.	\$ 7.20	L&L Multi Charger	\$19.50

SAVE SIG BIPES

\$38.45

SMITH MINIPLANE

\$48.95

SKYBOLT

\$50.75

LIBERTY SPORT

Six Shooter
Fuel Pump \$6.99

Hand operated rotary pump. Almost indestructible.

DuBro MUFF-L-AIRE II

Fits engines .29 to .80"

\$6.99



Pressure fitting included, easy to install.

Adjustable stainless steel spring controls back pressure, noise level.

*Special muffler for K&B .40 \$ 6.99

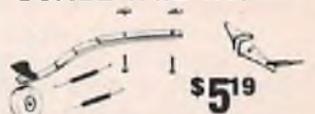
New Specials Every Month

Some items in limited quantity and advertised specials, subject to availability, will be honored until June 10, 1979. Prices may change if retail prices change.

R/C POWER KITS

Ace All Star Bipe	\$14.97
Bridi Kaos	\$44.66
Bridi Tweedy Bird	\$26.66
Goldberg Falcon 56	
Mark II	\$29.99
Goldberg Skylark 56 II ..	\$31.99
Mark's Bushwacker	\$26.97
Mark's Sunny Bipe	\$19.77
Jensen Ugly Stik	\$44.99
M.E.N. Trainer 20	\$21.99
M.E.N. Trainer 40	\$36.66
Mile High Super Joy	
Stick	\$22.88
Mile High Hornet	\$13.99
Midwest Little Stik	\$20.37
Midwest Attacker	\$25.88
Midwest Sweet Stik	\$25.88
Sig J-3 Cub	\$31.45
Sig Clipped Wing Cub	\$31.45
Sig Super Chipmunk	\$45.45
Sig Citabra	\$45.45
Sig Liberty Sport	\$50.75
Sig Cessna	\$52.45
S/R/C Alley Kat	\$35.37
Sure Flite 1/2A Cub ARF ..	\$24.99
Sure Flite J-3 Cub	\$24.99
Sure Flite Cessna	\$24.99
Top Flite Contender	\$36.99
Top Flite Freshman	\$30.99

C.B. Associates SCALE TAIL WHEEL



\$5.19

Unadvertised hard-to-get items — Royal, OS Engines, Nosen, Bridi Scale, Stafford, Andrews, Schluter & Jemco! Call, check availability, before ordering.

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- LIKE SHOPPING OVER THE COUNTER — we know our products, no catalogue number needed!
- SUPER SAVINGS ON NATIONALLY FAMOUS BRANDS — you get top quality at discount prices!

HOW TO ORDER

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| A. Within 48 continental states | B. Outside 48 continental states |
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| 2. Add \$4.00 to C.O.D. orders | 2. No C.O.D. orders accepted |

THE HOBBY MARKET

NEW FOR 1979

Schlüter „System 80”

New 1979



The New Improved 'Heli-Boy'
with 11 design changes asked for by
the American Modeler

• Write or call for details

An Exciting New Range of R/C Helicopters

- A new basic non-collective 'Heli-Boy'.
- An improved standard collective pitch 'Heli-Boy' which now includes 3 rotor head versions in the standard kit.
 - Beginners Hiller Head
 - Sports & Expert Aerobatic Head
 - Flybar-less Head For Scale
- **Four Bladed** rotor head for scale helicopters or just for fun.
- A beautiful scale version of the aerobatic **Bolkow BO 105** - fits any of the 'System 80' mechanics above.
- Improved HeliBaby II & collective pitch SuperBaby II.
- Dealer Inquiries Invited

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THE R/C WIFE

from page 140/51

But really, the nicest part about having your spouse fly R/C too, is that you've always got someone to talk flying with. You can discuss how well that new one flew or what went on at the flying field. And it's great to have a shoulder to cry on when you ding one and have to bring home the pieces. You never fail to get the sympathy you need. "There, there, Hon," he'll say, patting my back. "It's too bad . . . but I've told you a dozen times . . . up is down when you're inverted!" Grrrrr. □

from page 65/64

case, and the minute adjustments made to the exact size with a sanding block. But for most parts, removal of excess material to bring the part to size is usually no more than the thickness of the drawing outline.

Mistakes are easily corrected. If you slip with the transfer sheet while ironing or mis-register the image on the wood, don't throw the wood away. A light sanding will easily remove the transferred copy and restore the wood to its original condition. The xerographic image lies only on the surface, it does not penetrate into the wood like familiar lithographic ink printing on balsa and,

therefore, the amount of wood removed by sanding is negligible.

A word of caution on very soft balsa sheet. Too much ironing pressure will tend to caliper it to a thinner dimension. Use just enough iron pressure to effect the transfer. If in doubt, make a practice transfer on a piece of scrap.

It should be mentioned that the transferred image on the final support is reversed reading. Since I never found this to be a drawback, I nearly forgot to mention it. There are probable occasions when it is necessary to have a "right" reading image on the part, but I can't conceive of it at the moment. Most

to page 146

MIRAGE

Forerunner of a New Generation of Sailplane Design

As featured in Feb. 79
R/C Modeler



The MIRAGE kit includes all parts and plans to build either a standard or open class MIRAGE

	Standard	Open
Wing Span	99.75	112.5
Wing Area	847 sq. in.	915 sq. in.
Aspect ratio	11.8	13.3
Weight	32 oz.	33 oz.
Wing Loading	5.44 oz./sq. ft.	5.2 oz./sq. ft.
Surface loading	4.43 oz./sq. ft.	4.29 oz./sq. ft.



\$59.95

The ultra-light loading of the semi-symmetrical airfoil produces a new dimension in light air performance. yet the Rawdon airfoil gives the MIRAGE excellent penetration for windy conditions.

Kit features machined ribs, pre-cut formers, doublers and fuselage sides, canopy, complete hardware package, push rods, rolled plans and complete instructions with pictures.

C.O.D., Visa or
Master Charge

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SHOWN ABOVE

WALT MOUCHA JR. WITH NOMAD SAILPLANE 100" SPAN 18.99

SWIZZLE STICK 40 ON FLOATS

FLOAT KIT 30" UP TO 6 LBS ALL Balsa 9.99
 SWIZZLE STICK 40 60" SPAN .30 - .45 13.99
 SWIZZLE STICK 30 48" SPAN .15 - .29 11.99

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PIPER CUB J-3 9' SPAN, 1/4 SCALE
 SUPER SALE 14.95

BOTTOM ROW:

PHAETON BIPLANE 48" SPAN .35 - .45 22.99

EXCALIBUR 52" SPAN .40 - .50 21.99

SMOOTHIE 52" SPAN .40 - .50 18.99

TEMPO II 60" SPAN .30 - .45 17.99

SPECIAL 'TIL JUNE 15

CUB J-3
 WHEELS
 WHEEL PANTS
 15' COVERING
 QUADRA

\$184.00

ALL KITS INCLUDE
 FULL SIZE ROLLED PLANS
 COMPLETE INSTRUCTIONS - FULL
 HARDWARE - NO FOAM - ALL
 AAA Balsa AND HARDWOOD



COMING SOON:
 SOPWITH PUP

9 FOOT SPAN QUADRA POWER

QUADRA ENGINE
 THE MOST POPULAR 1/4 SCALE ENGINE,
 2.2 CU. IN., 2 H.P., \$89.99
 REAR PROP ADAPTER \$10.00

AAA Balsa

AS YOU CAN SEE WE GOT IT - TOP QUALITY ONLY

WE NOW HAVE 48" SHEETS IN MOST SIZES - ADD 35% FOR 3" WIDTHS
 AND 40% FOR 4" WIDTHS - SORRY NO 48" STICKS YET.

SHEETS 36"		STICKS 36"		MUSIC WIRE 36"	
1/16 x 2 [10 PK]	2.70	1/16 x 1/4 [30 PK]	2.18	1/16 DIA. [10 PK]	.70
3/32 x 2 [10 PK]	3.33	3/32 x 1/4 [30 PK]	2.25	3/32 DIA. [10 PK]	1.48
1/8 x 2 [10 PK]	5.60	1/8 x 1/4 [30 PK]	2.34	1/8 DIA. [10 PK]	1.99
1/4 x 2 [10 PK]	8.50	1/8 SQ. [30 PK]	1.80	5/32 DIA. [10 PK]	2.99
1/16 x 3 [10 PK]	3.06	3/16 SQ. [30 PK]	2.34		
3/32 x 3 [10 PK]	2.80	1/4 SQ. [30 PK]	3.80	BLOCKS 36"	
1/8 x 3 [10 PK]	4.50	1/4 x 3/8 [30 PK]	3.96	1 x 2	1.00
3/16 x 3 [5 PK]	2.50	1/4 x 1/2 [30 PK]	4.32	1 x 3	1.47
1/4 x 3 [5 PK]	2.90			1 x 4	2.20
3/8 x 3 [5 PK]	3.59			2 x 2	1.47
1/2 x 3 [5 PK]	4.49	DOWELS 36"		2 x 3	2.22
1/16 x 4 [10 PK]	4.80	1/8 DIA. [10 PK]	.60		
3/32 x 4 [5 PK]	2.89	3/16 DIA. [10 PK]	.70	SHEETING 30"	
1/8 x 4 [5 PK]	3.33	1/4 DIA. [10 PK]	1.00	1/16 x 3 x 30 [10 PK]	2.50
3/16 x 4 [5 PK]	3.83	STRIPS 30"		3/32 x 3 x 30 [10 PK]	3.00
1/4 x 4 [5 PK]	4.22	1/4 SQ. x 30 [20 PK]	1.90	1/8 x 3 x 30 [10 PK]	3.80
		1/4 x 3/8 x 30 [20 PK]	2.12	1/16 x 4 x 30 [10 PK]	3.99
				3/32 x 4 x 30 [10 PK]	4.79
				1/8 x 4 x 30 [5 PK]	2.75



R/C/M PRODUCT REVIEWS:
 SEPT. 78 - PHAETON BIPE
 MARCH 79 - NOMAD SAILPLANE

ALSO AVAILABLE:
 FUSELAGE SIDE STOCK
 LIGHT POPLAR PLYWOOD
 BIRCH AIRCRAFT PLYWOOD

CLOSE OUT

1/4 SCALE CURTISS JENNY, 9' SPAN,
 CLOSE OUT, WHILE THEY LAST, YOU'LL
 NEVER SEE ANOTHER BARGAIN LIKE THIS \$49.95

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 We accept PERSONAL CHECKS BANK AMERICAN MASTER CHARGE
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 add \$3.00 over \$30.00 we pay handling. Wisconsin residents
 add 8% sales tax. C.O.D. orders add \$1.00. For Parcel Post shipment
 add \$1.00. If P.P. C.O.D. add \$1.00. Orders outside continental US
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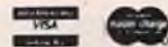
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Big H ray	31.00	45.00
BRIDI		
RCM-40	39.00	54.00
RCM-60	43.25	59.00
GOLDBERG		
Falcon 56 II	31.95	46.45
Sr. Falcon	40.95	56.90
JENSEN		
Ugly Stick	42.75	59.75
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Sweetstick	27.50	42.00

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Super Cov. 15'	38.34	28.95

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Pitts 40	—	—
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XEROGRAPHIC TRANSFERS

from page 144/64

parts, such as bulkheads, are symmetrical and have no specific orientation during installation. If not symmetrical, then just turn the part over when it's finished.

For fabrication of a multiple of wing ribs having constant chord, I usually make a transfer onto 1/16" plywood, cut it to shape and use it as a cutting guide. But for tapered wings, copy and transfer each wing rib. Xerographic transfers really speed this job up, and you will find it easier than many methods usually

covered in magazine articles on the subject of tapered wings.

I have found that about two transfers is all that can be practically made from one copy. The third transfer, although discernible, is very light. However, there is no sense in trying to stretch pennies that way. While at the copying machine, make enough to satisfy your needs and a few extra for practice. It is extremely aggravating to run short of any material on an evening after facilities are closed.

A word of caution. If the copier you have access to is not properly tuned, and is not producing good, dense, dark lines, then find another one. Remember that the process involves sharing part of

the original plastic image on the copy paper. Light copy images indicate a smaller amount of material available for transfer, and, of course, the transferred image will, in turn, be light.

For those of you modelers working in an engineering environment, you may find in your drafting reproduction department a Xerox printer called an 1860. This machine has the capability of copying your original plans size for size or in various steps of reduction. If plans are copied on an 1860, then the plans themselves can be used to supply transfers. I have recently built a miniature Aeromaster, having reduced

to page 148

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	S5443K	Kit of S5443 servo	27.00	
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XEROGRAPHIC TRANSFERS

from page 146/64

the plans 62%, and it was in the process of constructing the "Aero Mite," if Lew Andrews doesn't object to such a name, that I discovered I could use the plans directly to make those complicated, miniature bulkheads. In the case of transferring directly from 1860-reproduced plans, it is not necessary to compensate for the 1% magnification factor. Since everything is copied at one time, all parts are to the same scale and transfers are the exact size. Again you don't have to cut the piece part out of the plan for transferring. Just tape an appropriate size piece of wood over the part to be transferred, turn the plan over and iron the back. If your iron heat is adjusted below the scorching point, your plans will remain "like new" condition.

Throughout the article, I have stressed the use of xerographic copies for transfers. I have done this only because I have been using such copied images and know they work. However, I have not experimented with all types of copiers on the market. There may be others that perform equally as well for this application. On the other hand, I do know that some copier images will not transfer satisfactorily, if at all. From this standpoint, try whatever kind of copier is available to you. Who knows, it may work. If not, don't give up the ship. Look for a Xerox machine. One may be found at a copy center, a drugstore, post office, library, or luckily just down the hall from your office.

Good luck, and happy carving! □

COOK 45 "RISER"

from page 47/44

foreplane covered, assemble the model, and move the radio pieces until the C.G. is around the location shown on the plans (within plus or minus 1/2").

The photos show the arrangement of the Cannon radio that I installed, the servos fitting between the forward cross members, and the battery, wrapped in foam rubber, is held into the battery tray with a couple of rubber bands. A similar arrangement should be suitable for most other small radios. If a satisfactory balance cannot be reached in this way, a small amount of lead can be used to correct the C.G. position.

Connect the rudder to the servo with flexible NyRods, taping or lashing the outer cover to the framework at suitable points. The 1/8" dowel cross member is used as a final anchor point for the NyRod casing. Don't tie down the control runs finally until some checks have been

to page 150

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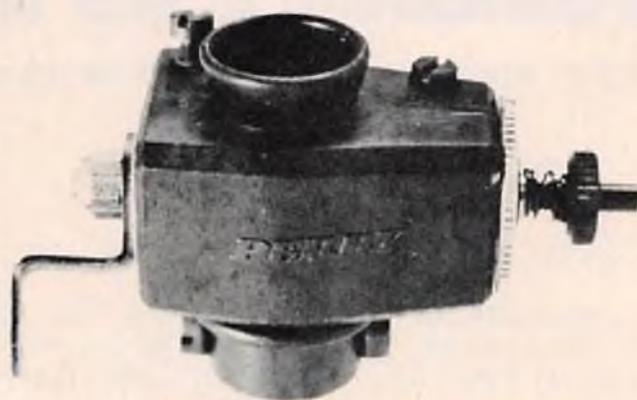
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COOK 45 "RISER"

from page 148/44

made to assess the friction level in operating the controls.

The elevator is hooked up to the servo with a length of 1/16" wire. Since the tail is up front, the elevator must work backwards. Down elevator makes the nose go up and vice versa. Be sure to connect the elevator to the servo so that the elevator goes down when you pull the stick down on the transmitter.

That's about all I have to say --- the flying has been covered during the first bits of the article. The only thing I would like to add is to remember that this is a sport model, so treat it as such. No pylon racing (or maybe this would make an interesting challenge for a different type of pylon race!)

I'd like to write more on possibilities such as this but I have this Dornier project I want to get back to, so good luck with your 'A' frame, and may both your engines keep running! □

ELLIPTICAL FOAM WINGS

from page 43/42

carefully, to take out the required 1/8".

Unfortunately, in taking the required 1/8" out of the core, you also took it out of the bottom side of the block, which you will need to hold the core while the spar, and later the sheeting, is being glued in place. This 1/8" must be added back; by the addition of a piece of 1/8" balsa sheet of the proper shape. As adhesive, I used some of Hi Johnson's "Super Tape" (see RCM June '78, page 54). We have used this tape for Quarter Midget and Open Racer wings, with excellent results, though so far, no one that I know of has tested it out on Formula 1 wings. More about those adhesives later.

Anyway, for this application, it works perfectly. Since it goes on fast and requires no curing time, you can work right along. Be sure that you rejoin the block and balsa insert on a perfectly flat surface to assure that you have a straight support for the wing core when it is in place later for drying.

The next step is to glue in the spar. It should be carefully cut and trimmed so as to be perfectly even with the surface of the core. Better too little than too much, it is hard to trim it down later without cutting into the core, and any high spots will show up as bumps on the outside covering. Once it is cut to shape, the spar is glued in place with Hobbypoxy II, or your favorite slow drying epoxy. Hold the core together with strips of masking tape, wipe off any epoxy that has oozed out with alcohol,

to page 154

O.S. Max 15, 19, 20, 25, 30; S.T. 15, 23-30; Veco 19; Wankel Rotary; Enya 198B, 198S; McCoy 19; K & B 25; Talpan 15; Rossi 15.

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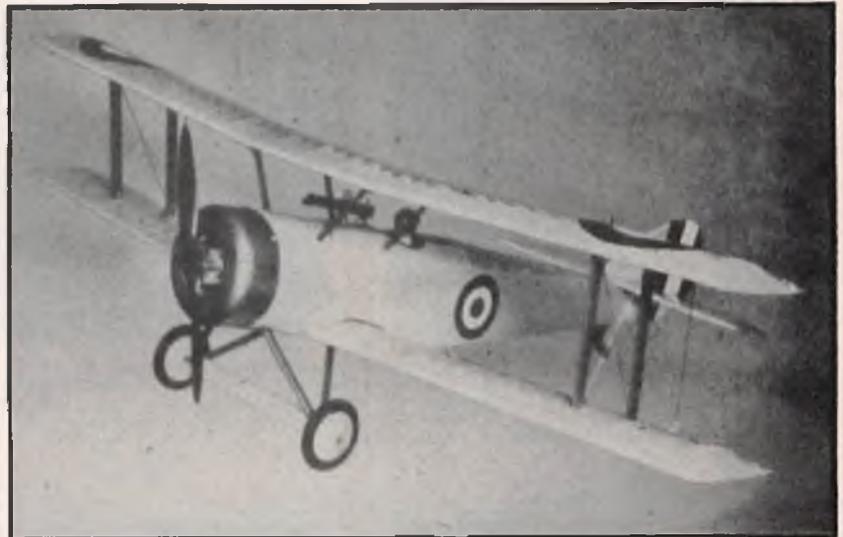
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KIT FEATURES:

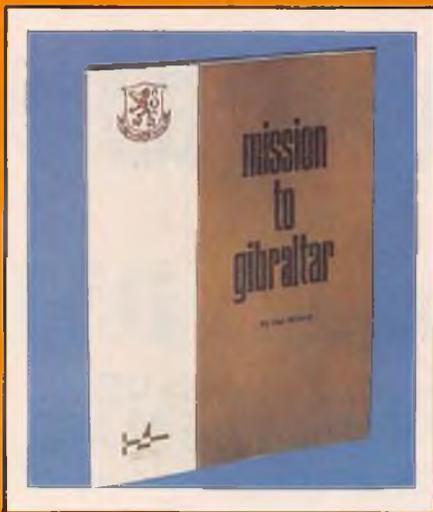
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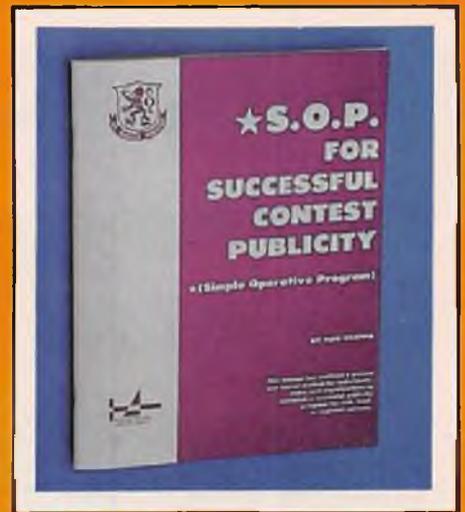




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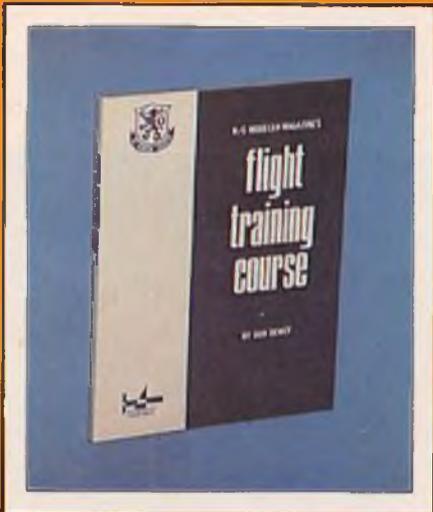
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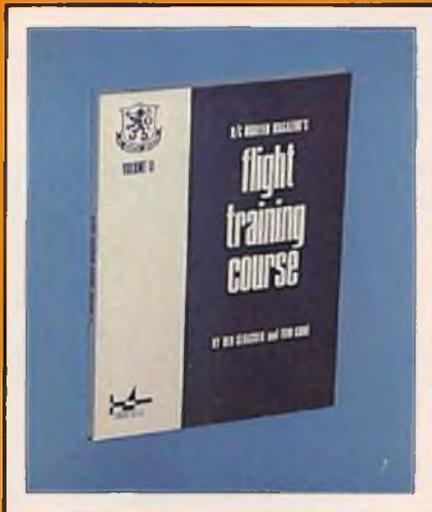
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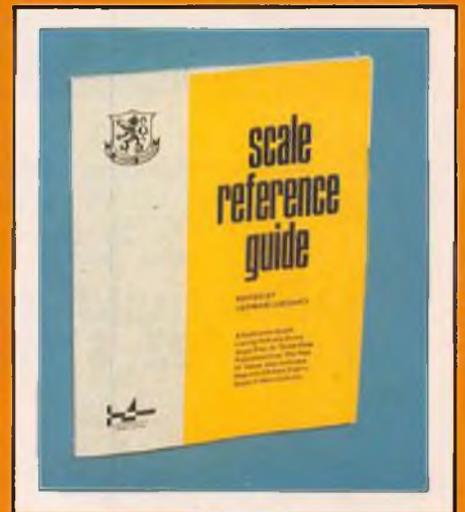
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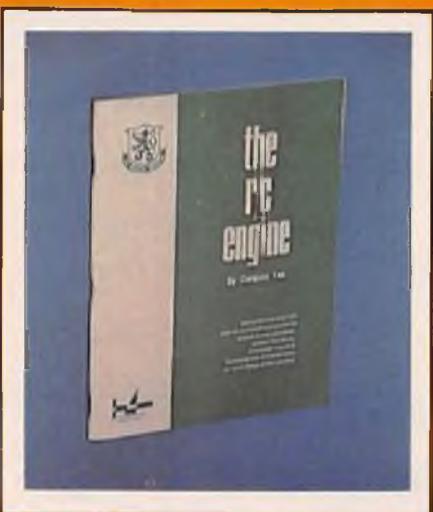
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ELLIPTICAL FOAM WINGS

from page 150/42

and place it back in the block pieces. Place wax paper between the core and outside pieces. Place the now reassembled foam block on your flat surface with another piece of wood and weights on top, the same as recommended during the application of the covering, and go away until tomorrow.

Tomorrow finally comes, and after removing the core from the blocks, dress it carefully with fine sandpaper to remove any small imperfections, and any epoxy build-ups that might have occurred. The covering, in this case 3/32" balsa, is now applied also with slow drying epoxy. It was applied only to the sheeting, and spread evenly with one of those serrated edge glue spreaders available in hardware stores for applying glues to countertops and such. Once again, the whole thing goes back in the blocks, on the table, weighted down until the next tomorrow.

The wing skins, previously made from 4" wide balsa, are held together with Satellite City's Blue Line Hot Stuff — my first real use of this new colored cyanoacrylate. I love it! The tinted liquid is much easier to see as it creeps along the joint, so that you always know just where the next drop has to be applied. You can clearly see it heading for your fingers if that is how you are holding things together till the bond is made.

After the epoxy is thoroughly set, you can remove the cores from the blocks, dress the edges, and start giving the wing the final elliptical shape. All of the trailing and tip pieces are pre-shaped, from 3/8" medium hard balsa in this case. The tip is added first and shaped length-wise to the contours of the wing top and bottom.

Next, the leading and sub trailing edge pieces are added. As the man said, when you're hot, you're hot, and in order to keep going, I applied them with a combination of slow drying epoxy, and some more of that terrific blue 'Stuff.' A fine bead of epoxy is applied to the exposed edge of the foam; the balsa strip is put in place, and bonded along the balsa to balsa edges with the Hot Stuff. This results in an instant joint, which permits you to do the shaping and trimming necessary before the next step. At the same time, the epoxy is curing, giving you a better foam to wood bond internally.

The last pieces, the rear tip, aileron, and inboard section are added, after the sub trailing edge is shaped chord-wise. Only the tip piece is permanently bonded in place, the other two are tack glued on so that they may be removed after shaping.

to page 157

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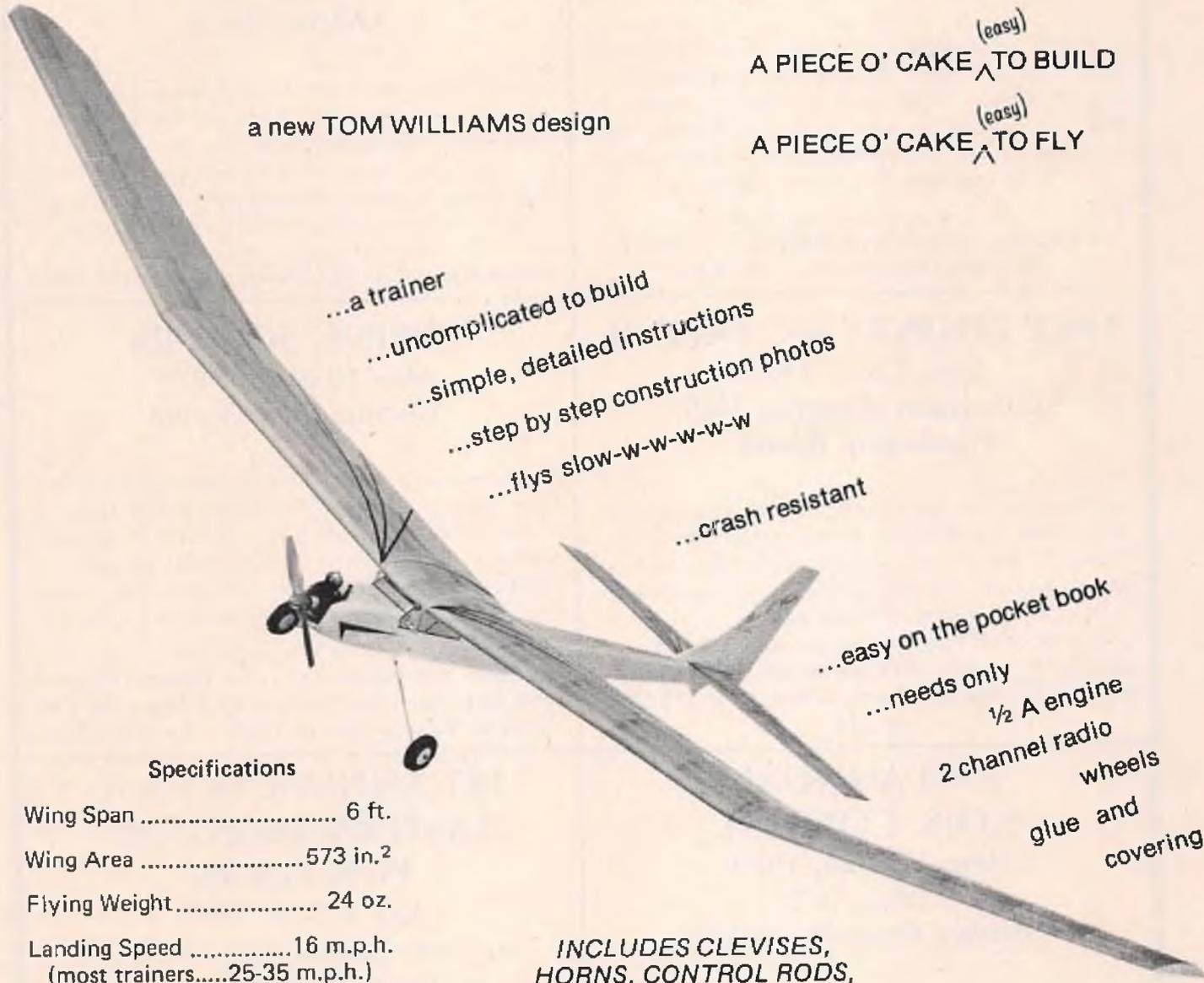
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For further info, contact CD:
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For additional literature and information, contact:
Michael P. Loesch, 2012 Indian Rd., Waukegan, IL 60015 (312) 662-6843 home, or bus., (312) 272-5500 ex. 274.

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Sponsored by: The Miracle Strip Modelers. Three classes: Open, Standard Modified, Two Meter. Events: Task II, 3 rounds 7 minutes; Task IIA, 3 rounds 15 minutes; Triathlon, in accordance with the rules published in Model Aviation. Entry Fee: \$5 for each plane in each event. Registration: 8:00 a.m. Advanced registration is desired.

For further info, contact CD:
Jim Corry, 606 Florida Ave., Lynn Haven, FL 32444.
(904) 265-5906 after 7 p.m. or Clell Diddy, 2401 W. 27th St., Panama City, FL 32405. (904) 785-6002.

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For further information, contact CD:
Howard Toaze, 561 Mary St. No., Oshawa, On, Canada L1G 5E6.

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For further information, contact CD:
John P. Sullivan, 4710 Briarwood Ln., Louisville, KY 40229. Days (502) 636-5551.

from page 154/42

Now, comes the real fun, carving and shaping everything to its final shape. There are no short cuts that we know of — if you know any, please let us know. When you are satisfied with the shape, pop off the aileron and inboard pieces and proceed with the installation of the hinges and torque rods.

So much for cheap and easy elliptical foam wings.

The next procedure we have for you deals with getting those razor sharp fine edges that you've probably seen and admired on some of the winning airplanes. We are not sure who was the first to do this, or when, but regardless, it works.

The procedure involves inlaying a strip of 1/64" plywood all along the edges of the tail surfaces, centered as close as possible. If your bird has straight lines all around, the procedure is a little easier, since you can cut the required pieces of plywood with a straight-edge. The Stinger, with its full complement of curves, requires a slightly different technique.

To insure that the plywood edging has the exact same shape as the balsa surfaces, they are pinned together with Hot Stuff, and cut and trimmed at the same time. They are then pulled apart and the plywood is trimmed to between 1/4" and 5/16" wide, cut into sections where the elevators and rudder lines are. A horizontal saw cut has to be made with a small rotary saw on a drill press, or with a Dremel Moto-Tool mounted on their drill press stand.

The required slot thickness will vary, depending on your particular 1/64" plywood, which is generally imported and not really 1/64", being made to some close metric measurement. Pick a saw blade of the next largest thickness, trying for the best possible fit. If you have to sandwich blades together to get the required thickness, check them often as they are flexible and will sometimes accumulate enough sawdust between them to spread them apart resulting in a thicker cut than desired.

Clean all the dust out of the saw slot, and install the ply strip. If you were careful in your choice of saw blades, you'll have a fit tight enough for a Hot Stuff bond; if not, you'll have to use epoxy or an aliphatic resin glue.

to page 160

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 - #9130 6.5 R/C F.R. W/MUFF LIST \$10.00 BHC 77.00
 - #9140 6.5 F.R. W/MINI PIPE FF-UC LIST \$5.00 BHC 66.50
 - #9080 7.5 MARINE LIST \$120.00 BHC \$84.00

PANAVISE



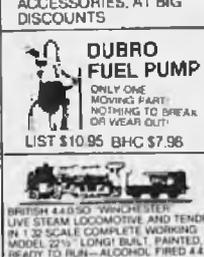
#385 LIST \$16.95 BHC \$13.00
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ONLY ONE MOVING PART! NOTHING TO BREAK OR WEAR OUT!
LIST \$10.95 BHC \$7.95

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SPECIAL! NICADS - GOULD

PAK OF 4—475 MA 4.8 VOLTS EASILY SEPARATED \$4.98 AS ABOVE—500 MA ONLY \$5.98

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MALLARD... \$30.99
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SEA HAWK... \$34.95
FLOATS 33" \$16.49
FLOATS 28" \$14.95
DREAMER... \$44.00

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60 POWER LIST \$325.00 BHC \$250.00 TRAINING GEAR \$28.00

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FOX COMPLETE CONTROL LINE KITS



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FOX .19 43.43 30.00

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BRAND NEW 1978 KRAFT 5 CHANNEL 2 STICK (K/P5) SYSTEMS ON ANY 72 THROUGH 75 MHZ. CHOICE OF SERVOS-14'S OR 15'S

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DUMAS HIGHEST QUALITY BOATS AND PLANES IN WOOD AND FIBERGLAS AT 30% OFF-FITTINGS AT 20% OFF SEE OUR LIST, SAVE \$\$

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05 TWIN 69.95 49.95
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DV-40 GLASS CF 95.00 66.50
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SKYLARK 56 49.95 39.95

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- PROCTOR KITS LIST BHC**
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KOUGER 47.50 38.00
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CHIPMONK 64.95 51.95
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CLIPPED WING CUB 44.95 35.95
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LIBERTY SPORT BIPE 72.50 58.00

- TOPFLIGHT LIST BHC**
AIRCORRA 74.95 52.95
P-40 74.95 52.95
SE5A 74.95 52.95
P51 74.95 52.95
CONTENDER 56.95 42.95
P-47 T-BOLT 95.95 69.95
FRESHMAN TRAINER 47.95 33.95
CORSAIR 99.95 72.95
- VK MODELS LIST BHC**
CHEROKEE 69.95 65.00
CHEROKEE BABE 39.95 32.00
NIEUPOORT 69.95 55.00
CORBEN 45.95 36.00
TRI-PLANE 69.95 55.50
SOPWITH CAMEL 69.95 55.50
- FOX ENGINES LIST BHC**
FOX 19RC 36.95 25.90
FOX 25RC 36.95 25.90
FOX 29RC 39.95 28.00
FOX 36RC 39.95 28.00
FOX 40RC 45.95 32.40
FOX 45RC 51.95 38.40
FOX 60RC HAWK 84.95 59.50
ALL FOX U-C CONTROL ENGINES IN STOCK AT 30% OFF LIST PRICE
- GEL CELLS LIST BHC**
6 VOLT 4 AMP 10.39
6 VOLT 7 AMP 12.95
6 VOLT CHARGER 9.95
12 VOLT 4.5 AMP 23.00
12 VOLT CHARGER 7.95
- ZAP BHC**
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ZAP 18 FL OZ 1.30

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#1034 40R/C F.I. 94.95
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\$239.95
KP-5C



**SUPER SALE PRICED
FINAL CLEARANCE-
WHILE THEY
LAST! ONLY
\$239.95**



5 CHANNEL - 2 STICK ON 72 - 75 MHZ
CHOICE OF KPS 14 (OR, 15) SERVOS
OPEN GIMBEL

WE ARE OVERSTOCKED ON VERY LATE MODEL 5 CHAN KRAFT (KP-5C) SETS. ALL BRAND NEW, 1 YEAR FAMOUS KRAFT GUARANTEE, CHOICE OF KPS-14" OR 15" SERVOS. FEATURES FREQUENCY MODULE CHANGE IN TRANSMITTER, ANY FREQUENCY ON 72-75 MHC, GIVE 3 CHOICES IF POSSIBLE. OUR PRICE IS **\$239.95**, ADD \$4.00 SHIPPING.

THESE ARE VERY LATE '77 SETS AND ARE COMPLETE. THE LIST IS \$375.43 AND WILL GO VERY FAST AT \$239.95.

SEND A MONEY ORDER FOR PROMPT SHIPPING. ALLOW CLEARANCE TIME FOR PERSONAL CHECKS. NO C.O.D.'S! THIS PRICE CANNOT BE BEAT, AND THIS OFFER IS EXCLUSIVE WITH BROWN'S HOBBY CENTER.

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\$339.95 SEVEN CHANNEL Centennial 7 channel Kraft 2 Stick



List Price \$515.43, and we are letting them go for only \$339.95. Brand spanking new, famous Kraft guarantee, and your choice of frequency, and servo. Choose the KPS-15 workhorse or smaller KPS-14

SOLD OUT OF 1 STICK SETS

VERY FEW SETS LEFT

KRAFT'S TWO STICK SYSTEM ON 72-75 MHZ OR 50 MHZ

LIST PRICE \$515.43 BHC PRICE ONLY **\$339.95**

KRAFT 1979

KRAFT	LIST	BHC
KP-2A	129.95	89.95
KP-4A	299.95	194.95
KP-6A	329.95	224.95
KP-9C	375.43	264.95
KP-9CS	375.43	264.95
KP-7C	515.43	369.95
KP-7CS	515.43	369.95
KPS 14, 15 SERVOS	38.95	

Futaba

MODEL	BHC
FP2GS	75.00
4FM4 (S-18)	180.00
4FN4 (S-16)	154.00
5FN	225.00
6FN (S-18)	210.00
6FN (S-16)	235.00
7GN	390.00

BRAND NEW FULLY GUARANTEED BY KRAFT SYSTEMS, INC.

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**WORLD ENGINES
NEW LOW
LOW PRICE
5 CHAN
EXPERT ONLY
\$235.95**

WORLD ENGINES

WORLD ENGINES	LIST	BHC	SUPRE TIGRE	LIST	BHC
OS 10 FSR std	29.95	24.00	X21 SPEED R/C	70.00	56.00
OS 10 FSR R/C	36.95	29.50	X21 CAR	75.00	60.00
OS 15 std	33.95	27.20	ST 23 std	38.95	29.60
OS 15 R/C	40.95	32.80	ST 23 R/C w/muff	53.95	43.20
OS 20 std	36.95	29.60	ST 35 std	53.50	42.80
OS 20 R/C	43.95	35.20	ST 46 R/C w/muff	74.95	60.00
OS 25 std	39.95	32.00			
OS 25 R/C	46.95	37.60			
OS 25 FSR R/C	61.95	49.60			
OS 25 FSR std	54.95	44.00			
OS 30 std	45.95	36.80			
OS 30 R/C	50.95	40.80			
OS 35 std	49.95	40.00			
OS 35 R/C	55.95	44.80			
OS 40 R/C	76.95	61.60			
OS 40 FSR R/C	89.95	72.00			
OS 60 FSR R/C	129.95	104.00			
OS 60 FSR B.H.	99.95	80.00			
OS 60 FSR R/C w/pump, carb & muff	159.95	120.00			
OS WANKEL	119.95	96.00			
OS 65 RSR	139.95	112.00			
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OS 21 MARINE	75.95	60.80			
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OS 90 R/C	225.00	157.50			

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PLANES, BOATS,
CARS, SCALE
KITS, GLIDERS,
ENGINES, ETC.
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AT BHC!**



EXPERT 7 CHAN 2 STICK 4 SERVOS	LIST	BHC
EXPERT 7 CHAN 2 STICK 4 SERVOS	440.00	259.95
EXPERT 7 CHAN 2 STICK 5 SERVOS	465.00	271.95
EXPERT 5 CHAN 2 STICK 4 SERVOS	400.00	235.95
MULLIGAN	47.95	38.40
DAS BOX FLY BIPLANE	39.95	29.95
DAS BOX FLY SHOULDER WING	29.95	23.95
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CESSNA
ALL BALSA 50" SPAN, ALLERONS, WORKING FLAPS, ALL DELUXE PARTS AS IN OTHER CHAMPION KITS. LIST \$44.95 BHC ONLY \$31.50

KINGFISHER
27" SPAN - 750" AREA - B13 7 1/2" LBS - 4 CHAN - 60 60 ENGINES - RETRACTING WING - 31" STAND OFF - SCALE - ABS COWL TIP FLOATS - NACELLE - FORMED WIRE PARTS - ADD \$4.00 SHIP PNG EXCESS REFUNDED

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WOOD ABS COWLS NACELLES, WHEEL PARTS PROVEN, TESTED, FLIERS MAKE GEAR BOXES, EASY CONSTRUCTION, MET-HOODS SAVE TIME

AUDIBLE CONTINUITY TESTER 177

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BEAT DETECT TOGGLE SWITCH

LEADS RAISED POLYNEIC SOLDERING

1. TESTS ANYTHING ELECTRICAL WITH CURRENT OFF

2. USES ONE 9VOLT BATTERY (NOT INCLUDED)

3. CHECKS RESISTANCE UP TO AT LEAST 20K OHMS

4. CHECKS CAPACITORS, DIODES & COILS

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6. COMES WITH 36 TEST LEADS & INSTRUCTIONS

7. MADE IN U.S.A. WITH A 90 DAY WARRANTY

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MODEL	LIST	BHC
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775-5 CHAN	379.95	237.95

MRC

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LIST 49.95 BHC 32.00

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LIST 100.00 BHC 79.95

LEOPARD TANK
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A PRE-FORMED FIBER-GLASS BOX, CLEAR ACRYLIC TOP, WATER PROOF SEALS AND BRASS CHANNEL TUBING, HELIX SERVO AND RECEPTOR PROTECTS AGAINST WATER, SUNBURN, SMOG AND DAMPNESS. DIMENSIONS: EXTERIOR 8" LONG X 5" WIDE X 2 1/2" DEEP. INTERIOR AREA 5" LONG X 4" WIDE X 2" DEEP.
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LIST \$156.98 BHC \$125.60

NEW SUEVIA ENGINE
LIST 296.95 BHC 198.99

MRC COMBAT VEHICLE FOR R/C 1/12 SCALE
LIST 84.95 BHC 68.00

40% OFF "HOT" SPECIALS!

FOX 35 STUNT	26.95	18.20
FOX 38 CARRIER	69.95	41.97
ENYA 60 RC XF CHROME		
SCHNUELER	234.95	141.00
S.T. X21 RC CAR	75.00	45.00

INCLUDE \$4.00 FOR SHIPPING—EXCESS REFUNDED IN CASH. SEND MONEY ORDERS FOR PROMPT SHIPMENTS—EXTRA FOR AIR & OVERSEAS.

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ELLIPTICAL FOAM WINGS

from page 157/42

After whatever glue you use is set, comes some more fun; shaping the balsa down to the plywood. We can't give you any advice about this except to remember that it is rather difficult to put it back once you have taken it off, so go slowly as you approach the desired sharp edge.

Now that you know some of the secrets, there is no longer any reason for putting off building that racer you've been thinking about, is there? We'll be looking for you at the next race --- just be on the lookout for some of these round wing beauties! □

EL TIGRE

from page 40

controllable, with smooth elevator response immediately noticeable. Rolling maneuvers are exceptional due, in large part, to the barn door ailerons. Knife edge flight is effortless, with vertical maneuvers easy and fun. Inverted flight requires very little trim change. The aircraft is very stable in all attitudes, and exhibited no bad habits at all. And, finally, to sort of put the icing on the cake, El Tigre can be brought in v-e-r-y slowly for a landing, with good control all the way. We did find that the barn door ailerons required fairly stiff torque tubes in order to prevent flutter.

So, if you are looking for a pattern kit with near perfection in fuselage and wing design and construction, your search may well have reached its goal, as ours did, with El Tigre. □

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HERCULES

from page 39

...smoke stack aligns with the hole in the cabin. Then, the engine was used to align the bulkhead and prop shaft for as nearly straight an exit from the hull as possible. Be sure you get the prop high enough to clear the bottom rudder support. With the prop shaft tube glued in place to the hull and bulkhead, the remainder of the boat was completed.

To provide access to the engine, the entire cabin/wheelhouse lifts off of the deck. Because we built the receiver antenna into the rigging so it wouldn't show, a mini telephone plug was installed as an easy disconnect. Although the area on the deck where the cabin fits is designed with pieces of ply to prevent the hull from taking on water in "rough seas," we added a bilge pump in the bow using an extra windshield

to page 162



A FUEL THAT'S A LITTLE DIFFERENT BUT A LOT BETTER

COOL POWER FUELS ARE COOL CLEAN BURNING FUELS THAT LET YOUR ENGINE PERFORM ITS BEST AND LAST LONGER. THEY CONTAIN ALL THE TIME HONORED INGREDIENTS PLUS A FEW DIFFERENT FEATURES THAT GIVE THEM A DIFFERENT EDGE ...

- ANTI-FOAMING
- WETTING ACTION THAT ALLOWS THE LUBRICANT TO FLOW MORE FREELY INTO BUSHINGS AND BEARINGS.
- SUPERIOR FILM STRENGTH AND ANTI-WEAR QUALITIES THAT CUT FRICTION AND ALLOW MORE POWER WITH LESS NITRO.
- MILD DETERGENT ACTION THAT HELPS PREVENT VARNISH EVEN WITH A MUFFLER.

	(Gallon)
FAI	9.95
5%	10.95
10%	11.95
15%	13.95
25%	15.95
40%	21.95
Helicopter	12.95

Give your engine a treat!!! Feed it Cool Power and you'll both be pleased. These are a few of the in-the-know people who do:

Rhett Miller Ron Chidgie
Dave Platt Steve Helms

Cool Power is now available in metal cans as well as plastic bottles (\$1.00 more in cans).

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Quick Built Series

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All of these kits are specially designed for the modeler who wants to build a model fast, with a minimum amount of work, yet have a good flying model when he is finished! These kits feature a "Snap Lock" type of construction which means that the fuselage, for example, is already die cut to accept the formers. These snap into notches in the fuselage in exactly the correct positions, all without checking the plans! Because of the special Quick Built design, covering is easy using Kwik-Cote, Monokote or your favorite covering material. The Q.B. designed kits are a lot of kit for the money!



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The Model That Does It All!

SPAN: 84 inches (7 ft.) ENGINE: 60
AREA: 1,069 sq.in. RADIO: 4 - 8 channel
LENGTH: 69 inches WEIGHT: 8.37 lbs.

Comes complete with all needed wood & metal parts for the glider launching pad.

Hobby Shack
DISCOUNT PRICE
\$79.99

RETAIL \$109.95

RADIO-CONTROL

Quick Built Series

Scale Model Kit

Q.B. CESSNA 20 20 ENGINE



SPAN: 53 1/2 inches
AREA: 427.6 sq.in.
ENGINE: .20
RADIO: 3 - 4 channel

CESSNA 20

We at Hobby Shack think that this kit is the ultimate QB series kit because it is a scale type that is very attractive, the excellent design makes for good flying characteristics, and because it is a "Quick Built" design, it is very easy to put together. The kit is loaded with goodies like a full color decal set, big vacuum formed front windscreen and "pop-in" vacuum formed side windows. The cowling is vacuum formed which helps construction much easier. The steerable nose wheel bracket, dual aluminum landing gear and all other necessary hardware is also included. The wood parts are magnificent, being mostly hand cut. The plywood parts are so precisely die cut they will fall out at a touch! A full size plan is included with step by step photographs showing construction. For real relaxation, and a great flying, nice looking model, consider the QB CESSNA 20.

LIST \$44.95

Hobby Shack
DISCOUNT PRICE
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Q.B. 15H



Span: 49 1/2 in.
Area: 409 sq.in.
Engine: .15
Radio: 2 - 3 channel

RETAIL \$32.95
\$24.99

Q.B. 20S



Span: 52 in.
Area: 420 sq.in.
Engine: .20
Radio: 3 - 4 channel

RETAIL \$36.95
\$28.99

Q.B. 40S



Span: 59 in.
Area: 573.8 sq.in.
Engine: .40
Radio: 4 channel

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Q.B. 2500



Span: 96.5 in.
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Length: 40 in.
Radio: 2 channel

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HERCULES

from page 160/39

washer pump we bought from a local junkyard for \$1.00. The eight C size batteries serve both as a power source for the pump and as needed ballast. A micro switch on a servo is used to activate the bilge pump. While the boat has never taken on any water, it is somewhat reassuring to know that the switch can be thrown any time it's needed.

After the radio installation was set up, the parts to be painted were sanded (it's a lot easier if you pre-sand all of the parts before you glue them together), primed with an auto primer, then painted with a polyurethane paint. The brass wire wheelhouse railings and ladders were assembled with the cyanoacrylate adhesive applied with a spare piece of wire to minimize the size of the glue drop. Clean the wire with acetone first for a good glue bond. Incidentally, when we installed the brass running lights supplied in the kit we found that the

inside diameter was just the right size for a LED, so we added a red and green LED running light. To push the idea further, we also added some yellow LED cabin lights by the portholes. As the final preparation for its maiden voyage, we set the boat in a plastic wading pool and added pieces of stick-on weights on the inside of the hull as ballast so the boat would float straight up in the water.

After we found some methyl-alcohol at a local boat store (it's what they use in alcohol stoves) for the burner (because we learned earlier that rubbing alcohol won't work), we fired up the burner and waited until the pressure started to build. We launched the boat, moved the control on the transmitter to forward and carefully opened the "throttle." The water around the prop churned and off it went, heading for the open seas. Our big surprise was how fast the thing moves with a full head of steam. The bow wave seems to be from 4" to 6" high!

It's something else to see the boat steaming around on the pond chasing the ducks. A "peeeeeep" out of the steam whistle adds a final touch of realism to the whole operation.

As a great, different, and exciting building project we give Hobby Shack's Hercules 1/40 scale Delux Tugboat our enthusiastic "cast off." □

SCALE VIEWS

from page 30/27

being spread on the white glossy paper. In effect, they needed a second coat. The BAC of WW II chips, on the other hand, are so thick that a definite edge appears around each one. Close examination shows what looks like a nozzle spray pattern, complete with little runs. It appears that each chip was individually painted on the paper, more accurate than using printing inks and, in fact, the way that all quality color chips are done.

In the course of many years of scale involvement, I've become convinced that really accurate color proofs are few and far between. There is a tendency, among judges and contestants alike, to unquestioningly accept a certain color source as "the" proof. For example, the

to page 166

Model Master™ Caddy

- ★ Special plastic laminate exterior
- ★ Weather Max Burn & Fuel resistant surface
- ★ Paper towel holder
- ★ Four colors: Orange-Red, Yellow-Blue
- ★ Wide stance All Aluminum legs
- ★ Light weight



- ★ Optional Aluminum detachable POWER MODULE CASE
- ★ Carries starter 12v battery, 2000 watt panel transmitter & has hooks for existing 9V plug & starter cords



(starter 12v battery, two panel trans not included)



- ★ recessed top keeps parts & tools from rolling off!
- ★ Optional clear plastic 10 drawer organizer
- ★ Additional storage for 2nd trim, scale props, etc.



- ★ Model cradles telescope & tilt for field repairs
- ★ Fuselage cradles available in four standard sizes (see below)
- ★ Cradles are interchangeable with wing, seat and helicopter cradles
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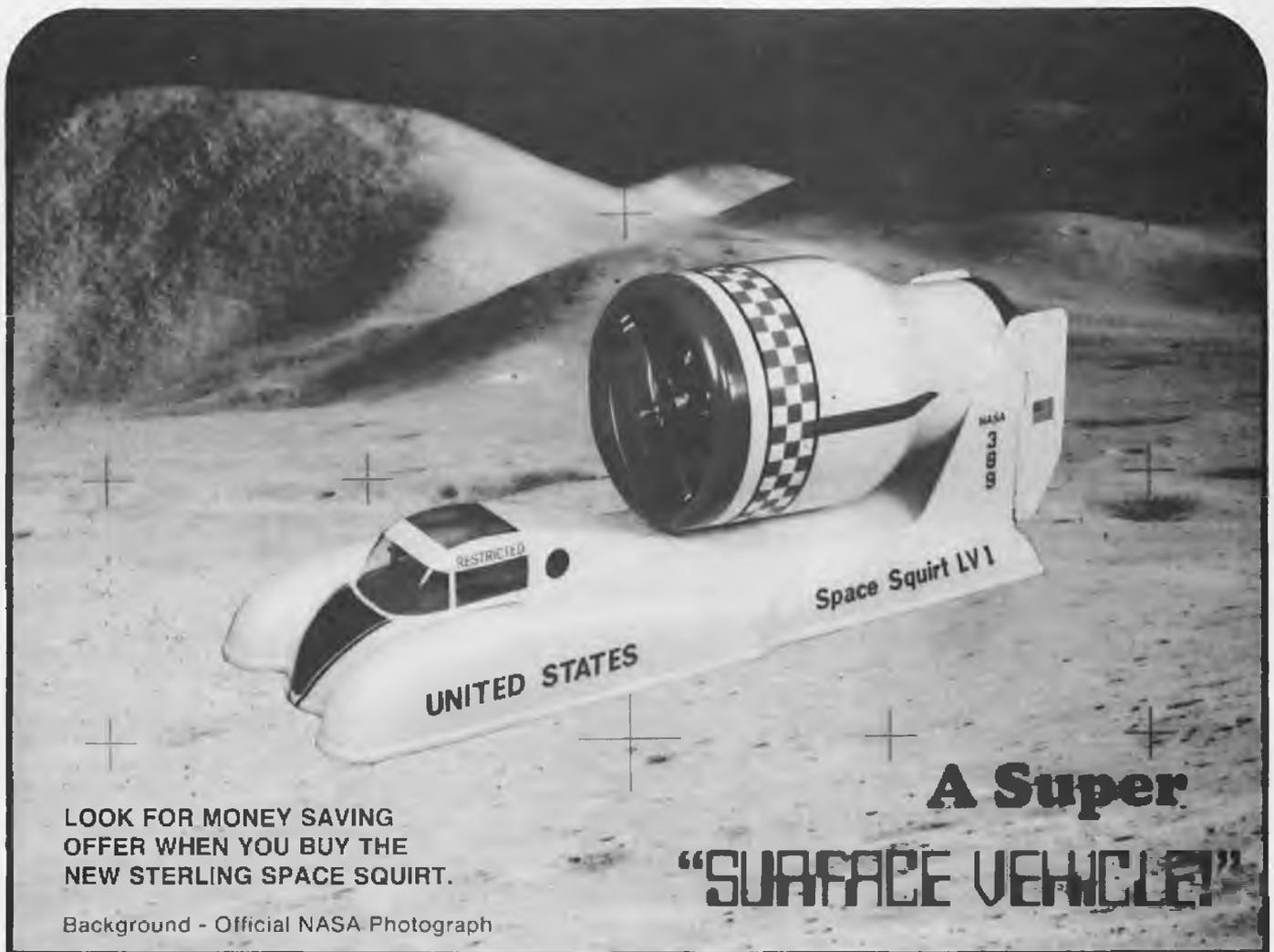
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★ Select any two fuselage cradles with caddy (2 1/2", 3 1/2", 4 1/2", 6 1/2", 8")

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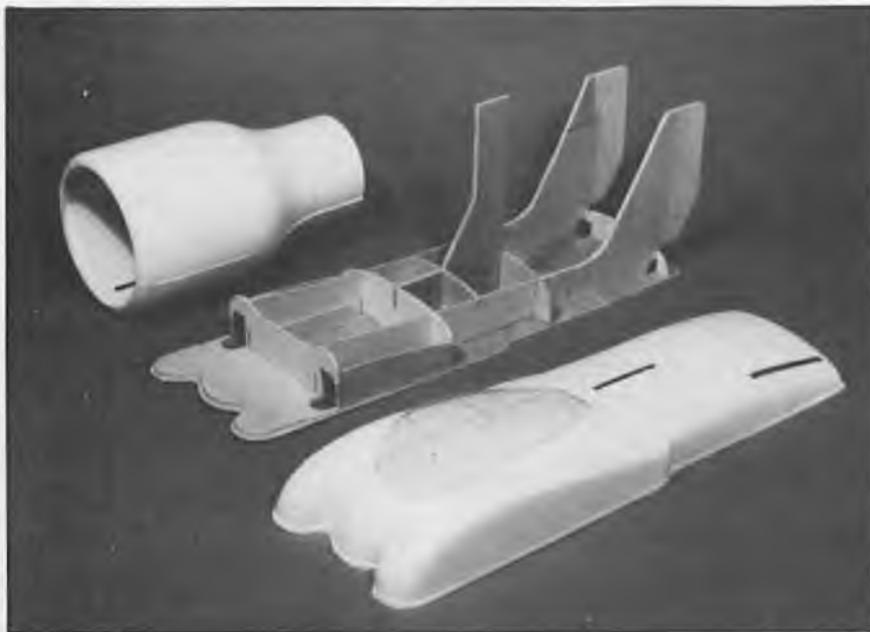
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KIT LV I

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Width 7 3/4"
Engine .049

\$24.95



Save \$150 on Your Next Radio!

A Digital Commander Flite Pack Kit Can Avoid Unnecessary Duplication and Save You Money!

In these days of skyrocketing prices, all of us are faced with having less money to spend on our leisure activities so we have to try to find ways to save money and yet we'd like not to give anything up. Ace R/C's Digital Commander line of receivers, servos, and flite pack kits avoids unnecessary duplication so it save you considerable money without having to downgrade the quality of your equipment.



STANDARD BANTAM servo option. Measures 0.75" X 1.375" X 1.5", weighs 1.25 oz. and has 5 lbs. of thrust. Our best all around servo.

COMPATABILITY AVOIDS DUPLICATION

Say that you're building a couple of new planes this winter and you'd like to put a radio in each plane that you get ready to fly but it would mean having to buy two new systems . . . that could cost you \$500 and up! You probably already have a good radio with a transmitter you are used to and like. No matter what brand, a Digital Commander Flite Pack kit is compatible with your transmitter without ANY modification to the transmitter as long as they are on the same frequency! There are only a couple of isolated exceptions to this statement.



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You can build a flite pack kit, tune it to your existing transmitter, and install it in your plane just as if you had bought a complete new system and at a fraction of the cost. By the same token, if you have some extra servos, no matter what brand, our Digital Commander receiver will operate them. Or, if you want to have servos in all you planes and switch one re-

ceiver from plane to plane, our servos are compatible with your receiver, no matter who made it.



MICRO servo option. Measures 0.625" X 1.25" X 1.28", weighs .75 oz. and has 4 lbs. of thrust. Where you need the smallest size and weight possible.

KITS ALLOW COMPATABILITY

Because the Digital Commander units are kits, and because there is very little difference in the basic electronic concept between brands of radios, they can be matched and tuned to your existing equipment as you are building. Also you learn a good deal about the operation of your system that can save some trips to a service center.



SINGLE DECK RECEIVER option. Measures 1.3/16" X 1 3/8" X 2 7/16" and weighs 1.75 oz. Compatible with any digital transmitter on the same frequency.

YOU CAN BUILD A KIT

We recommend that if you have the patience and ability to build a decent airplane, access to the proper tools including a small tipped soldering iron and a voltmeter, you can build and tune a Digital Commander kit. If you don't think you have the ability or desire to handle a kit, Ace R/C offers the complete line factory custom assembled--please write or call for details.

Write for our complete catalog today! Contains thousands of quality products just for the R/C enthusiast. Please send \$1 and add \$.50 if you want 1st Class mail return.



Double Deck Receiver with Bantam Servo Flite Pack Kit. Receiver measures 1" X 1 7/16" X 1 3/4" and weighs 1.5 oz.

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TOP QUALITY parts and design combine for high performance and dependability.

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Following is a list of the Flite Pack options we have available. All of them except the Micro Servo flite packs come less ni-cd batteries and contain connectors and switch. The Micro Servo flite packs have 100 mah ni-cd batteries included also.

These Flite Pack Kits are unassembled and less ni-cd batteries.

12G1B-2	Single Deck Receiver and Two Bantam Servos	\$ 74.95
12G1B-4	Single Deck Receiver and Four Bantam Servos	114.95
12G2B-2B	Double Deck Receiver and Two Bantam Servos	74.95
12G2B-4B	Double Deck Receiver and Four Bantam Servos	114.95
12G1B-2R	Single Deck Receiver and Two Bantam Midget Servos	80.95
12G1B-4R	Single Deck Receiver and Four Bantam Midget Servos	126.45
12G2B-2R	Double Deck Receiver and Two Bantam Midget Servos	80.95
12G2B-4R	Double Deck Receiver and Four Bantam Midget Servos	126.95

These Flite Packs are unassembled and have 100 mah ni-cd batteries.

12G2B-2M	Double Deck Receiver and Two Micro Servos, 100 mah batt.	94.95
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Besides the flite packs, we have complete systems, separate receivers and servo kits, batteries, chargers, plus much more. For more details on the Digital Commander line please send \$1 for our complete catalog (add \$.50 if you want 1st Class mail return).

All of Ace R/C's products are available through your dealer or may be ordered direct. Please add \$1 handling on all direct orders. Visa and Mastercharge OK.

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50L213—Ace Alpha 15 Kit
\$39.95



Designed by Tom Runge

Span: 50"
Area: 425 sq. in.
Engine: .15 to .25 R/C
Functions: Three or Four Channels

ALPHA 15

A big brother to the Alpha, the Alpha 15 is a sturdy, easy to build, rock stable trainer/sport plane for three or four channel control and a .15 to .25 engine. On a .15 this plane will easily take off of grass and has plenty of power for loops and rolls. It doesn't have any bad spin or snap roll tendencies and has excellent slow flight characteristics.

Plywood fuselage and built up wing construction is featured for sturdiness and durability. Even at the reasonable price, the kit contains complete hardware: steerable nose gear, formed main gear, all control linkage and hardware; all you need to complete the model is tools, glue, finishing material, engine with mount, tank, wheels and radio.

A perfect full house trainer/sport plane!



KIT IS NOW AVAILABLE!

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A sophisticated piece of lab quality equipment for cycling ni-cd batteries. Accurate, dependable, and attractive.



--Automatic discharging and recharging of both receiver and transmitter batteries, simultaneously or independently.

--Switch for three different transmitter voltages, (6V, 9.6V or 12V).

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--Available in kit form or assembled and tested.

34G15 Ace Digipace I, assembled \$94.95
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THE KIT IS RECOMMENDED FOR EXPERIENCED BUILDERS ONLY.

Please send me your complete catalog. Enclosed is \$1.00 which is refunded on my first order. (Add \$.50 for 1st class mail return; add \$1.00 handling on all other orders.)

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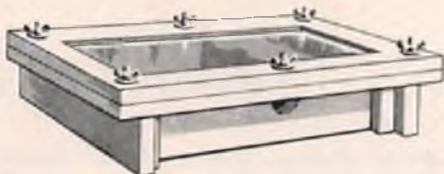


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SCALE VIEWS

from page 162/27

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\$2.00 per two foot roll
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\$4.00 per one pint mix
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popular color profile paintings appearing in print so regularly are, in most cases, only the artist's perception of what the colors should look like. Since it is accepted that different human eyes perceive colors differently, then in the case of the many "lost" colors, for which no samples or official standards exist, a painting or color chip is only guesswork.

Others feel a color photo is the only real proof. Unfortunately, even the most recent films vary widely in the way they reproduce colors and vary more when they are reproduced as color prints. As far as World War II era color photos go, when the newly invented film was not nearly so refined, the variation can be even more pronounced. Add to this the fact that color film and prints change and fade with age, then it gets complicated. A leading photo magazine recently concluded the only way color photos could be preserved for the future was to immediately make color separation negatives and reproduce them in printing inks, since the color film and/or color prints would eventually completely decompose.

So what is my point -- calling into question the accuracy of just about all available color proof sources? First of all, for builders, it is that a little digging may turn up several color proof sources which can then be selected as to degree of accuracy for the best possible final result. And for judges, don't be so ready to reject a contestant's scale presentation as "inaccurate," your pet "definitive" source may very well be equally questionable. As a matter of fact, judges should not be in the business of determining the accuracy of sources in a contestant's scale presentation. If the color source used by the model builder is listed as an acceptable one in the scale rules, then only how well he followed this approved source can or should be judged. □

SOARING

from page 26/22

wife "Charlie." They traveled to the flying field in their one to one scale Mooney.

The whole event was a lighthearted affair --- 26 pilots enjoyed themselves immensely. Two meter is here to stay! The five top flyers were 1st, Jay Siren; 2nd, Dave Watson; 3rd, Harry Gould; 4th, Bill Mueller; 5th, Scott Simmons; and Best Finish, Don Barron.

★

Two good contests are coming our way this June. The N.S.S. is holding a
to page 168



ROYAL REALISM... from the outside in!

Royal scale aircraft have long been known for their authenticity and flyability. Now, this meticulous craftsmanship has been carried one step further — right into the pilot's seat! Everything from seat belts to instruments are included in these micro-molded plastic interiors. The sides, dash, seat and flooring come in modular sections which are easily assembled. The end result: a new dimension in scale realism. Available at your local hobby dealer.

Now Available

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FW - 190 Focke-Wulf	.642 sq. in.	\$94.95
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ME - 109 Messerschmitt	.697 sq. in.	\$94.95
.40 SIZE		
P - 51D	.576 sq. in.	\$79.95
Bleriot	.564 sq. in.	\$54.95
Spitfire	.496 sq. in.	\$54.95
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Hien	.468 sq. in.	\$59.95
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.20 SIZE		
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P - 51D Mustang	.372 sq. in.	\$54.95
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Magnificent LAZY ACE

- 76" span, 1800 squares
- The bipe-lovers' bipe

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The name of the game is fun! And the Lazy Ace is lots of it. Designed for easy building and easy flying. Start with a .61 and add excitement with a .91 when you really want to move! Customize it for added beauty.



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Miss Texas

- 84" span, 1000 squares
- 8½ pounds, for .61 engine
- Great maneuverability

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- 47" span, 5 lbs.
- .40-size engine

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Stable, easy to fly, yet fully aerobatic performance. Take offs and landings are smooth and gentle. A chip off the Lazy Ace for the fun flyer working his way up to "big."

LUCKY LADY

Trainer for .60 engine **\$59.50**

All kits are complete: rolled plans, balsa, spruce, plywood. All parts machine cut and packaged. SKY MASTER kits are designed for easy building and easy flying. You'll be proud of your finished ship.

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SOARING

from page 166/22

Soar-In on June 23-24, at twelve flying sites --- one in each N.S.S. district. The purpose of this contest is to have a good

RIGHT: Joe inspected every plane for its conformance to plans.



time, promote the N.S.S., encourage the new contest flyer to try the enjoyment and challenge of contest flying, and to determine a N.S.S. Soaring Champion. The contest is open to all. There will be two classes --- Standard and Unlimited. The task is three rounds of AMA II A (Precision Duration, 15 min. add-em-up). Landing option D. If you are interested drop a note to the contest
to page 170



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twins, where a single carburetor would result in one cylinder running rich and the other lean. Although the Fox Twin can turn a 17, 18 or 19 inch propeller faster than most chain saw engines of equal displacement, its true potential is achieved by letting it rev up. The result is the ability to fly your airplane in a realistic manner, using a scale type propeller, but if you are performance minded, then put on a smaller propeller and really move out. We recommend a 15-6 for average models.

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TWIN Fox Twin \$250.00

SPECIFICATIONS:

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SOARING

from page 158/22

coordinator, Dick Crowley, 16413 E. Stanford Pl., Aurora, CO 80015, or watch for details in the "Sailplane" the voice of the N.S.S.

Rick Norwood is planning a two meter, two day event at Dominguez College, Carson, Calif. on June 16 and 17. This contest is not a one of a kind --- any two meter configuration that flies.

Larry Fry of Arcadia, Calif., started his first R/C model in January, 1978. So far he has built eight planes. He has soloed on his Wanderer, Soarbirdy, and Wanderer 99, and he has now started to learn power flying. Big Deal you say. Larry is 85 years young. It proves you are never too old to enjoy the fun of R/C flying.

Good Lift.



Larry Fry of Arcadia, Ca., with his Wanderer 99. Note wing bands over cleats to hold wing halves together. Photo by B. Stackhouse.

□

SUNDAY FLIER

from page 19/16

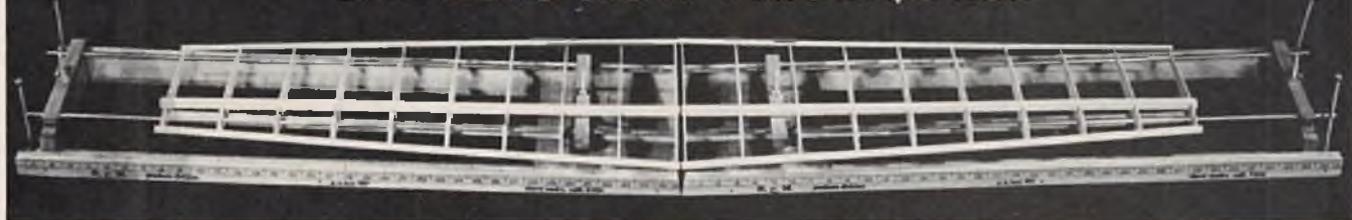


August. There's still hope for us small airplane enthusiasts! It's one of the new products that appeared.

The other was Don Clark's license free "Thermic Sniffler." Heretofore, if you wanted a sensor in your sailplane to

to page 174

THE WING JIG II—PRICE: \$34.50



The original RCM Wing Jig, first published in the August 1967 issue of this magazine made it possible for many modelers to build their airplane wings warp-free and in far less time than it had previously taken. The **WING JIG II** offers many design improvements on the original version that greatly extends both its versatility and the accuracy of the wings produced. It is now used exclusively in the RCM shop for all building projects.

The **WING JIG II** consists of two sections hinged in the middle. Each section consists of a front and back "L" shaped base piece. A jig rod support is located at either end of each wing jig section to mount the rods that support the wing ribs.

The switch to a double length jig that's hinged in the middle makes it possible to build an entire wing, complete with the dihedral called for in the plans, in one operation. Or, the **WING JIG II** can be set up flat to use both sections to build up a wing panel for one of those big powered or glider jobs. Or, with the dihedral set, a polyhedral wing can be accurately built. It can even be used to join foam wing halves to get the dihedral as it should be.

A uniquely designed rod end support makes it possible to true the wing jig rods to order. A simple protractor device makes it possible to set the dihedral even when it is given in degrees. The addition of adjustable end legs make it possible to set the dihedral accurately for each wing panel. New "L" shaped base pieces assure a warp free jig to start with. A yardstick attached to the front of the base pieces helps in spacing the ribs when the wing is set up on the jig. A bubble leveling arrangement assures both wing panels will be true to each other. A new design rod support makes it possible to move the two wing jig rods from as close as you'd want them to 6 1/2" apart. And, a new technique makes it possible to build those small cord wings with ribs too narrow for two wing jig rod holes.

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182	5-32	50
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184	7-32	65
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SUNDAY FLIER

from page 170/16

detect thermals, you had to have a technician's license. When Don's is approved by the FCC, you won't.



It operates on the 49 MHz band, at one tenth of a microwatt power. When it's approved, you won't have any excuse for missing that thermal and winning the contest. Unless, of course, you blow the precision landing. Wonder if anyone will ever come up with a homing device that you can stick on the spot and force the sailplane to come to rest right side up with the nose nestled up against the spot?

I'd like to close this column with a personal note, and picture. For three years now, RCM's booth at the WRAMS show has been manned by Jim Buonocore. He doesn't work for us — he just likes R/C, and volunteered for the duty. He answered questions, gave out copies of RCM, and did an outstanding public relations job for us. Never was paid a dime! And never complained. This year, he bought a raffle ticket --- and won! An MRC five channel system, no less. Sometimes Lady Luck smiles on the right guy. Here's Jim, receiving his prize, from Larry Di Rubbo, President of the WRAMS.



Great show, great models, and a great finish.

One of these days, I'm gonna build one of those great models.

Just like all you other Sunday fliers. □

ENGINE CLINIC

from page 15/10

piston, cleaned all of the little particles out of it, and tried again.

The engine ran okay for a couple of

flights and then the sluggishness began again. I figured the muffler was building up heat and causing premature varnishing so I tried some rich running. No improvement.

Next, I put on a Tee-Dee .049 head, piston, cylinder assembly, and tried again. First flights, ran great; after, no improvement over the stock engine; still was somewhat difficult to set the mixture and the engine just did not seem to have any power.

I bought another ORC .049 just to see if I got a bad one. It did the exact same thing as above with the same results. I even reset the con rod in the piston as they were sloppy.

Boy, do I need your help on this one! And, I wonder if any new RC'ers are having the same problem?

Yours,
Steve Benjamin
Claremont, California

Assuming that some of those nose-in landings did not bend your engine, your problem is simply varnish. The 1/2 A engines are very susceptible to varnish build-up. The use of a muffler and rich running is going to varnish them up tight every time --- especially when using a mild nitro fuel which allows the engine to run too cool. You should have been using Cox red can in the engine from the beginning. It would have been easier to adjust, developed more power, and had less varnishing problems. The muffler is not helping matters any, so if you can possibly fly without it I suggest that you do so. Clean the engine out again and use a fuel in the 25%-30% nitro range. The use of a fuel with synthetic oil rather than castor oil will help the varnish problem considerably. Aldrich fuels (Goldberg), K & B 1000 with X2C, Sig, etc., to name a few using synthetic oil. □

CUNNINGHAM ON R/C

from page 8

quite quickly. These same aircraft were much more difficult for a beginner to fly due to the ability to snap at a high rate of speed. If you didn't keep the speed up on landing, wham, instant contact with the ground. If you sand a nice well rounded leading edge on the airfoil of your wing, you will wind up with a much nicer flying aircraft. This one feature can often change the entire aspect of an airplane. I wonder how many models have been built from kits or magazine plans that the builder screwed up by not making the leading edge of the wing as shown on the plans, and then wondered for a long time why his aircraft didn't fly like it was designed to do. The same thought is true for the Center of Gravity.

A proper Center of Gravity location (or balance point) can make a bad airplane from a good one, and turn a bad flying



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aircraft into a good flying aircraft. Next to elimination of warps, the correct CG location is most important. To begin your design, locate the CG at 30% to 33% back from the leading edge of the wing. This is a good safe location. Some years back a 40% location was quite normal and, in today's racing aircraft, the CG may be located at only 15% back from the leading edge. Each location has its reason. The more rearward the CG is located, the more sensitive the aircraft will be to the action of the elevator, or pitch control. A rearward CG location will make for easier spins, but will also make for an aircraft that needs a higher landing speed to keep from snapping.

The forward CG location makes for a more "groovy" aircraft, and one that tends to go where you aim it. The CG location, as shown on most kits and magazine plans, may not be the final word, but it is one heck of a good place to start. I don't know how many times I have looked at a beginner's model, and some not so beginner, and noted that the CG was way off of the proper location. It seems that it is hard to take the time to get everything balanced correctly, and yet this is very important. When you're designing your own aircraft, use the 30% location and, then, when you're building it, make sure that when finished, the aircraft does balance

at that point. Once the aircraft has been checked out, and you're happy with the design, you can shift the CG a bit by the use of stick on weights, and if you find that the aircraft flies more to your liking with a CG a bit further aft, then you can shift around the battery a bit to achieve this new balance point. But, be careful with the CG location. This can really make a dog out of what should be a good airplane.

The location of the wheels is another feature of design that you need to consider. Again, the wheels can be located in many places, but, for best use the following takes the pains out of your first design. For a trike geared aircraft,

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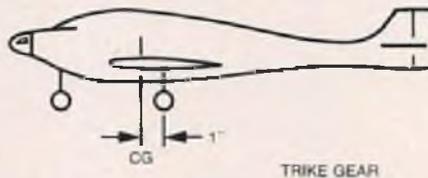
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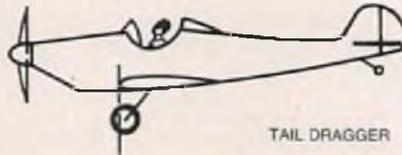
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the nose gear most naturally falls at the firewall, works well here, and there's no reason to move it. The main gears, though, need a good look. Once you have decided upon the location of the Center of Gravity of the aircraft, then locate the axle line of the main gears just about 1" to the rear of this location. 1 1/2" won't hurt either. Why is this important? Because if the main gears are located too far aft of the CG, it makes taking the aircraft off of the ground a less than pretty sight. With the mains properly located, a take-off can be gracefully made, with the model just lifting into the air when flying speed has been attained. But, located too far aft, the model jumps



TRIKE GEAR



TAIL DRAGGER

WHEEL LOCATION

and jerks into the air on take-off, because the elevator has to overcome the weight hanging off the front end of the aircraft.

The same is true for the angle of attack of the aircraft when sitting on the ground. If the nose strut is short, and the aircraft sits at a nose down attitude, take-off will be made in the form of a jerk from the ground. If the aircraft is sitting at a tail low attitude then it will be hard to keep it on the ground when landing. Take-off will be smooth but, on landing, the aircraft will bounce into the air, and will want to try to keep flying. If you couple this with a rearward CG, the second bounce on landing just may be

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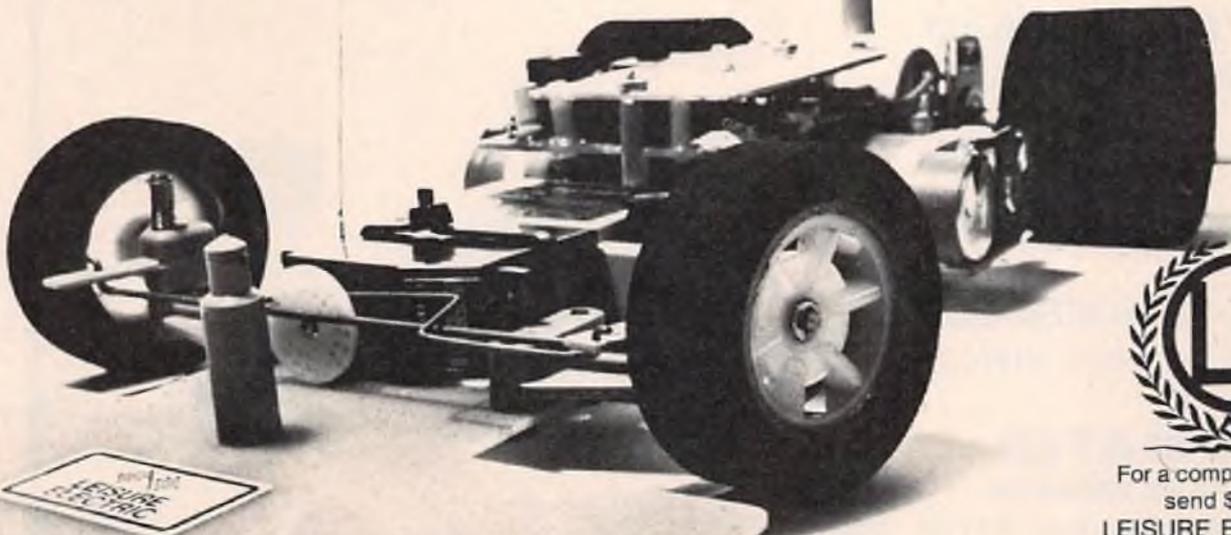
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the last bounce of the day, as the aircraft will stall out, keel over and die.

If you're designing a two wheel geared "tail dragger" type aircraft, then again, the landing gear location becomes very important. Generally speaking, if you keep the main wheel axles at, or very near to, the leading edge of the wing, you will have success. With the front of the tires just under the leading edge of the wing, nice smooth take-offs and

landings, can be made. If the wheels are located too far to the rear, then, on landing, the weight of the aircraft will force the nose down, and into contact with the ground, at the same time busting heck out of the aircraft's propeller. With the wheels located too far forward, the aircraft will do strange things on tracking down the runway. It becomes very hard to steer, and will have a tendency to ground loop very

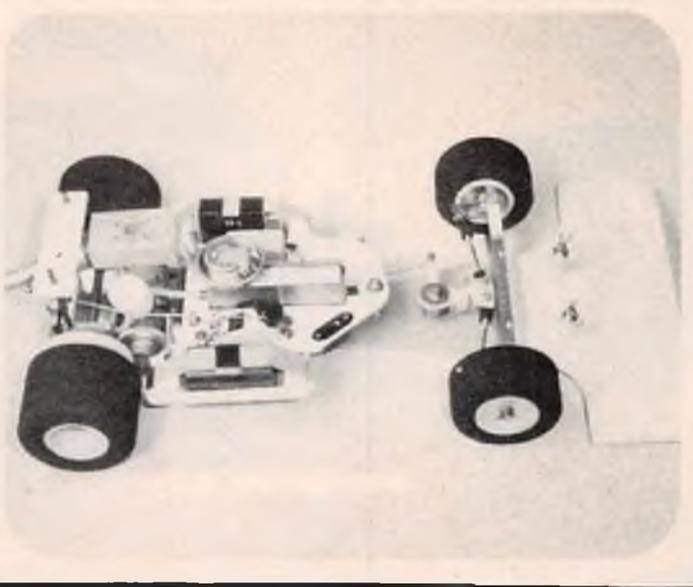
easily. Tail wheel placement is not important because, quite naturally, it has to be at the tail of the aircraft. But tail wheel use can be a very large factor in creating an unwanted take-off problem. With a nice simple aircraft, like a Piper Cub, not much rudder action is required, so the tail wheel coupled directly to the rudder is no problem. But, with a fast flying, snapping dude, such as the Aeromaster, a tail wheel coupled directly

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to a large, full swinging rudder can cause mucho problems in getting the aircraft off of the ground. Tail wheels similar to full size type, with a big reduction between the rudder, wing and the tail wheel movement, can solve lots of take-off problems.

Also, the angle of attack that the tail dragger assumes at rest can cause problems at take-off. Try to set up your design so that the tail wheel strut length

keeps the angle of attack not too far from the flying position of the aircraft and you will make take-off and landings much easier. One of the ways to keep the angle of attack low, is to keep the main gear struts at a reasonable length. You need to allow for good ground clearance of the prop, but you don't need a high angle of attack when the aircraft is at rest on the runway.

To wind up Part II, let's take a look at

the sizes of the movable surfaces that impart course corrections to our model aircraft. By that I mean the rudder, elevator, and ailerons. The portions of the vertical stabilizer that is allocated to the rudder can vary quite widely, and for many reasons. If your rudder is the prime turning control, and you're an experienced pilot, then it can be as much as 50% or more of the total vertical fin area. If you're a fledgling pilot, then 20%

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R/C MODELER MAGAZINE'S MODEL OF THE MONTH CONTEST



The Model of the Month Award Program is designed to encourage the sport and novice competition flier to submit details of his most recent kit or scratch-built model to RCM in order to encourage general model craftsmanship and the overall promotion of R/C flying.

Each month Dremel will award a 371 Variable Speed Moto-Tool as illustrated in the photograph. The second and third place winners each month will receive a one year subscription to R/C Modeler Magazine, or, if they are a subscriber, an extension of their current subscription. If you would like further information concerning the winning models, write to us giving us the winner's name and what month he won, and we will forward your letter on to the winner. For rules of Model Of The Month Contest, see the February 1979 issue.

JUNE WINNERS

SECOND PLACE

Joseph Potipco
Mississauga, Ont., Canada

A beautiful DeHavilland Mosquito Mark IV built from a complete-a-pak kit has a 63 in. wingspan and bears the markings of the N.F. XIII Intruder HK 382 "RC-T" 29 Squadron. Featuring operable bomb bay doors and Vortac Mfg. Co., bomb drop mechanism, it weighs 9 lbs., and is powered by two O.S. 40 engines. Pactra flat finishes were mixed to obtain the correct camouflage colors. The radio is a Kraft KP7C.



THIRD PLACE

Dave Davidson
Orlando, Florida

The Bird of Time sailplane designed by Dave Thornburg was scratch built from RCM plan #751. It has a wingspan of 118 in., 1070 sq. in. area, and weighs 38½ oz. Wing and tail are covered with Super MonoKote. Fuselage is covered with 3/4 oz. glass cloth applied with a mixture of clear Aero Gloss dope and Ambroid. Finish is Aero Gloss dope and Bridl Irim stripe.



FIRST PLACE

Ronald Bailie
Apache Junction, Arizona

A scratch built Stand-Off Scale L-39 Albatross from RCM plan #712 and finished in authentic Czech Air Force colors. The 9¼ lb. model is powered by an O.S. Max .60 FSR engine swinging an 1 1/734 pusher prop. Finish is R/S Perfect and Pactra Formula U paints applied to Super Coverite covering. A Kraft KP7C is used for control.



of the area is plenty, the same goes for movement of this surface. Lots of movement with lots of area will give one heck of a jumpy model, just what you want if you're going to bash about the sky. Small rudder area and moderate movement will be your thing if you're going to learn to fly on your creation, or you're designing a model for others to learn to fly. Elevator area can be just as critical, but keep the elevator area at

25% of the total horizontal stab, and the movement moderate, and you will have an aircraft that is most pleasing to fly.

Now, about the ailerons. It makes no difference if you're designing strip ailerons, or barn door ailerons, into your dream ship. If you use about 12% of the total wing area for the total aileron area, you will be successful. If, for example, we are going to use strip ailerons on our model that we were designing last

month, and we came up with a total wing area of 600 square inches and a span of 60" we then have a total aileron area of 72 square inches. A strip aileron of 1" wide and 60" long will give us 60 square inches of aileron area, or a strip aileron of 1¼" wide, and 60" long will give us a total aileron area of 75 square inches. Leave out a bit for the portion lost at the center of the wing, and the latter would be more close to the size to use. If you

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FRED



JUST A NOTE TO LET YOU KNOW HOW THE SUPER PUMPER / AUTO MIX COMBINATION IS WORKING OUT. I HAVE INSTALLED IT IN MY LAS VEGAS TOURNAMENT OF PATTERNS AIRPLANE WHICH USES A 91 ENGINE. RESULTS ARE OUTSTANDING. IT WORKS PERFECTLY AT ANY RPM AND IN ANY POSITION AND TRANSITIONS FROM LOW TO HIGH SPEED ARE VERY SMOOTH. I HAVE LOCATED THE FUEL TANK FAR FROM THE REAR AND BELOW THE ENGINE WITHOUT ENCOUNTERING ANY PROBLEMS. IN SUMMARY I AM VERY PLEASED WITH THE TROUBLE FREE PERFORMANCE OF THE SUPER PUMPER / AUTO MIX.

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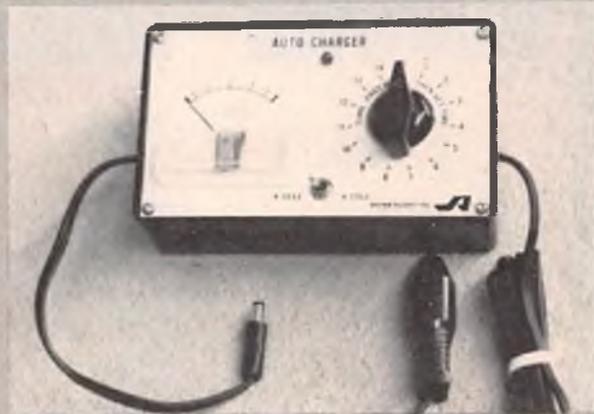
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want to design barn door ailerons, then keep the width at around 25% of the wing chord width. In this case, then the barn door ailerons would be 2.5" wide and 14.5" long. (25% of 10" = 2.5", and with a total aileron area of 72" one half for each wing would be 36", and 36" ÷ 2.5" = 14.5".) Like in everything else, you can fudge a bit, but work around the averages.

Before we close out this month, one

more thought about the CG location --- always set up the balance of your aircraft with the fuel tank empty. This is the condition that will exist when the aircraft is ready for landing, and this is the condition that you want to be most careful of. For example, if you balance the aircraft at 35% with the tank full then, when it is empty, it just might balance out at 45% or 50% which, in turn, just might allow you the opportunity of snapping

the aircraft into the ground on landing.

If you think that I tend to emphasize the problems of take-off and landing just a bit much, keep in mind that if you're designing your own aircraft, then you want one that will be fun to fly, a joy to look at, and definitely not squirrely on landing or take-off. Many aircraft look just great sitting on the runway but, when they take to the air, become a bag of

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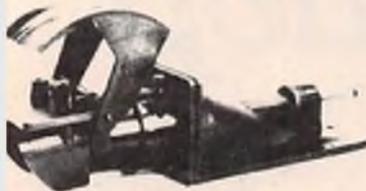
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CUNNINGHAM ON R/C

from page 181/8

rattlesnakes. If you're careful, shoot for the averages, and watch the gear placement and CG location, your dream plane will be a flying cloud to fly and land.

Next month we'll take a look at the design of biplanes, and some structure design problems of the biggies. □

FROM THE SHOP

from page 2

...opinions and feelings toward the actions of the Academy numerous times over the past years. And, those opinions have not changed. Washington still continues to fill endless pages of correspondence and published material with platitudes that are designed to lull the membership into a feeling of complacency. And complacency is the breeding ground for apathy --- and apathy is the foundation upon which bureaucrats subsist, preserving their jobs from extinction by perpetuating the myth that they are actually doing something other than simply taking your annual dues. They really don't have to worry --- those platitudes are surrounded by so much hot air their ship couldn't possibly sink. I, personally, exercised my individual, and final, prerogative by not renewing my membership in the Academy after 16 years as a Leader Member. So, as a non-member, you won't hear any further discourse from me as to the state of affairs with the AMA. However, there are those on our staff who won't hesitate to do so when they feel that it's in the interest of you, the individual reader, since they are still active as Academy members.

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We've all come a long way since those early days when we wound up strands of rubber on our single channel escapement --- and it's been a lot of fun. As for the future ... despite the problems, the trials and tribulations, the obstacles that we'll find in our path, this sport and hobby will continue to grow and prosper, and each one of us will find our enjoyment increasing on a day to day basis directly proportionate to our own interest and participation.

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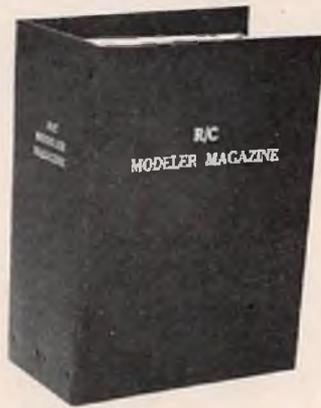
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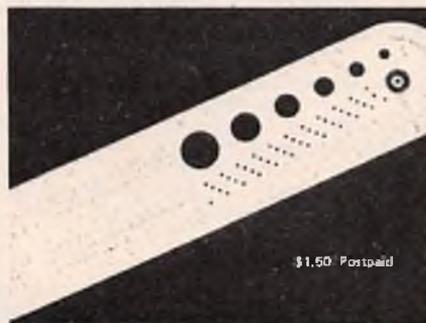
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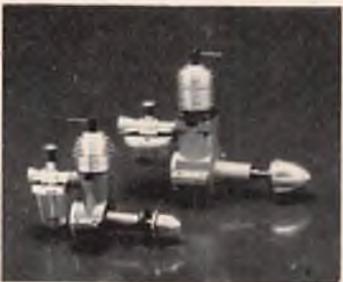
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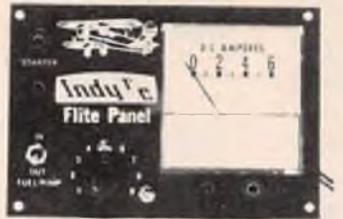
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MOTOR: 18mm Dia.
IC: Signetics 544
CONN: Male and Female 3 pin
STALL: Approx. 400 MA
OUTPUT: Rotary 90 degrees
MTG. DIM: 1.90"x.40"

This is a typical sports servo and should be compatible with Kraft, World, Futaba, Sanwa, Cannon, and other most positive pulse systems. May chatter a little on some older systems (5 years).
L: 1.580" - W: .825" - H: 1.490"
Spare gear set less pinion... 1.15
Retail Price 13.95
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