

RcM



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radio control MODELER

THE WORLD'S LEADING PUBLICATION FOR THE RADIO CONTROL ENTHUSIAST



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John Simone, Jr., 1977 AMA National/Expert Champ.

Performing against Experts at the AMA Helicopter Nats leaves no margin for error. That's why John A. Simone of Mission Viejo, California, chose the Futaba FP-5FN system to pilot his Rev-olution II to victory. Precise control and exceptional reliability are essential

in helicopter competition, and that's exactly what John's Futaba delivered. And with John at the sticks, spectators and the opposition alike were treated to the first perfect loop performed by a scale chopper.



The Simone Rev-olution. Power by K&B. Radio by Futaba.



Futaba systems are recommended by American R/C Helicopters for optimum control and reliability.

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John Simone, Jr. National Helicopter Champion.



RCM MODELER

VOLUME 15 1978 NUMBER 11

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RCM radio control
MODELER



This Month's Cover

features Roger Sanders & his flying wing "Windfreak", soaring high over the Los Banos Creek Reservoir in California. The Windfreak is featured as a full size construction article on page 32 of this issue. Ektachrome transparency by Arley Simpson.

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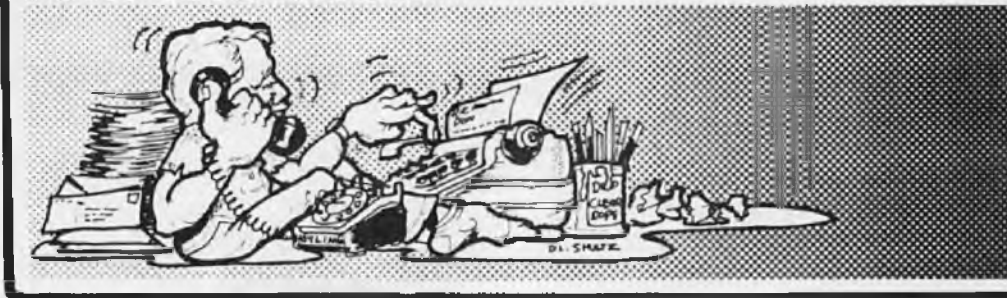
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NOVEMBER

From The SHOP



DON DEWEY



An event of interest for the older group. For the first time in 30 years, this famous modeling team was together at a model airplane contest. Harry Rice (L) and Irwin Ohlsson (C) accepted an invitation from RCM's Asst. Editor, Dick Tichenor (R), to attend the 4th Annual Scale Squadron of Southern California Contest.



Harry Rice shows the prototype of his 1.3 cu. in. engine for mid-size Quarter Scale models. Engine swings an 18/6 Zinger prop in excess of 8,000 rpm. Production units will be available very soon.



Hal Okert (L) and George Killeen (C) welcome RCM's Technical Editor Dick Kidd to the new Kraft Orange County Facilities.

from Bill Fitzerka of Manchester, Missouri:

Dear Don,

I would like to tell you what happened to me so that it will not happen to others. After coming home from the flying field on Saturday, July 15, 1978, I was draining the fuel from my plane back into the fuel caddy container. That's what I thought I was doing, but that was not the case --- the fuel was going back into the plane. Before I knew what was happening, the fuel was all over the basement floor. Then I made my mistake --- a mistake that could have taken my life. After cleaning up the fuel from the floor, I threw the fuel soaked towel into the washer and then went back to my plane. After about 5 to 7 minutes my eyes started to burn, and I didn't know why. I ran into the next room and after about a minute, the eyes stopped burning, so then I went back to my plane. Then the washer stopped, so I went to see why. After raising the lid, my eyes really started to burn and I found it very difficult to breathe. Then I began to cough quite badly. I ran upstairs, then to the deck outside and the coughing lasted a full ten minutes. All that was left at that point was a slight burning inside my throat and lungs but that was gone by the next morning.

As a result, I learned not to add bleach to anything that has been soaked in model fuel and only hope that others can learn from this experience of mine so that this cannot happen to

them. In closing I can only say that had I read this letter, myself, a year ago, I would have said that it would never happen to me. But it did --- only a year later.

Happy flying, as long as it is safe!

Sincerely yours,
Bill Fitzerka

What happened to Bill was a reaction that occurred between two chemicals. Several years ago Clarence Lee, in writing about nitromethane, wrote that it is perfectly safe and, when diluted in our model fuels, no more dangerous than any combustible material. In other words, don't store it next to the water heater or try mixing it anywhere where there is an open flame in the room. Also, keep it away from any swimming pool chemicals such as chlorine. As Clarence pointed out, you use other combustibles everyday that are far more dangerous than nitromethane. Lacquer thinners, cleaning solvents, gasoline, etc. In fact, if you try to ignite nitromethane with a match, you have a hard time getting it lit. When it finally does ignite, it burns with a slow blue flame. Chances are it will put the match out a couple of times before you are able to get it lit. Clarence further stated that, many years ago, tests were conducted to determine what it would take to cause nitromethane to explode. Cans were dropped from airplanes, 50 caliber machine gun bullets fired through it, etc. It could not be ignited. The only thing that was found to cause nitromethane to explode was rapid

to page 180

NATS NOTE

A point of interest from the AMA Nationals, held at Lake Charles, Louisiana, this year, happened in Stand-Off Scale. Bob Violet took Second Place with his ducted fan A4D. Bob was only 1/2 point behind the First Place Winner, Ralph White who entered a beautiful P-51. Ralph's static score was 94 points, Bob had 90 points. Bob's A4D was awarded the highest cumulative flight score in Stand-Off Scale.

The significance was in Violet entering flight competition with ducted fan power. His flight options were the following maneuvers: Split S, Slow Roll, Immelman, Loop, and Inverted Flight.

Congratulations Bob --- as the cigarette commercial says, "You've come a long way baby."

Mike Grady, whose article on airbrushing techniques appears elsewhere in this issue, also entered his fan powered Violet A4D in the Nats. A few minor problems, unfortunately, kept him out of the winner's circle.

★

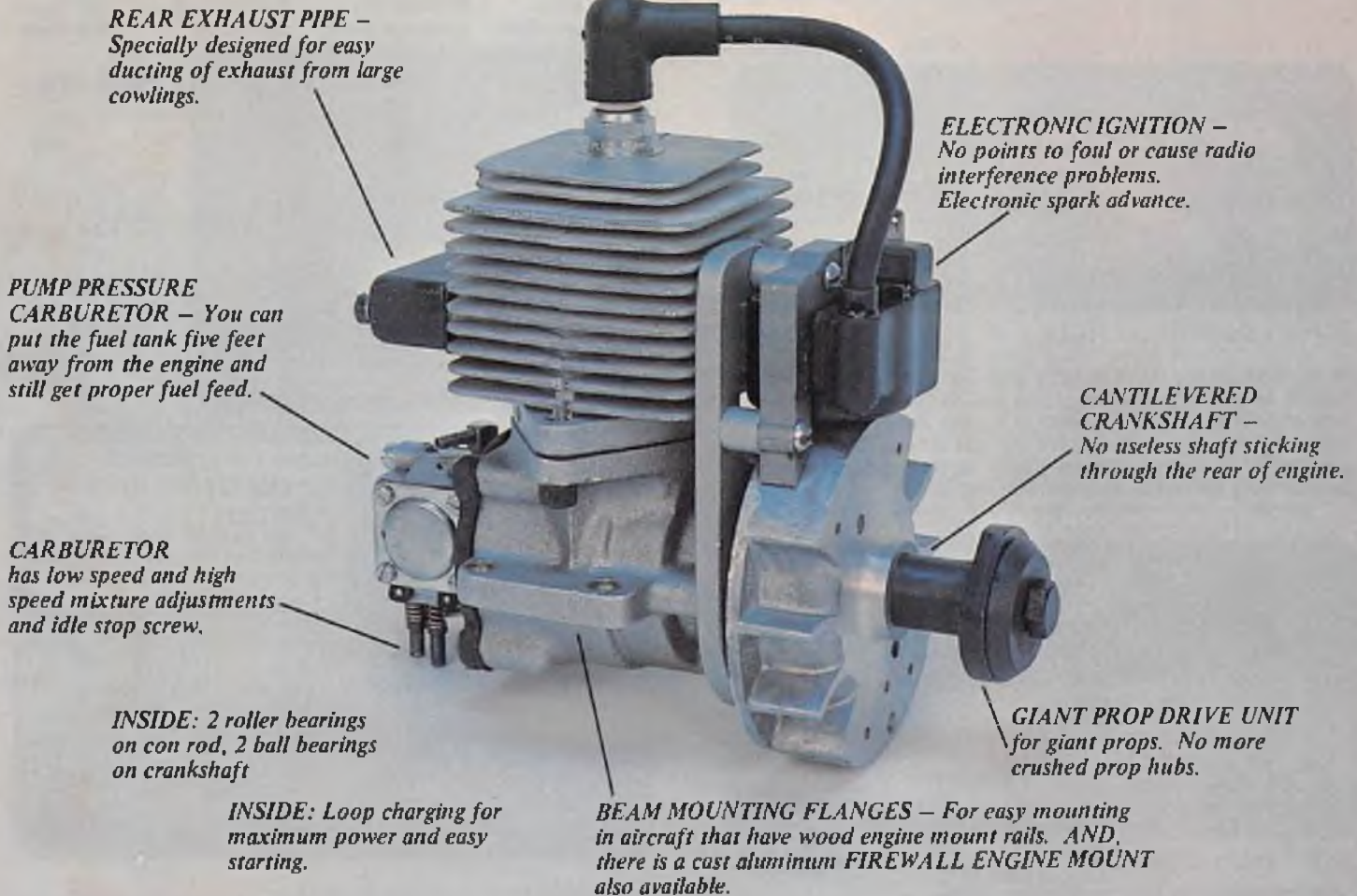
As with all hobbies and avocations there are many hazards associated with the building and flying of radio controlled model aircraft that are not immediately apparent to either the observer or even the experienced sportsman. As an example of this, we would like to reprint the following letter which we received

NEW! The engine for giant RC aircraft!

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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.

Send me ___ Hobby Lobby-EVRA 190 engine(s) at \$97.50 ea. Send me ___ Firewall Mount(s) for EVRA 190 at \$15.00 ea.
() I enclose check for \$____, plus \$1.80 handling. () Charge to my BankAmericard No. _____ Expires _____
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Here's a plane for .09-.10 engines!



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Hobby Lobby CESSNA .09 ~~List price \$38.95~~ **\$28.97**



"... Received the Taig Lathe the other day and it sure looks like it will do what I want it to... I am a machinist and took it down to the shop to show the other fellows... my boss called out the big boss and told him they should have a small one like (the Taig)... I have a Unimat and the Unimat looks sick compared to the Taig."
W.L. - Hayward, Calif.

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Hobby Lobby/Wik-Modelle DELTA 40 **\$49.50**



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(Almost-Ready-to-Fly)

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The wings are made of cut foam or injection-molded foam, and are already sheathed with balsa. The tip blocks are in place and then the wing is sanded smooth. You only need to sand the edges and apply the finish. (Try Superkote and your wing will look like it was painted.)

The stab, fin, elevator and rudder are all balsa and are nicely pre-cut. You just sand the edges, finish with Superkote or paint, and install hinges.

The fuselages are fully built with wood bulkheads, and doublers. Originally all the J.L. Modelcraft kits had fiberglass fuselages. But, J.L.M. discovered a better material than fiberglass. They call it Polyflite. You might think that it's fiberglass when you see it (it paints and glues like fiberglass) but it's better. No pin holes to fill, no uneven thicknesses, no brittleness. You just sand the seam (if you like) and spray paint it—it's done.

Just a few hours after you open the box you can have the best looking most durable RC airplane you've ever seen. You can fib to your friends that you built it—we won't tell on you.



Did you ever see a better looking seaplane? Here's the easiest way for you to start flying off the water. 57" span, 540 sq. in. wing area for .35-.40 engines and 4 RC channels. A nice feature is that the pre-built polyflite fuselage is automatically water tight.



Very, very swift! This is an all-out large pattern plane with a very low drag factor. CF-5 Tiger is 61" wing span, 660 sq. in. wing area. Fuselage is 48" long! For 4 channels and hot .60 engine.



This is a 4 CHANNEL beginner's plane—a very gentle flyer that's stable, recovers quickly from unusual attitudes and is very EASY to assemble. 57" span, 540 sq. in. wing area, for .35 to .40 engines. The very clear plans are ideal for a first-time RCer.



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Designed by Jim Newman. Gemini is a spectacular performer. J.L.M.'s clever engineering solves a host of biplane building problems: Fuselage and cabane strut—completed; wings—4 panels all sheathed with tip blocks in place; wheel pants mounting plates—soldered in place! 46" span, 740 sq. in. area. For .60 size engines and 4 channels.

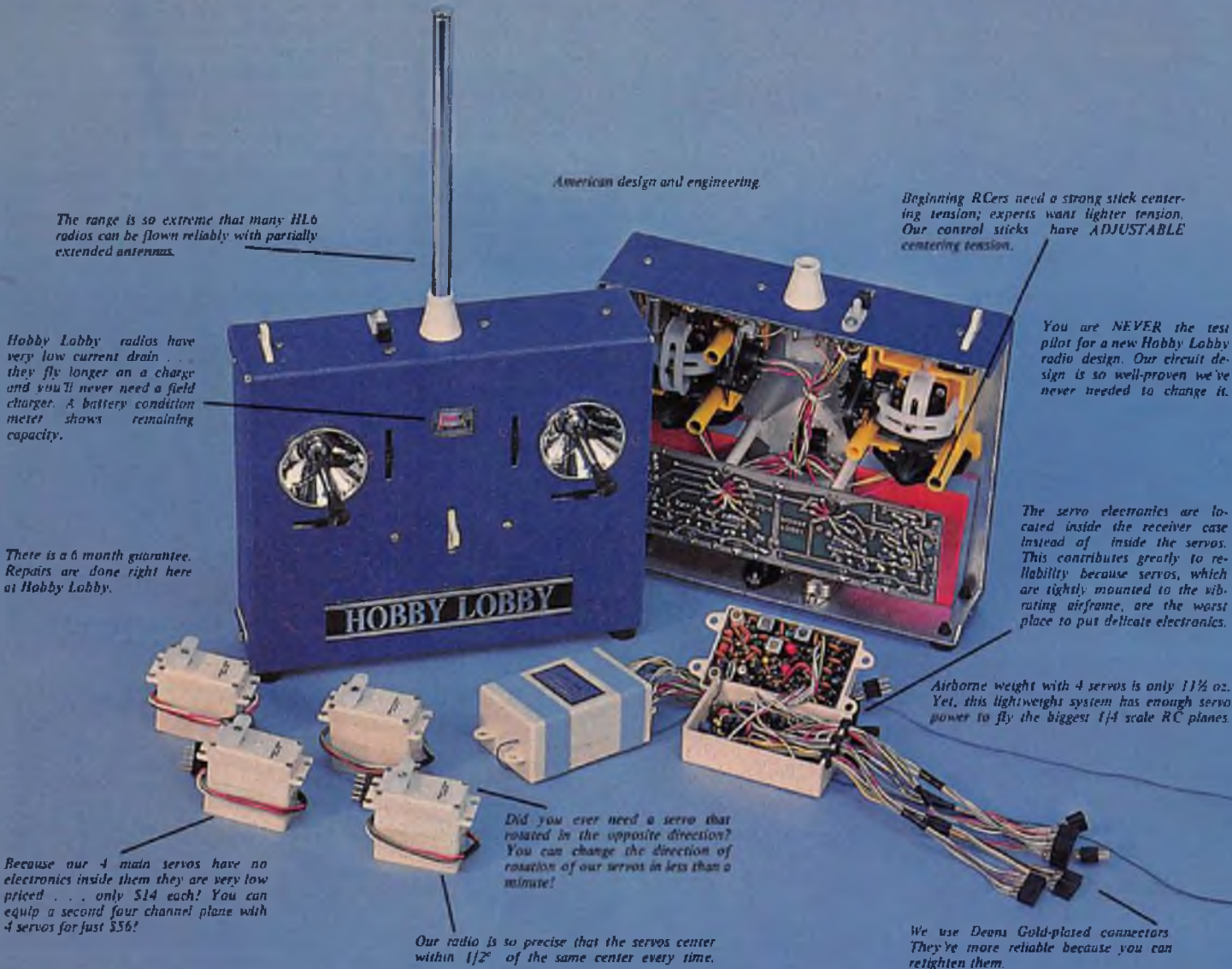


BIG—the fuselage is 6" wide at cabin! Near scale model that makes a great beginner's plane or beautiful expert model. 66" wing span, 680 sq. in. wing area, for 4 RC channels and .40-.60 engine.

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This month we have a number of far reaching subjects that I would like to cover. For the past several months I have been deeply involved in bringing off the First Annual Jumbo RC Fly-In, which will be covered elsewhere. But, during that time, I have also been doing some flying of my antique airplanes and having the usual bunch of fun with them. This month, then, I want to talk a bit about the Old Timers and Antiques, and to bring you a report on the Third Annual Texas Pride Tournament.

The Texas Pride Tournament is the brainchild of the one and only Helmer Johnson. The Tournament is sponsored by the Fort Worth Thunderbirds and the Pearl Brewery, brewers of Texas Pride Beer. The trophies for the Tournament are all fabricated from empty Texas Pride beer cans. Helmer and his wife Jane make all of these trophies each year, and, according to H.J. the best part of making the trophies is in emptying the beer cans. Of course, he could get empty cans from the brewer, but that would take all of the fun out of the trophy making.

This year's Tournament had twenty six entries, pretty much equally divided between Old Timers and Antiques. Here in Texas, unlike much of the rest of the country, we fly our Antiques and Old Timers fully by radio control, and the tasks are set up for radio control flying rather than free-flight with a string (radio string) attached to the main. We also use glo engines, and the main idea is to have a good time flying - - and we do.

The competition this year was similar to former years, but with a difference, and this difference is a good one. Each contestant had five flights, and these flights were flown in rounds, to prevent



Popular columnist for leading R/C magazine, lives in Texas, designs oversize airplanes, and is a sweet and pure, clean living, wealthy gentleman.

someone from going in and putting in all of his flights at just the right "air time." The attempt was to fly five flights of ten minutes duration, with the scores for the best and the worst flight thrown out. This put a premium on consistency.

The good old Texas wind on the day of the Tournament was blowing 20 mph with gusts to 30 mph, and this does make it just a bit hard to get in a good thermal flight. Old Timers were given twenty second engine runs, while Antiques were allowed thirty second runs. The classes were not combined. A 50' diameter spot landing circle provided 25 bonus points (the scoring was one point per second), and the wind made this a bit harder to hit than normal. You also had to have a helper who would roam under your landing aircraft to grab it just at touch-down to prevent the wind from tumbling it all over the ground. No one maxed out with a ten minute flight on TPT day; in fact, the best time was about 6½, but due to the method of scoring, this flight was tossed out.

All in all, it was a good contest and the scoring method really works well. It seems to me that although the ranks of SAM membership have grown quite a bit in the past several years, the interest in this form of modeling may be dropping off a bit, at least the interest by radio control pilots. This may be due to the ignition engine/limited use of radio approach taken in some parts of the country. I hope that this is not the case, because flying my antique cabin airplanes is a pure joy to me, and is just about the easiest method by which a newcomer to R/C can get started.

The other day I was talking to an old friend of mine, one whom I had helped

get started into R/C about seven or eight years ago, but who had never really been bitten hard by the R/C bug. Naturally, I tried to rekindle his interest in R/C, and started talking about the antiques. His eyes started to light up when I talked about building with sticks, rather than slab sheets. "You mean just like the 10¢ Comet kits I used to build? . . . and then I build a Clipper and a Zipper . . . and I can put a radio in that kind of airplane?" If you haven't tried an antique or an Old Timer, you owe it to yourself to give them a try. There are several kits available from the hobby shop shelves or you can go the route that is really a lot of fun and scratch-build from one of the hundreds of plans that John Pond has to offer. It is great fun to read down his list of plans, trying to determine just what you want to order. I suggest that you write to John and order his old timer plan booklet. His address is: John Pond's Old Time Plan Service, P.O. Box 3215, San Jose, Calif. 95156.

Now, to go along with these plans, two companies (that I know about) provide partial kits of many of the Old Timers. These are Schmidt Custom Kits, 11948 Franklin Blvd., Elk Grove, Calif. 95624, and my very good friend, Gene Wallock operating as P & W Model Service, 1114B East Edna Place, Covina, Calif. 91724. The partial kits contain all of the formed parts, such as wing ribs, round bulkheads or formers on some designs, rudder and stab outlines, or tips, etc. You need to add sticks, glue and covering.

While on the subject of Old Timers, and building them from scratch, we need to consider how to go about beefing up the structure to allow for the added weight of radio equipment, and the

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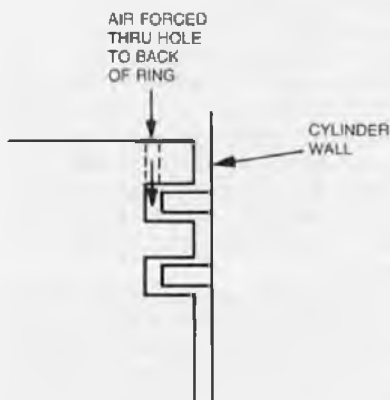
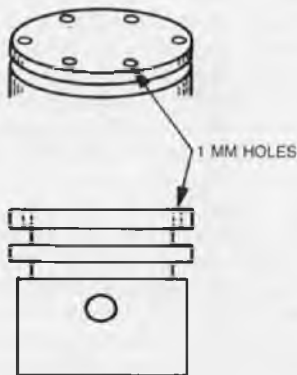
Chuck's Eindexer, 8' 8" span 16 lbs. Webra .91 power, designed & built in 8 days for Jumbo Fly In.



Preparing for first test flights. Pilot left behind for test flight.



Our first letter this month was sent in by Bruce Pickering of Gisborne, New Zealand. Bruce actually submitted an idea for use in the "For What It's Worth" column but since it was an engine related modification that I felt needed a little explanation, I thought it would be better to run it in Engine Clinic.



Dear Sir,

I have a very old and tired Merco .49 which was suffering badly from lack of compression. It would only start when it was cold and dripping with fuel nor would it idle for more than a few seconds. However, I could not locate any spare parts in New Zealand and I didn't feel that it was worth sending overseas for new rings, etc.

After some thought, I hit upon the following idea: I drilled six 1mm holes through the top ring and into the back of the top groove. The principle is quite simple. On each upward piston stroke, some air is forced through the holes into

the back of the groove. This creates pressure against the back of the ring, pushing it against the cylinder wall, thereby greatly improving the compression. Indeed, this same principle is applied with the Dykes piston ring.

Anyway, I reassembled the motor and it has been going like a dream ever since. It starts easily, hot or cold, and will idle through a whole tankful without even a hint of stopping.

The sketches illustrate what I mean.

Yours faithfully,
Bruce K. Pickering
New Zealand

Drilling holes in the top of the piston so that combustion pressure can increase piston ring pressure against the cylinder wall and, in turn, improve ring sealing is an old practice used in full size automotive engines called "gas porting." It is most commonly used in drag race engines where high power for short periods of time is the requirement. Increasing piston ring pressure against the cylinder wall also increases the rate of wear, so gas porting of the piston is not normally used in engines where long piston ring life is expected.

As far as model engine application, myself and many others have experimented with gas porting, but I personally never found it to be of any advantage as far as increasing power or rpm of the engine. This is more than likely due to the fact that the rings in model engines are larger and have more sealing area in proportion to the size of the piston and cylinder than the rings used in full size engines, i.e., the rings in our model engines are normally .046 wide. Automotive piston rings run from as narrow as 1/16" up to 1/8" with most in the 3/32" range. With larger displacement and higher combustion pressures, automotive rings have a harder time sealing — especially in competition engines where extremely high power output is developed.

Bruce's suggestion to use gas ports to improve ring seal in a worn out engine would be an alternative if new rings were not available such as on engines that have been discontinued by the manufacturer, etc. If lack of compression due to ring wear is the only

thing wrong with the engine, then gas porting the piston should help performance as it did in Bruce's engine. However, if the wrist pin holes in the piston are badly worn, the con-rod badly worn, etc., then gas porting is not going to restore the engine to like-new operating condition. If an engine is over the hill and new rings and parts are available, then the engine should be re-built without the gas ports. Gas porting should only be used as a last ditch effort where new parts are not available. This is due to the fact that many fellows do not have the mechanical ability to properly do the job and could end up doing more damage than any improvement.

For those who do decide to give gas porting a try, the position of the holes is very critical. They must intersect the rear wall of the top ring groove. The wall is quite thin at this point and if you drill the holes too far towards the center of the piston you are going to break through into the inside of the piston. On the other hand, if the holes are too far towards the outer edge of the piston they will not serve their purpose. So be sure and measure **exactly** before doing any drilling. Only the six #60 (.040) holes are required. Do not think that because six small holes work okay that more larger ones will work even better. Many times I am very reluctant to make mention of modifications of this nature knowing the less than happy results that some fellows will end up with.

Dear Sir,

The following is a suggestion for those having trouble with Enya .19VTV engines freezing up after using a Hi Torq Starter. My engine was scored between the front housing, drive washer and crankshaft bronze bushing due to the pressure applied against the faces of each part from the starter. Here the pressure applied caused the aluminum parts to wear down. To correct the problem, all affected parts were sanded with #400 grit paper to a smooth finish along with the bronze bushing end, which was de-burred with a sharp knife and a fine grinding stone. Next, a nylon washer was made from a "Sig" 3/4" x 3/4" x 1/64" plain nylon hinge with a hole

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ENGINE CLINIC

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cut 7/16" in diameter to fit over the crankshaft between the front housing and drive washer. Following assembly and repeated starts with the starter, no further problem developed.

Thank you,
James J. Rossio
Bath, Mich.

Generally it is not too good an idea to use an electric starter on engines that do not have ball bearing supported crankshafts. Ball bearing equipped engines can take the thrust load of the electric starter. Many sleeve bearing engines do not have provision for thrust loads in the wrong direction. If the engine has a steel prop drive washer that bears against the bronze crankshaft bushing, you can usually use an electric starter okay. However, always make sure that pushing the crankshaft fully to the rear does not allow it to rub on the back plate. If this is the case, serious damage will occur if an electric starter is used. An extra gasket (or more) should be used on the back plate to be sure the thrust load is taken by the prop drive washer. If the prop drive washer is made of aluminum, you do not want to use an electric starter as the aluminum will gall. Although you seem to be getting away with the nylon thrust washer, a steel washer would be a better material. Nylon can get soft when hot and even melt. A steel thrust washer can be made from .010" shim stock available at any automotive parts store. The steel thrust washer would allow the use of an electric starter on sleeve bearing engines with aluminum prop drive washers. Be sure to check crankshaft end play after installation of the washer. If no end play is present, the end of the crankcase will have to be faced off on a lathe or carefully filed until a slight end play is noticed.

Dear Mr. Lee;

I thoroughly enjoy your articles in RCM, and over the years I have gained considerable knowledge about engines because of them.

I purchased two Enya .40's at the same time, ran one tank of Blue Max 5% through each, very rich. I then proceeded to break them in on a Sweet Stick, logging about 3 hours flying time on each, with the same fuel. During this break-in period, each engine, individually, performed okay, good consistant range - also running quite rich.

After the break-in period, my modified Cherokee (VK) was ready and they were attached. The Cherokee is now a "Twin."

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to page 15

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from page 12/10

outlet from tank is approximately the same height as the spray bar (on each engine).

My problem is this: When each engine is adjusted, individually, for best high range running (nose high), in the intermediate throttle settings, one engine is considerably faster than the other. The openings in the venturi appear to be exactly the same and I believe that when the throttle is against the stop, the rpm (Heathkit) are about the same on both engines. Yet, just advancing the throttle slightly, it is obvious that the one engine is turning considerably faster than the other, and are definitely not in "sync," judging by the sound.

At highest throttle setting they appear to be "in sync" sound-wise.

My question is this: What can I do to improve performance of the "slow" engine to result in a more linear graduation in rpm's? Both engines are actuated by a single servo, coupled to a shaft made from two thicknesses of brass tubing, supported at 4 points by nylon bushings (no stop) running parallel to the wing spar.

I would appreciate any helpful information you could offer concerning this situation. Once I tried leaning the "slower" engine, but it quit on take-off.

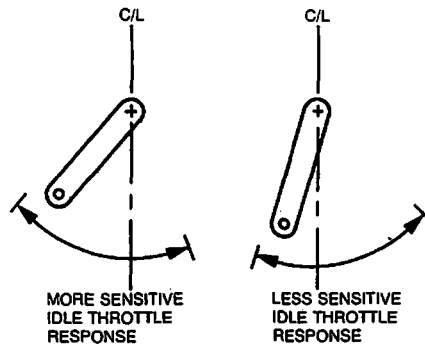
*Very truly yours,
Marion Dickey,
Atlanta, Georgia*

Two engines of the same make will quite often have different idle and acceleration characteristics. This is usually due to minute variations in port timing, compression ratio, etc. Many years ago when building my Lee .45's, I used considerably closer tolerances than any mass production engine manufacturer could possibly use to assure every engine being almost identical. And, yet, under actual running conditions many times one engine would have different idle or acceleration characteristics than two or three others being run at the same time — idle slightly lower, accelerate cleaner, etc. Of course there has been considerable improvement in carburetors in the last 20 years which has helped the problem considerably.

The carburetor on the Enya .40 has never been known for good linear throttle advance. Loading through the mid-range has always been a characteristic of the engine and carburetor. Throttle response could be improved considerably by using one of the after-market carburetors such as the Perry. The Enya also has a rather large hole in the exhaust baffle. Plugging this with a rivet and then re-drilling a 1/16" hole will help acceleration considerably.

The fact that one engine runs faster in the mid-range indicates that it is running leaner. Richening the idle mixture on this engine slightly and leaning the idle mixture on the other should help equalize the mid-ranges.

Also, be sure that the carburetor arms swing through exactly the same arc. Visualizing a vertical center line, an arm with more swing behind the center line than before will cause the engine to come off idle sooner. An engine with more swing ahead of the center line than behind will come off idle more slowly and be more linear in operation. Many times guys get to bending the arms around with pliers to match the servo pushrod and never give any thought to the effect they are having on throttle linearity. Then they gripe because the engine is so sensitive to throttle movement around idle.



Dear Sir,

I enjoy your Engine Clinic column very much, in fact it's the first thing I read each month. My question is concerning Perry Directional Porting you reported on some time ago.

In your original column you used the Super Tigre Bluehead and O.S. Goldhead as examples of the power increase provided. Would the same proportional increase be realized in a Webra Blackhead .61? (less than 2 hours total time on the engine). Also, would the tuned pipe for the Webra Speed .61 be effective on the Blackhead (with or without PDP)?

I know that, in a later article, you printed some dimensions for this modification (are they the same for all engines?), but I can't find it. I have a friend who's a machinist who will do the work for me if he has the specifications. He has a S.T. Bluehead and would like to do it to his engine also.

I realize that with all your readers you must be absolute deluged with requests, but I don't know where else to look for the information.

*Thank you,
John J. Zimmerman
Falls Church, Virginia*

Incorporating the PDP modification in a Webra Blackhead is pretty hard to do due to the Webra having a hardened sleeve. The PDP slots have to be cut with a milling cutter and the Webra

sleeve is too hard even for a carbide cutter. So the PDP modification is pretty well limited to those engines using unhardened sleeves; or milled into the sleeves prior to hardening. In the case of the Webra Blackhead, this would mean making a new sleeve from scratch. You could expect a 300-500 rpm gain the same as the Super Tigre Bluehead and O.S. Goldhead.

How well a pipe works depends a lot on the sleeve timing of the particular engine. A Webra Speed .61 pipe can be used on the Webra Blackhead but you probably will not get as much power increase. This is due to the engine design, not the pipe. The Webra Speed .61 with pipe is intended for pipe use and timed accordingly. The Webra Blackhead was never intended for pipe use and has very conservative exhaust timing. A slight gain will be noticed if installing a pipe, but more would be noticed if the exhaust ports were raised at least .040". PDP had no effect on pipe use or vice versa.

As far as specifications for PDP — we have covered this in a past article so will not go into a lengthy discussion again. In short, the PDP ports should be the same height as the bypass ports of the particular engine involved and positioned as far towards the exhaust port side of the sleeve as space will allow. Allow at least .125 between the PDP port and exhaust port for sealing crankcase compression. There should be two ports 1/16" wide with approximately .025 wall between. The ports should be cut at an angle to direct fuel towards the center of the exhaust baffle. This angle will naturally vary with individual engines due to cylinder bore, position of the ports in the wall, etc. Channels then have to be cut in the crankcase to feed fuel mixture to the ports. This should be done with a milling cutter but can be done with a Moto-Tool if done carefully. The channels should be the same height or slightly wider than the PDP ports and as deep as the crankcase wall thickness will allow; usually .075"-.090" deep. The deeper the better.

Dear Mr. Lee,

I have a K & B .40 standard engine with approximately 20 hours running time with a Perry Carb. and I have a problem. The engine will run at a very good idle on the ground and will also peak perfectly until I get approximately 200 feet altitude then the engine becomes rich until the end of the flight. I have checked fuel lines, gas tank level, no kinks in fuel lines, tank is wrapped in foam, carburetor seems to be well adjusted. I am using a 10/6 prop. I am getting very poor results so I have decided to take off the carb to check it. The carb seems okay, other than I found a crack at the bottom of the throat where

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It had to happen. Murphy's Law — "If anything can go wrong, it will" — strikes again. Nothing serious, but it's always embarrassing to get caught in a mistake, especially when you are supposed to be well informed.

You can't fool a real scale modeler buff - - - even unintentionally. No sooner than my book, "Mission To Gibraltar", had been published and some copies sold, I received two letters; one is from old-time modeler Cedric Galloway — who also worked at Lockheed, and the other from Butch Baird, a real scale buff. Both of them pointed out the same error. I probably should have caught it before the printing, but I didn't. I have an excuse, though. The information was provided to me by the company that built the airplanes - - - and if the company's own public relations staff can't identify their airplanes, well!

No, I'm not going to tell you what the error is, you'll have to buy the book. But don't just buy it to look for the mistake; you'll enjoy the story (it's true) and you'll like the pictures. Besides, I need the money. I may want to build a Quarter Scale Jenny, painted up like my dad's.

Then again, I may not. Recently, due to the exploding popularity of the larger models, I've had the opportunity to see several Quarter Scale models, both in flying condition and in various stages of construction. To say that they are impressive is redundant, and from the experiences I've had in flying even larger RPV's, I can say without fear of contradiction that the larger they are, the easier they are to fly. The easiest airplane to fly that I ever flew by radio control was Lockheed's RTV-1, which weighed 340 pounds, was powered by a 28 horsepower engine, and spanned 12'. Its only problem was that, with a wing loading of 11 pounds per square foot (that's pounds, not ounces) it was underpowered and had to be dragged through the sky just above the stalling speed.

No, it's not the construction time, or the flying that makes me hesitate. It's the problem of transporting it, storing it, and assembling it for flight. I haven't yet been able to justify it to myself - - - but that doesn't mean you can't. Frankly, if you want an easy airplane to fly, the bigger the better. And if you have room to store

one, and a car big enough to transport it, and the patience to assemble it and disassemble it before and after flying it, respectively, then you'll really enjoy it. Oh — one more thing — the money to buy the materials, or the kit. And maybe — just maybe — the patience to repair it after a crash. The big ones, due to mass times velocity squared, hit a bit harder, and tend to come apart farther.

Even so, there are two trends evident — one towards the larger and larger models, the other towards the smaller 1/2A jobs. Take your choice. As for me, I think I'll go with the smaller ones. So what's new? I always did. But I'll continue to admire the biggies.

There's no way to thank you Sunday fliers enough for the great support you give this column. I've always maintained it is yours, not mine. I just edit it - - - with editorial comment. However, just to remind you, if you want the picture of your pride and joy to show up, please send a 5 x 7, single weight, black and white glossy print. I know — you're so proud of the color scheme, but unless the photo is so outstanding that our photo editor accepts it for color printing, it has to be reprinted in black and white. That's expensive, so we don't do it too often. And I can tell you, our photo editor is very selective when it comes to color prints. I've got quite a collection of my own, which were returned, to prove it.

Now, having warned you, let me show you some black and white prints of color shots (which I reprinted in B & W myself) that caught my fancy.

This first one intrigued me for obvious reasons. Harold G. Strand of Ogden, Utah, writes:

Dear Ken:

As you can see from the picture I am sending you, I'm not partial or anything like that to a particular model designer.

Briefly, here's a run-down on each model:

Headmaster — seven years old, built in 1970. I learned to fly as an RC'er with this aircraft. It is powered with an Enya .19 and controlled with an O.S. Cougar radio, four channel. It is still in excellent shape and has hundreds of flights.

Top Dawg — almost four years old, built in 1974. Also many hundreds of



flights. Powered with an O.S. .15 and controlled by a three channel Digit Migit radio. Flown off water with the Islander float, it is a great performer with skis. I have both the sport wing and pylon wing.

BT-70 — this particular model was built in 1975. Second one in the family, my youngest son built one earlier and learned to fly with it. It had almost a thousand flights with it before the wing folded up one day in a power dive. This airplane is also a great flyer and I use it also during the winter with skis. Enya .15 and a MRC 700 radio.

Islander — built in 1976. Performs well with wheels and skis as well as the float. It makes a great ski plane with the float in real soft powder snow when others are unable to get off. O.S. .15 power and the three channel Digit Migit radio are used.

Thanks very much Ken for your fine designs. My son and I have had, and are having, a ball with these fine aircraft. Keep up the good work.

Good flying,
Harold G. Strand
Ogden, Utah

I appreciate the kind remarks, Harold, but even more intriguing is the fact that all of them are still in flying condition. Just shows what good care — and good flying technique — can do for the life of a model.

Bill Aldredge, a long time modeling acquaintance of mine from far off New Zealand, sent in a beautiful color shot which I reproduced in black and white. Normally I won't go to the trouble, but read on, and you'll understand why I did.

Dear Ken,

Just a short note. On reading your column in the January RCM, I noted the
to page 162

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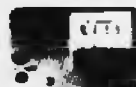
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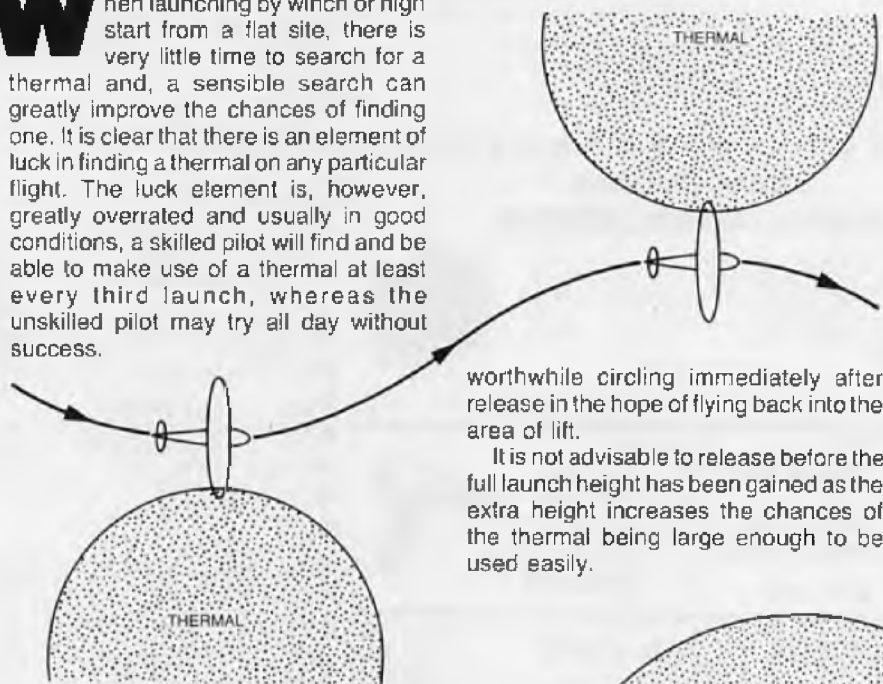
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When launching by winch or high start from a flat site, there is very little time to search for a thermal and, a sensible search can greatly improve the chances of finding one. It is clear that there is an element of luck in finding a thermal on any particular flight. The luck element is, however, greatly overrated and usually in good conditions, a skilled pilot will find and be able to make use of a thermal at least every third launch, whereas the unskilled pilot may try all day without success.



worthwhile circling immediately after release in the hope of flying back into the area of lift.

It is not advisable to release before the full launch height has been gained as the extra height increases the chances of the thermal being large enough to be used easily.

FIGURE 1

Since at least 200' of height is needed to make use of a thermal, it is obvious that the height gained on the launch is of great importance. A sailplane launched to 300' instead of 200' will have double the chance of finding a thermal.

It should be obvious that the glider with the flat gliding angle will be able to search a larger area for a given launch height.

If no thermal is found during the flight, the sailplane must be in a position to make a normal approach and landing. If one is found, the sailplane should be able to climb as high as possible before drifting downwind of the field. Ideally, then, the search should be made upwind of the launch point so that the wind will gradually drift the sailplane down the field as it gains height. At any time, the circuit may be joined without the necessity for a complicated approach and the need for S-turns.

The pilot must be able to fly the sailplane smoothly at a steady speed and be able to enter turns quickly and accurately.

On many occasions strong turbulence and an abnormally high rate of climb at the top of the launch may indicate that the sailplane has been launched into a thermal. In this case, it is always

If no lift is encountered at the top of the launch and no particular area is favored as a likely thermal source, a systematic search should be made upwind of the airfield.

The plane should be flown at the speed for best gliding angle so that the maximum amount of air is covered. If the rate of sink of the sailplane is abnormally high, indicating that the plane is flying through sinking air, height will be conserved by flying a little faster for a few moments to reach better conditions. If rising air is encountered even if it is too weak to result in anything but a reduced rate of sink, speed should be reduced to that which gives minimum sinking speed.

The search should consist of a cruise over the area considered most likely to produce a thermal, preferably returning to a position off to one side of the winch at about 200' so that a normal circuit and

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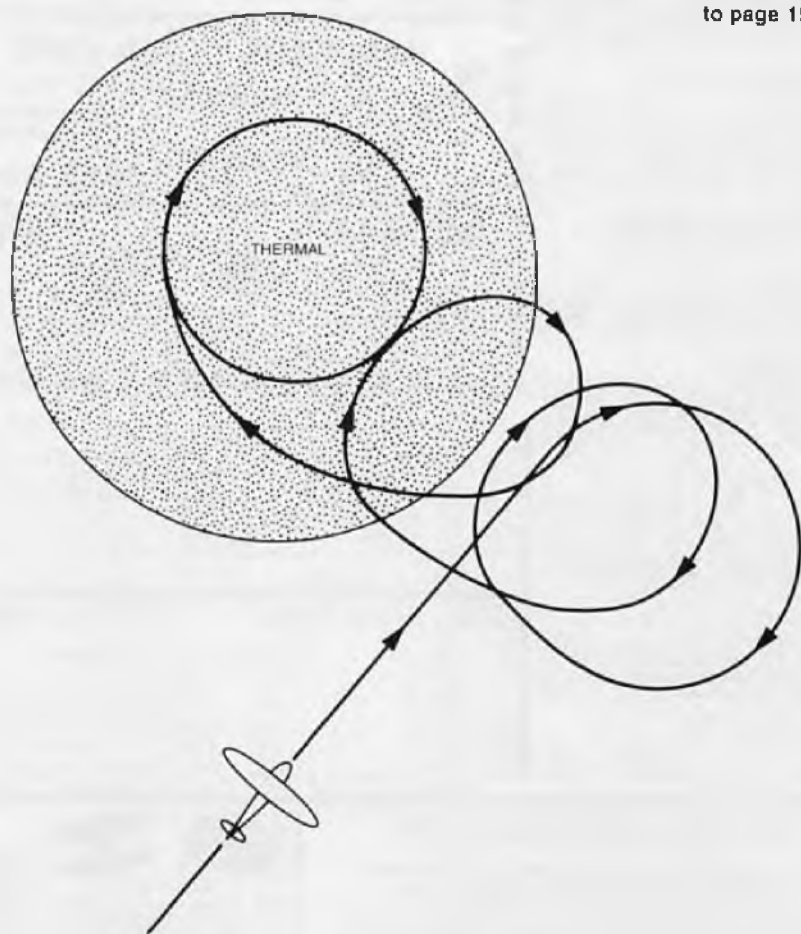


FIGURE 2

READ ABOUT THESE RESULTS with

MAGNUM POWER



Dear Carl,

RECENTLY, I WAS ASKED BY A FELLOW CLUB MEMBER FOR SOME HELP. Sid Greenleaf was flying a Sig Cadet with an OS35, but had never gotten a complete flight because of engine problems. The engine felt stiff to me, and after starting it with his well-known national brand fuel, it wouldn't idle. From a moderate 2-cycles, it would flood out when the throttle was opened. I fiddled with it for some time, and finally decided to fly the ship with the engine nearly full throttle.

After take-off and flying out about 300 ft., and making a 180° turn, the engine quit as though it were lean. I brought the plane in, restarted the engine, set the needle valve 5 clicks richer, and took off. Again the engine quit the same way. With Sid's permission, I drained his tank and filled it with Magnum Power 10. We restarted the engine, set the needle valve, and Sid noticed an immediate improvement. We now had a good idle and good transition from low to high. I took the plane off, got up to altitude, and handed Sid the transmitter. For the first time all summer, the engine ran fine for a complete flight. After landing, Sid said that Magnum Power had made a tremendous difference in the way his engine ran. It was much freer and the first few minutes of running had cleaned out all the varnish from the old fuel. Sid then made many more flights, and his engine ran reliably from the beginning to the end of the tank.

Another time, Dr. Alan Spievack asked me if it was true that engines ran longer with Magnum Power. Alan flies a tri-motor Stinson with three OS Wankels. He was getting only 8 or 9 minutes running time with his fuel (also a well-known national brand). I gave him a gallon of Magnum Power 10, and he decided to run a test. Using a regular fuel, he flew an entire flight until the engines quit — rather daring with a scale job. He then filled with Magnum Power, and restarted. He had to lean his engines more than with his old fuel, and picked up several hundred RPM as measured with a tach. He then flew an entire flight again until the engines quit. After landing, he could immediately touch the engines, which he had not been able to do for several minutes with his old fuel, since they ran hotter with it. He also noticed a black residue that had been cleaned out by the Magnum Power, and now his exhaust was clear and clean.



Dr. Allen Spievack with his tri-motor Stinson with 3 O.S. Wankels.

He was extremely surprised to find he was getting well over 10 minutes with Magnum Power. He now had plenty of time to complete his schedule of running maneuvers. Alan went on to run tests with various airplanes and engines, and found that everything that is said about Magnum Power is true and then some.

These two cases just confirm all the experiences I have had with this fuel. In every case when Magnum Power was substituted for the previous fuel, there was an immediate slight RPM increase, the engine ran longer per tankful, and the exhaust was very cool and clean. There is no doubt in my mind that Magnum Power fuel has something that none of the other fuels has.

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A brother to the Bantam servo (which has been a respected name in servos for years), the Bantam Midget is considerably smaller and lighter, but boasts the same torque and gear strength as its big brother with even a bit more speed. Notice the extremely low profile--important when interfacing the elevator and rudder servos with the aileron servo and linkages.

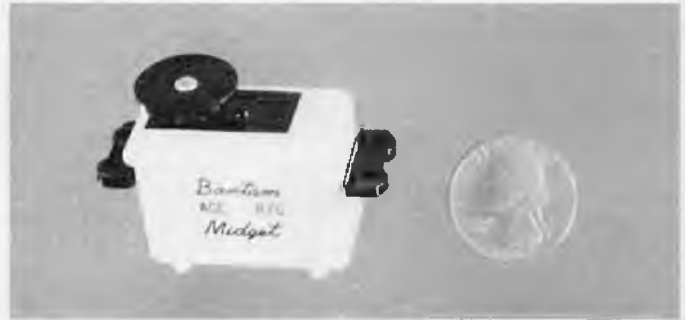
Reread the above paragraph then consider the fact that the Midget offers a servo that is in the micro-miniature category but also has the power and strength for .60 powered pattern ships! Truly a universal servo.

A Signetics 544 IC, external driver transistors, quality plastic conductive element pot and other components make a combination that has become synonymous with Ace R/C and Digital Commander servos. Servos that have "Competition Grade" performance with an economical price tag.

The Bantam Midget will work with any modern positive pulse system. For negative pulse systems (ProLine, etc.) a pulse inverter (14G18-\$2) is required for each servo.

A rotary wheel, extended arm, and an adjustable arm are furnished. No connectors are furnished with servo kits.

All of our flite packs and complete systems are available with the Midget option; please write for details.



Bantam Midget

Size: Height--1.125" Length--1.43" Width--0.705"

Weight: .85 oz. (24 grams)

Thrust: 20 in. oz.

Transit Time: Under .5 sec. for 90°

14G20R--Bantam Midget, Kit \$23.95

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HERE'S HOW

Recently, on a trip to the great state of Texas, I had the pleasure of taking in the First South Western Jumbo RC Fly-In held July 22, 23, of this year. This event was hosted by the Fort Worth Thunderbirds RC Club and sponsored by Sky Master Industries, the effervescent Chuck Cunningham. I really looked forward to meeting Chuck. I was also excited about seeing the large aircraft and what their builders were using in the way of servos, hardware and etc. It was my task to shoot pictures and, this gave me an excellent opportunity to look 'em over and talk a little about any interesting items I might discover. For the most part, they were all making use of what was available on the market today. With slight innovations, some were using larger control horns, in special cases. When hinging control surfaces, most used hinges, like the large Du-Bro or Klett, only they used more of them. One aircraft sported a .19 size Tatone nose gear for tail wheel. It seemed to work quite well in spite of the fact that it was somewhat stiff.

As I made the rounds, shooting pictures of interesting aircraft, I ran across my old friend Bob Hutton of E.W.H. Specialties, Inc. Bob had his forthcoming "Puma" (trainer) kit on display and was busy "hawking" his wares. Taking note of the hinge design on the aileron of the Puma, I found it different than any that I had seen before. In fact, it reminded me of full scale hinges except for the hinge pin which was a complete axle through all the hinge assemblies. It certainly represented a good rugged hinge design and had several distinct advantages that were readily apparent. The first and foremost was that each hinge assembly can be disassembled by removing two cap screws, allowing you to completely remove the aileron from the wing if it should become necessary. Also, with this hinge design, there is absolute freedom of movement, that is, except for the slight amount of friction around the axle — and that you can forget about. There is absolutely no binding when all hinges are aligned properly. And, finally, Bob's hinge

design imparts the same operational characteristics as that on full size aircraft.

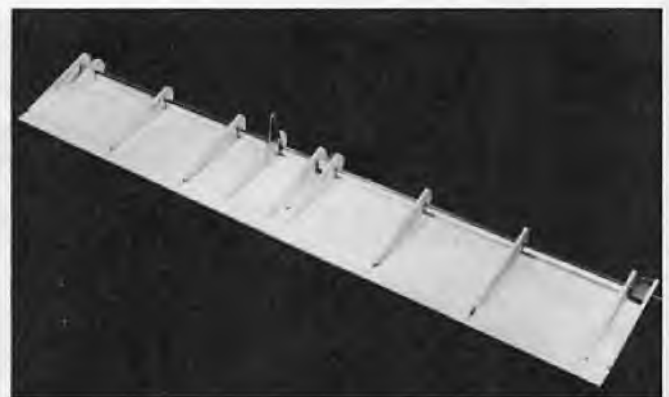
With Bob's permission, the sketches presented here have enough information to allow you to build your very own hinges. Of course, tools like a drill press are necessary because of the precision required for proper alignment between hinge assemblies. Straight holes are a must. If you have this capability, there is no reason why you cannot build your own.

You can buy aluminum bar stock (3/16" x 1/2") at most large hardware stores. While you are there, pick up the screws. With the material in hand, you're halfway home. The real tricky part in building this hinge is boring the axle hole exactly centered between the base and cap. To accomplish this it is necessary to first screw the cap and base together with the two cap screws. Once the hole is drilled, with a drill press, then the cap and base becomes mates. **Keep them together for absolute alignment.**

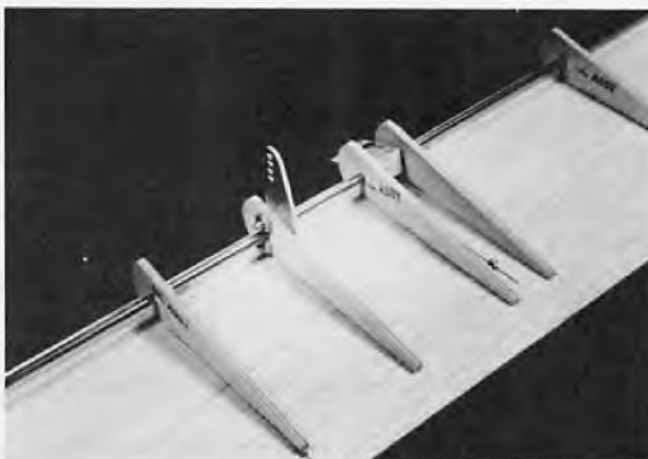
If this all sounds like something to page 154



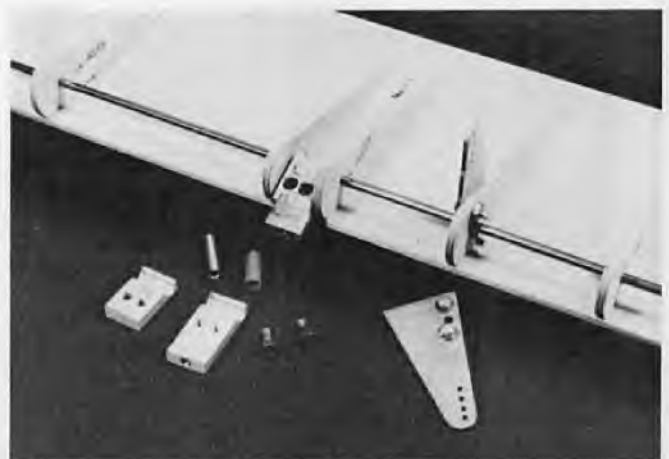
Aileron hinge kit available from E.W.H. Specialties, Inc. Can be adapted to most any large aircraft. A rugged hinge, made of quality material with precision tooling.



Typical aileron layout. 1/4" balsa blocks added between ribs at leading edge along with 3/32" balsa sheeting are needed to complete the aileron shown.

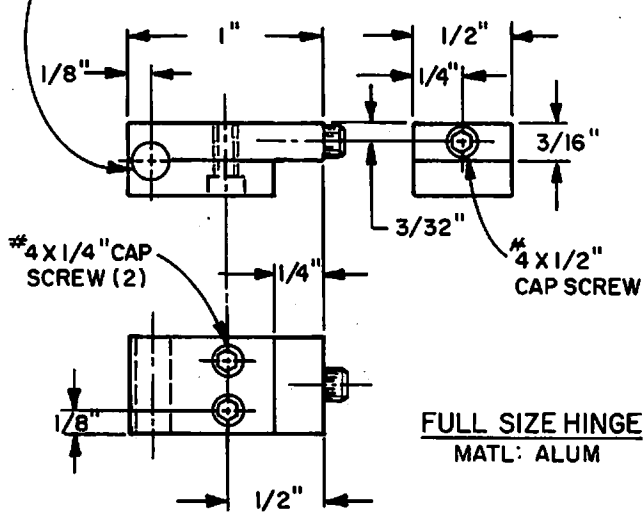


Aileron horn is bolted to 1/8" ply rib. 1/8" piano wire axle runs entire length of aileron and is retained by end caps.

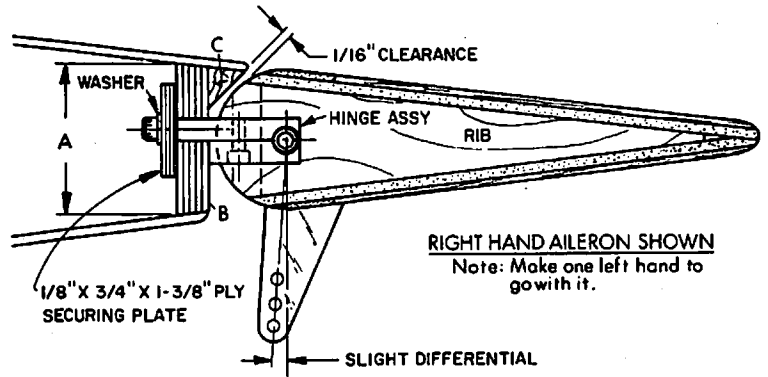


Hinge assembly captured between 1/8" ply ribs. In foreground, hinge assembly disassembled. Note plastic tube to eliminate metal to metal. Control horn is 6061-T6 aluminum .060 thick.

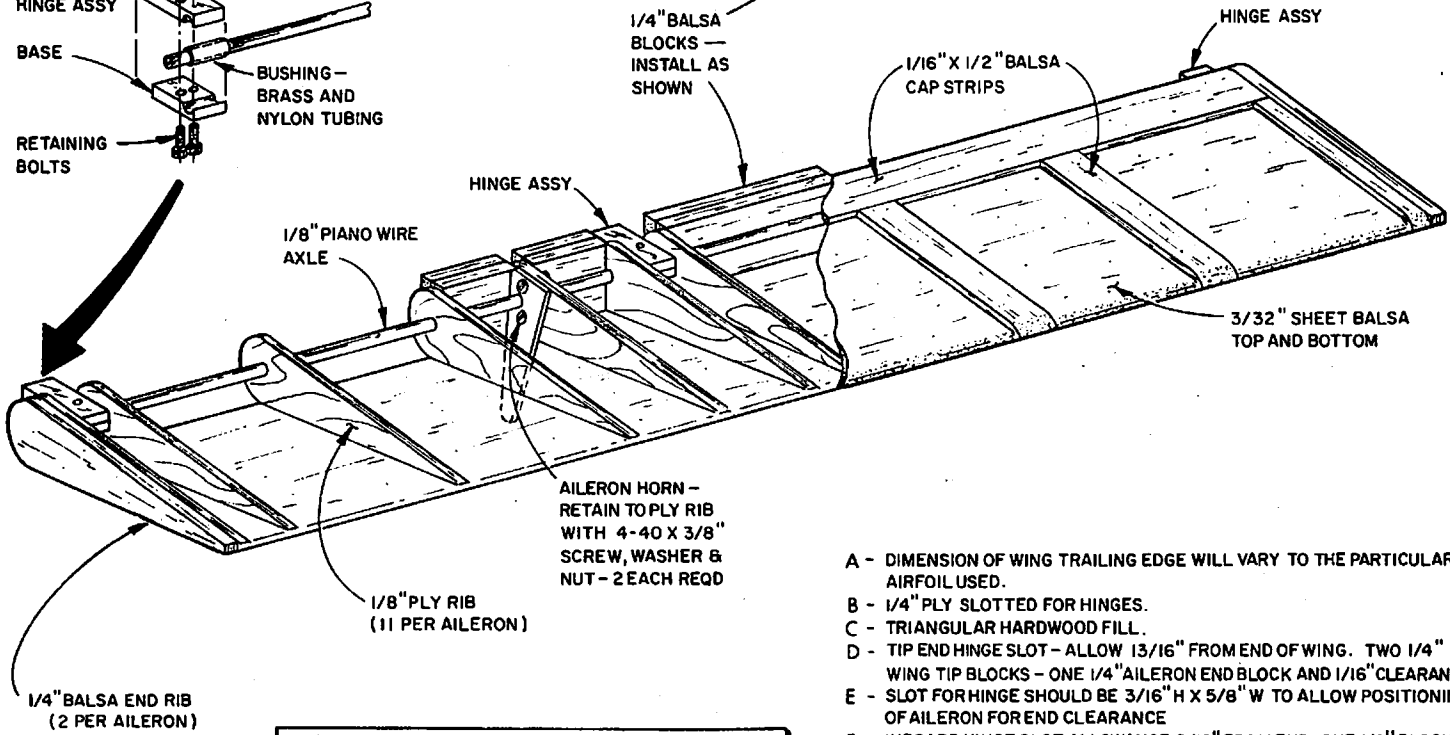
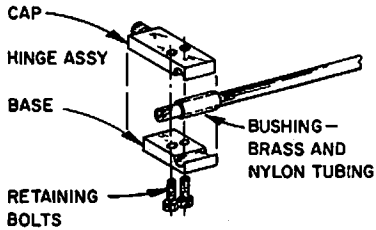
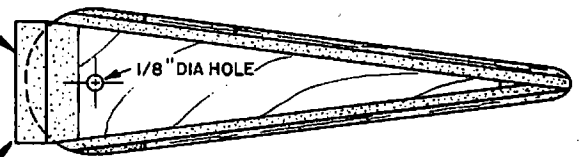
HOLE TO MATCH BRASS AND NYLON BUSHING OVER 1/8" WIRE AXLE - APPROX 3/16" DIA.



FULL SIZE HINGE
MATL: ALUM

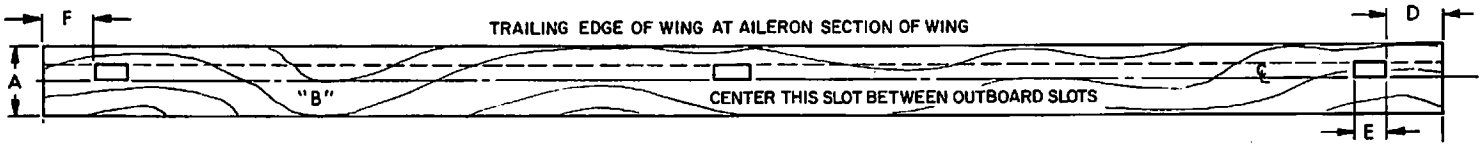


BLEND TO RADIUS OF PLY RIB



- A - DIMENSION OF WING TRAILING EDGE WILL VARY TO THE PARTICULAR AIRFOIL USED.
- B - 1/4" PLY SLOTTED FOR HINGES.
- C - TRIANGULAR HARDWOOD FILL.
- D - TIP END HINGE SLOT - ALLOW 13/16" FROM END OF WING. TWO 1/4" WING TIP BLOCKS - ONE 1/4" AILERON END BLOCK AND 1/16" CLEARANCE.
- E - SLOT FOR HINGE SHOULD BE 3/16" H X 5/8" W TO ALLOW POSITIONING OF AILERON FOR END CLEARANCE
- F - INBOARD HINGE SLOT ALLOWANCE 9/16" FROM END. ONE 1/4" BLOCK ON WING RIB - 1/16" CLEARANCE - ONE 1/4" AILERON END BLOCK.

Complete hinge kit available from
E.W.H. Specialties Inc. at \$14.95





1/12th Scale Electric Cars

I'm sure you've all heard about the latest, fastest growing new hobby — electric cars. The electric cars came into being as a sort of necessity. It seems a group of 1/8 scale R/C car racers from the Midwest could not stand to go through the long winter months without some sort of racing activity. So they made some scratch-built, 1/12 scale, electric motor powered, radio controlled model race cars and raced them indoors during the winter and then raced the 1/8 scale gas powered cars outdoors during the summertime. They've been doing this for over three years now.

In the meantime, Roland Boucher, formerly with Astro Flight, who makes electric motors and components for model airplanes, left Astro Flight and started another company — Leisure Electronics, specializing only in 1/12 scale electric powered radio controlled model cars. A motor similar to the Astro 05 type was used, with 6 nicad batteries. These were installed in the popular Jerobee chassis, which up to this time were only using the gas powered engines. This combination gave a top speed of approximately 30 mph. It takes 15 minutes to recharge the batteries and then the car can be driven for 10 minutes before another charge is required.

The advantages of the electric 1/12 cars over the 1/12 gas car is very great. It's simply a matter of turning on a switch and the electric car is ready to run. No



Latest entry into the 1/12 scale racing field is the Associated RC12E car. The car features fiberglass chassis plate and one of the strongest, yet lightest front ends available. 1/4" round axle, with or without ball bearings. Super true, super quiet gears with easy "Cam Lock" gear adjustment. Designed for racing. The first car to adapt the "mid-engine" location for better handling.



BoLink has one of the most respected names in 1/12 scale electric cars offering a very large selection of kits, parts and bodies. Shown is one of the best selling kits available — the BLX-94, based on Jerobee chassis. Other kits are also available complete ready to run with radios installed.



BoLink's newest car is the Mach 12, featuring aluminum chassis plate, 1/4" round rear axle and stamped steel front end.



Electrocraft's car features fiberglass chassis plate and MRP suspension and wheels.

need to put in fuel, flip the engine over trying to start it, and then setting the fuel adjustments and hoping it will keep running. That's the dark ages, especially when you consider the 1/12 electric cars actually out-qualified the 1/12 gas powered road cars at the 1977 ROAR Nationals. And, of course, the electric cars are much cleaner because they don't have any fuel mess. The cars can simply be brushed off clean with a paint brush. And the last plus is a real big one



One of the best electronic speed controls available is the Electrocraft PSC-9FR system rated at 25 amps.

— noise. The electric cars can be run anywhere without any fear of car noise being the cause of losing a racing site.

Most people must feel they would be good race car drivers because, as stated earlier, this hobby is really growing fast. In the San Francisco, California, area they recently had a race for the 1/12 scale electric cars and they had 95 entries. In an effort to cut down on the number of entries, they made everyone sign up and pay their entry fee one week early. At the next race, they had 98 entries!! The 1/12 electric cars are so easy to maintain and so much fun to compete with, that the whole family can race, from 6 to 60, male or female, can join in on the fun. There are many 1/12 clubs running in all of the areas of the country now. If there's none in your area,

to page 30



Jo Mac, the leader in 1/12 scale gas powered cars, has now released their new 1/12 electric cars. Shown is the top of the line Jerobee ready to run car #167, complete with Jo Mac radio, featuring brick type modular radio in car, with electronic speed control plus reverse.

**RC 12E
WINS
3 OUT OF 4
EXPERT CLASS
RACES AT 1978
ROAR NATIONALS**



OUR BRAND NEW RC12E LOOKS LIKE A WINNER.

IT SHOULD.

Serious RC Car enthusiasts will find the Associated RC12E familiar. That's because we've designed our 1:12 scale electric from the lessons learned in winning the 1977 World RC Car Championships and in dominating RC Car racing internationally since 1971. And the RC12E is designed to get the same results Associated is famous for... like sweeping the first four places in the 1977 ROAR NATS in its competition debut. Check out some of our winning features:

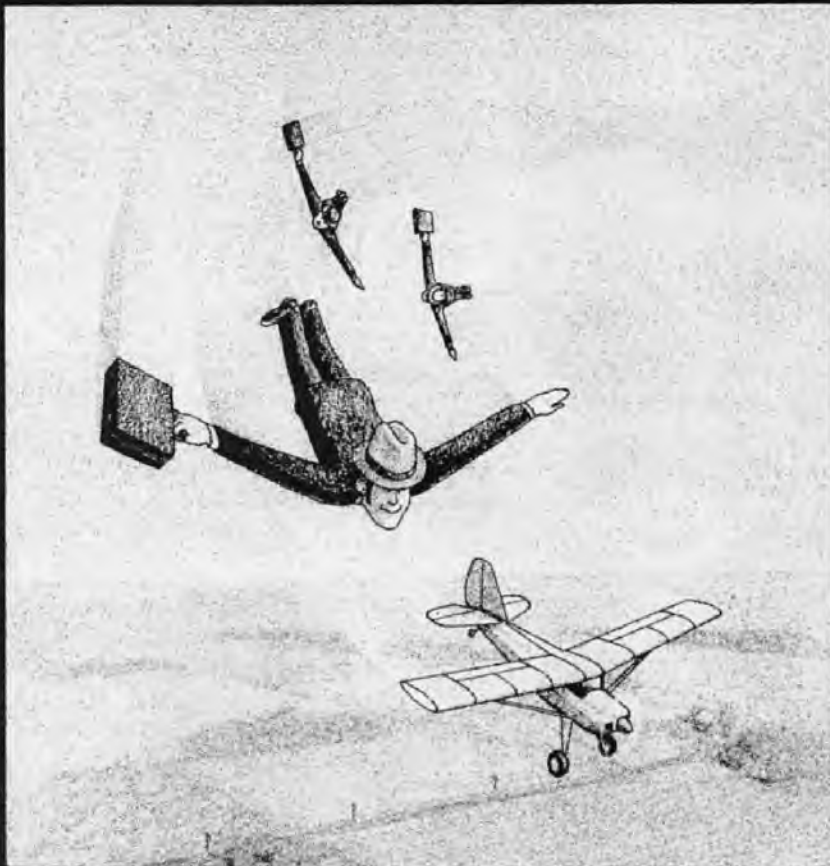
Bulch Kroell's factory Associated RC200-1-B scale, gas powered RC car. 1977's World RC Car Champion.



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PIT STOP

from page 28



The top of the MRP line, also from Jo Mac is the model #929. This car features the MRP chassis with Jo Mac radio and resistor type speed control.

start one. We just did an article on "How To Start A Club", which will get you going. Most of the activity is in the outdoor racing which uses 6 cell battery packs. Due to smaller tracks and generally slippery surfaces, indoor racing requires the use of 4 cell battery packs to cut down on the power and make the cars more driveable.

There are many different manufacturers making electric cars in a lot of different scales. It would be impossible to cover them all, so we'll just concentrate on the ones in 1/12 scale that are R.O.A.R. (Radio Operated Auto Racing) approved for racing. ROAR has a set of rules and regulations governing 1/12 scale electric cars. These can be obtained for 25¢ from ROAR, 20860 Homeland Rd., Matteson, Ill. 60443.

LEISURE ELECTRONICS

We'll start with the Leisure car, because they were the pioneers in the kit cars and were probably as responsible as anyone else for getting ROAR to include 1/12 scale electric cars in the rules.

Leisure has a variety of kits based on the Jerobee chassis, but they're most proud of their new Model 100 car. Just recently introduced, this car is already breaking track records in Southern California. It features a fiberglass chassis plate, mid-engine layout with aluminum motor mount, which greatly

to page 149



Leisure Electronics new Model #100 car features fiberglass chassis plate, MRP front end, aluminum motor mount and the new Leisure electric speed control.



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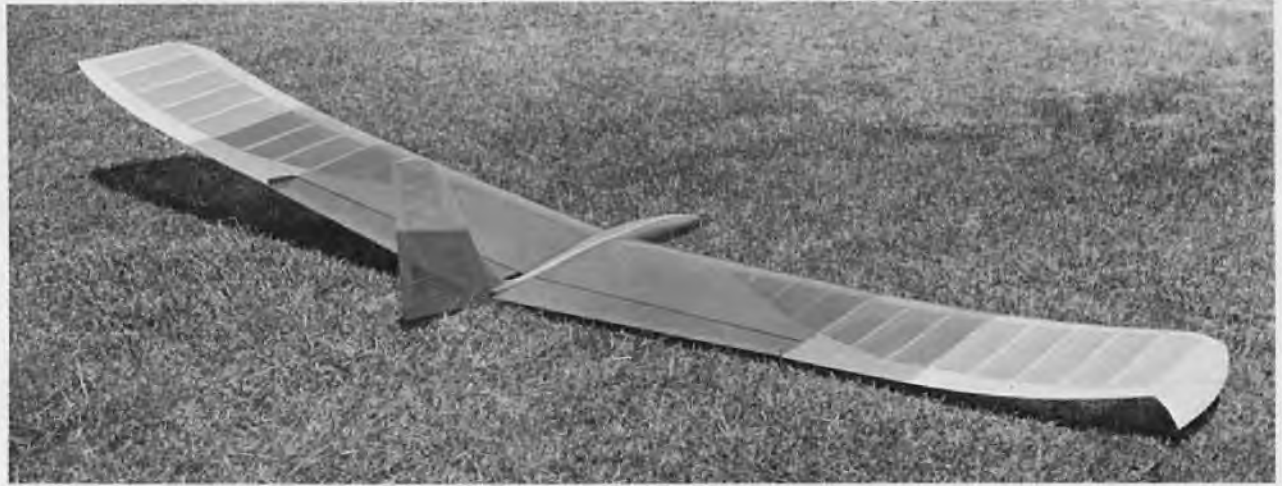
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WINDBREAK

Part II

By Roger Sanders

FLIGHT PERFORMANCE

I do not feel that it is appropriate for the designer, builder, pilot to evaluate his creation because he will be biased. This view is supported by reading articles where the authors talk only in superlatives about their design. At the same time, the reader should have some idea of what to expect from a given design, and unless an impartial evaluator is available to discuss the performance of a ship, the author is required to do the evaluation. Since an impartial evaluator is not available in this case, the author will do the evaluation, hopefully in an honest manner. Since no design is perfect, the bad points will also be discussed, and the opinions of other pilots will also be mentioned.

To begin, I want to compare the performance of the ship to the original goals of the design. The first goal was to match or exceed the glide slope of an Olympic II. Since we do not have a practical objective method of measuring

The state of the art of soaring takes a giant leap forward with the Windbreak - - a flying wing configuration that can equal, or exceed, the performance of a conventional design under all weather conditions. When it comes to maneuverability, it is unsurpassed.

this, the opinions of several observers and pilots were pooled. There was general agreement that this goal was met. That is to say that at slow speeds, both an Olympic II and the Windbreak were able to stay up about equally. However, when the two ships were compared at high speed (penetration glide slope) at the same weight, there was no contest. The Windbreak could cover more ground with less altitude loss than an Olympic II.

The second goal was that the

Windbreak must be able to surpass an Olympic II with regard to maneuverability. This turned out to be much more difficult to evaluate because the behavior of the two ships is quite different. There was no question that the Windbreak was much more responsive than an Olympic II, but at the same time the actual diameter of a tight turning circle seemed to be about the same for both ships. The only area of maneuverability where the Windbreak was clearly superior was in pitch control. It will recover from a stall virtually instantly - - something no conventional ship can do.

The third goal was to have a ship that towed predictably, was stable, and reached maximum launch altitude. This goal was clearly met. All were surprised to find that the Windbreak goes up on tow as though it were on rails! There is no hunting tendency. It does not tend to stall at all. When forced into a stall, rather than dropping a wing and heading for the ground as most ships do, it just



Elevator drive showing cast aluminum boat tiller - Strong!



Differential elevator drive detail. Servo arm in level flight position. Note reversed clevis and bend in pushrod for clearance.



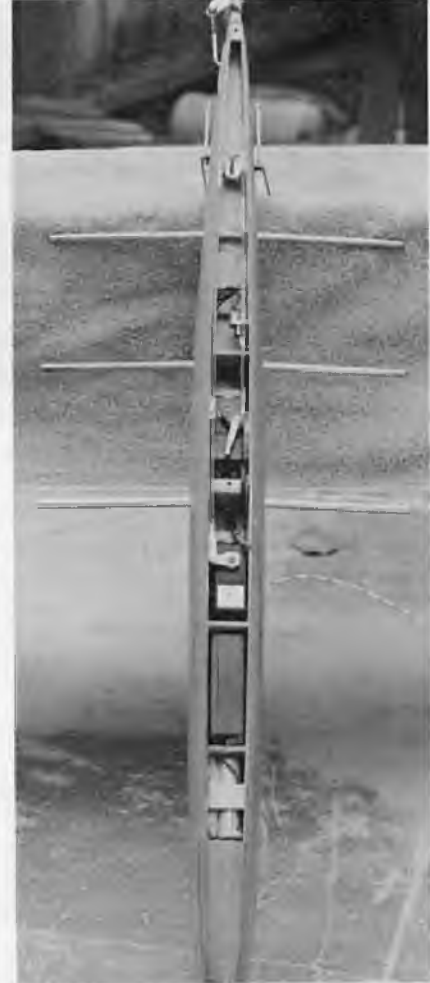
Swivelling tow hook mechanism.



Detail of control horn on rudder.



View of hatch showing tow hook and hatch hold-down bolts.



Detail of radio with bottom hatch removed.

dips its nose for an instant and heads skyward again immediately. It grabs altitude with the best of them.

Flying a wing turned out to be quite a different experience, and several pilots expressed mixed feelings about the ship. All were very impressed by how quickly it could be recovered from a stall. The stall behavior and instant response to elevator results in a ship that will recover from a gentle stall in a matter of inches. A severe verticle whip stall can be recovered in a matter of just a few feet. This incredible pitch control tended to cause most pilots to have some problems with over controlling. Furthermore, most felt that they had to concentrate harder on flying the ship because of this. In short, it was not relaxing to fly. With practice, however, this control should offer advantages for the skilled pilot. When flying in the wind, this degree of control was very helpful. The turn performance was also very quick and the turns were very tight. However, tight flat turns were difficult to execute smoothly and with minimum height loss because of the quick response to pitch command. Again, this could be an advantage to a skilled pilot but it requires concentration.

Orientation is not a problem. However, the lack of a fuselage makes it more difficult to read lift and determine the pitch attitude of the ship at a distance. Like a conventional ship that is directly overhead or so high that the fuselage can't be seen, the pitch has to be determined by the speed of the ship rather than by the fuselage attitude.

Speed is one of the Windfreak's strong points. The wings are so stiff that it is virtually impossible to flutter them,

and the clean design allows truly superior wind penetration without ballast. It is my opinion that this ship would be untouchable in the FAI speed run because of its speed and instant turning ability. The combination of excellent penetration glide slope and instant response to commands results in a ship that is truly at home in gusty wind conditions. Any ship in the wind requires concentration and powerful command authority and the Windfreak offers some real advantages here. A conventional ship tends to balloon when entering a wind gust or exiting from a turn and, because of the time required to level the ship, the pilot must apply down elevator immediately to prevent a stall. The Windfreak also balloons under these conditions. However, it is so responsive to pitch control that you can allow it to continue to balloon and then apply just a touch of down at the top where it will level out without stalling. The Windfreak will gain altitude out of turn or into a gust where a conventional design will not. The result is a really uncanny ability to gain altitude in the wind. The turn response in the wind is so quick that you can correct for the effects of cross wind gusts that turn the ship before the craft actually changes course. The advantage this offers on a windy landing approach must be experienced to be appreciated. Because of the outstanding windy weather response, the ship is quite at home on the slope. Its speed is such that in the hands of a skilled pilot who can utilize both the speed and quick turning abilities of the ship, it should be unbeatable in sportsman class slope racing.

There is another characteristic of the

ship that is shared by all ships that exhibit a really good L/D: They are hard to land. This is because a draggy ship will tend to slow down and settle right in for a landing, while a clean ship will tend to keep penetrating and doesn't want to stop. Don't misunderstand me, I am not saying that the ship can't be landed well . . . only that it is not quite as easy as with some ships. Once this penetrating quality is learned, the ship can be landed with the best of them . . . and better than most in the wind. The lack of a fuselage does allow it to ground loop easier than a



Detail of wing fit and elevator drive.



Curved building board.



The "Windfreak", when disassembled, makes a very easy to handle package.



The author just winding up one more perfect flight with his "Windfreak."

conventional design.

It should be apparent by now that this is not a ship for beginners. Although it is stable, its quickness allows the unskilled to get into trouble immediately. This quickness can also be used to advantage by the skilled pilot in that small lift can be centered quickly, wind can be handled well, and landing can be very precise.

In summary, if you are a skilled pilot who is looking for a highly maneuverable ship that is quick and responsive . . . a ship that instantly does what you want it to do . . . a ship that will hang up there with the best of them . . . a ship that will really move when you want it to . . . in short, a ship that you can really fly rather than just steer around the sky, then the Windfreak is for you. Let's move on and build one.

CONSTRUCTION

Just as this ship is not recommended for beginning pilots, it is also not recommended for beginning builders. However, construction can easily be modified by the individual builder to make things easier if he so desires. I shall make suggestions about this as we go along. Presumably the experienced builder is familiar with various building techniques, so only a few comments will be mentioned and special problems will be discussed in detail.

The wing has a lot of curves in it with the reflex and the elliptical dihedral, and

special techniques are required to build it. You should decide if you want to build the elliptical version, since straight dihedral will work as will conventional polyhedral. Frankly, I find that elliptical polyhedral is easier to build than building separate polyhedral sections and joining them. If you make conventional polyhedral, use 8 degrees at each joint, and "break" the wing at the second rib past the elevator. The last rib should be elevated 2.5" for the 8 degree angle. The wing rods should be bent so that one end is 0.6" high (assuming a wing rod 9" long). Unfortunately, straight wing rods cannot be used because the wing is too thin to get the proper angle on the rods, the rods must be bent. If you use straight dihedral the wing rods must have a bend that leaves one end 1.1" high. If you use elliptical polyhedral you have two choices. You can use 6 degrees of polyhedral and 10 degrees of dihedral, or you can use 8 degrees of both. I chose the former because to use more curve requires that the top sheeting be curved inward when being attached to the spar because it tends to curve outward when being attached to the wing. Since I attach the spar to the sheeting before gluing the assembly to the wing, and it is much easier to glue the two if they are straight, I opted for a bit less wing curve than I really would have preferred. If you want a full 8 degrees of elliptical curve, then make your building

jig 3.5" high at the tip. 6 degrees is 2.3" with wingrods that are 0.8"

I made my wing curve jig out of a 1/2" thick piece of cellotex to which I nailed on two pieces of wood with the proper curve. This assembly is quite flexible, but it works fine when placed on a flat work table (see photographs).

The spars are made from 1/2" x 1/8" x 48" spruce. Take all 4 of them and stack them together using double sided tape in several places. Draw the taper on the top spar. Note that the taper doesn't start for 14" as measured from the root. Cut the spars on a band saw or Dremel saw. Take a sanding block and sand the tapered section smooth. Split the spars apart and glue them to the balsa planking. I do this by taping the spar to the planking with masking tape so the fit is perfect, then opening up the two, using the tape as a hinge and filling the gap with glue such as Titebond. Do not use the instant adhesives for gluing spruce or plywood. Now close the "hinge", wipe off the excess glue, and let dry. You will have a perfect joint with no gaps or sanding required if you cut the balsa planking straight with a straight-edge before taping it up. If you don't have a long enough straight-edge, go to a home building supply and get a 6' length of aluminum bar about 1.25" wide and 1/8" thick.

Assemble the bottom sheeting, capstrips, and trailing edge on a flat

surface. Add the ribs. I cut only the front of the spar notch when making ribs and trim each notch to match the spar taper when I install the rib. The reflex section of the rib is above the T.E. at this point, only the flat part of the rib is glued in place. After the glue has set, just bend up the T.E. sheeting to meet the ribs and glue with instant adhesive.

Build both wing panels to this point, but do not add the plywood root ribs or L.E. yet. With the wing rods not yet bent, assemble the plywood ribs, brass tubes, and wing rods. Place the partially completed wing panels in their flying position on a flat surface; be sure the alignment is right, and then glue in the ply ribs and tubes. Now you can bend the rods.

At this point the jig hasn't been used and the wings are flimsy. Now use the jig to curve the wings and add the L.E. Carve the L.E. to shape (you may do this back on a flat surface). Place the wing back on the jig and add the shear webs. Things start getting stiff now so be sure the jig is weighted so it rests firmly on the work table. Add the top sheeting/spar. You will have to soak the balsa because it will not want to follow the curve of the wing, but it can be made to do so if no more than 6 degrees of polyhedral is present. If more than that is used you will have to add the sheeting. Splice it appropriately to get it to follow the spar line, then add the spar later. When the spar is dry the wing will retain its curve forever. The L.E. is now shimmed several inches high so that the T.E. contacts the jig. The T.E. sheeting will be all wavy, but don't let that bother you, just hold it down with pins and add the shear webbing. Now laminate the top T.E. sheeting in place. The T.E. will now be perfectly stiff and true.

The elevator and rudder are built the same way. Note carefully the 1/32" plywood strip on the T.E. of these items. This is very important. It prevents the MonoKote from crushing the ribs into the very thin balsa T.E. stock, and it adds amazing stiffness to the entire structure. Use hard balsa for all construction except wing tip blocks.

The elevator is sanded flat on top, and the underside is curved. Ideally the top of the elevator would be concave, but it is getting awfully thin as it is and it is just this side of impossible to sand it concave anyway.

Hinge lines are made with Slik Tak (available from Airtronics for 50¢/roll - 1 roll is 3' long and 2" wide). I don't use MonoKote hinges anymore because I have had trouble with them fracturing and they are excessively stiff. When placing the Slik Tak on the inside of the hinge, do not use one piece. Use about 3 or 4 pieces and leave some gaps. This will prevent binding. The surface piece is of course solid. The hinge gap is sealed with photographic film. Get a roll of C-120 in black and white. Drop it into

fixer and all the emulsion will come off leaving a violet tint only. This can be cut and held in place with double sided tape. Clean the MonoKote with acetone before applying tape so that it is really clean and you will never have to worry about it coming off.

I use a sheet of 1/4" plate glass for sanding structures like elevators and rudders. These small parts are hard to

not as stiff and the MonoKote is very important in preventing wing flutter. The colors are up to you. I have tried all the colors and find that no one color is best for all conditions. Therefore, you see my ship "giftwrapped". It may be odd looking, but I can assure you that it is the most visible craft in the sky!

The wing fillets to the fuselage are made with micro-balloons and resin. Assemble the wing to the fuselage, but be sure to rub Vaseline on the wing rods and the side of the fuselage so the resin won't stick. I do this after the fuselage is covered or painted. Masking tape is then placed along the bottom of the wing/fuselage joint and brought up the T.E. and L.E. so that no liquid can spill over. About one ounce of resin is mixed with micro-balloons until it will just flow slowly. This is then poured into the gap and allowed to get firm, but not hard. The wing is then flexed up and down on the rods a little to break the resin's bond to the Vaseline and the wing is gently worked off the rods and set aside to harden. Sanding is done by wrapping masking tape around the wing just beyond the fillet and the fillet is sanded with a block to the level of the tape. The tape is then peeled off and the final sanding is done. This prevents ruining the sheeting when coarse sanding the fillets.

The fuselage may require a bit of modification to fit your radio. The idea is to make everything just fit. The problem is in putting the extra wires somewhere, switches, and linkages. Furthermore, it has to be done in such a way that things can be placed in order so that everything will fit. It is not impossible to do, but it does take some thought and planning. If you don't feel up to it, make the fuselage bigger. You will lose some glide slope, however. The plans show just the plywood box. You can choose to leave the fuselage that way if you want, but if you do, you should make the entire thing out of 1/8" plywood . . . aircraft ply, not light ply. Remember that you want as much weight around the C.G. as you can get. To round the fuselage, just laminate 3/8" balsa and start carving. Make the nose block out of oak or at least use pine, but don't use balsa. Small nose blocks get mashed. Once the basic fuselage is constructed, assemble the ship and try to determine about how much weight you can add to the nose. Pour molten lead or lead shot into the nose, and resin it in place. If you add too much, you can drill some of it out later or add lead to the tail.

The tow hook pivots on a clevis from a Du-Bro Swiv-Link. The hook itself is made from just ordinary pushrod wire. A lock nut is used to prevent the wire from turning. A nylon elevator exit guide is used in the floor to allow motion of the hook. It looks flimsy, but it's not. The elevator linkage is a modified flap

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WINDFREAK
Designed By : Roger Sanders

TYPE AIRCRAFT
R/C Flying Wing Sailplane

WINGSPAN
100 Inches

WING CHORD
14" (Avg.)

TOTAL WING AREA
1400 Sq. In. Total
940 Sq. In. Effective Area

WING LOCATION
Shoulder Wing

AIRFOIL
Flat Bottom Reflexed
6.4% Total Thickness
9% Effective Thickness

WING PLANFORM
Constant Chord
POLYHEDRAL
See Text

OVERALL FUSELAGE LENGTH
36" (included rudder)

RADIO COMPARTMENT AREA
(L) 15" x (W) 7.8" x (H) 2"

VERTICAL FIN HEIGHT
12 Inches

VERTICAL FIN WIDTH (incl. rudder)
7" (Avg.)

REC. NO. OF CHANNELS
2

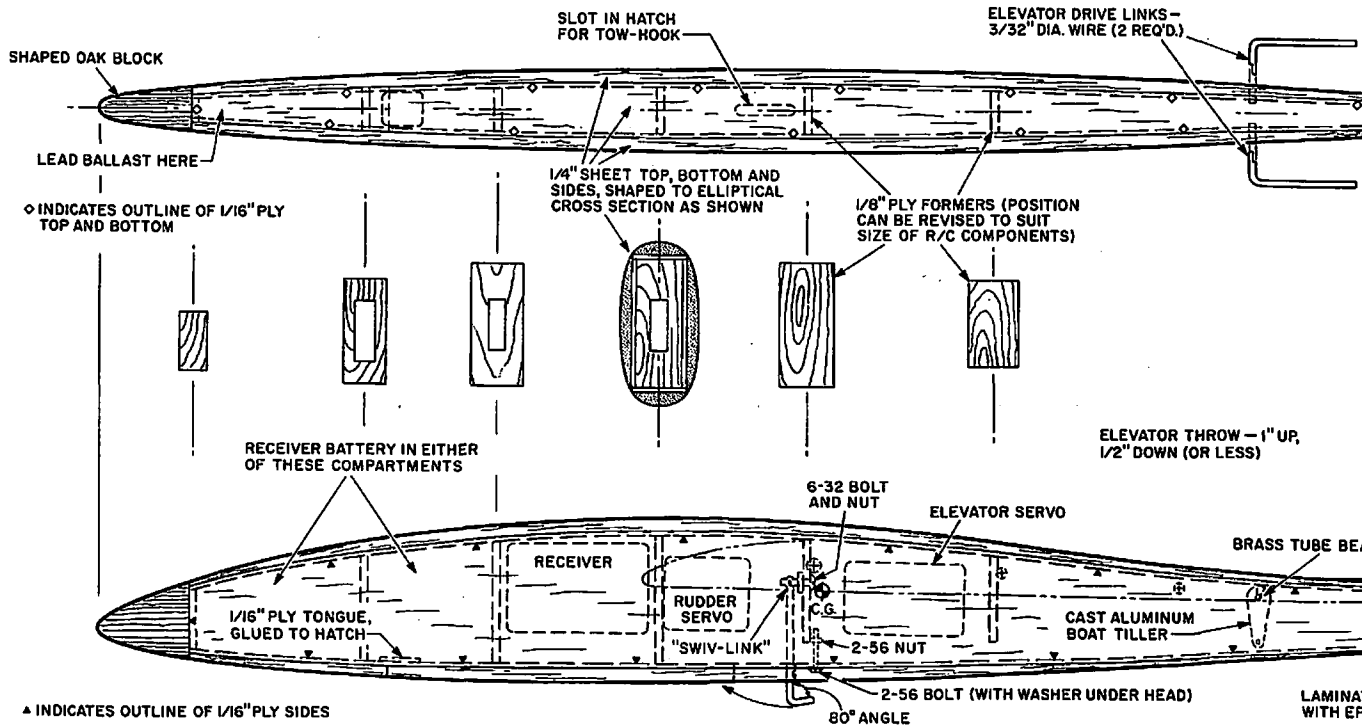
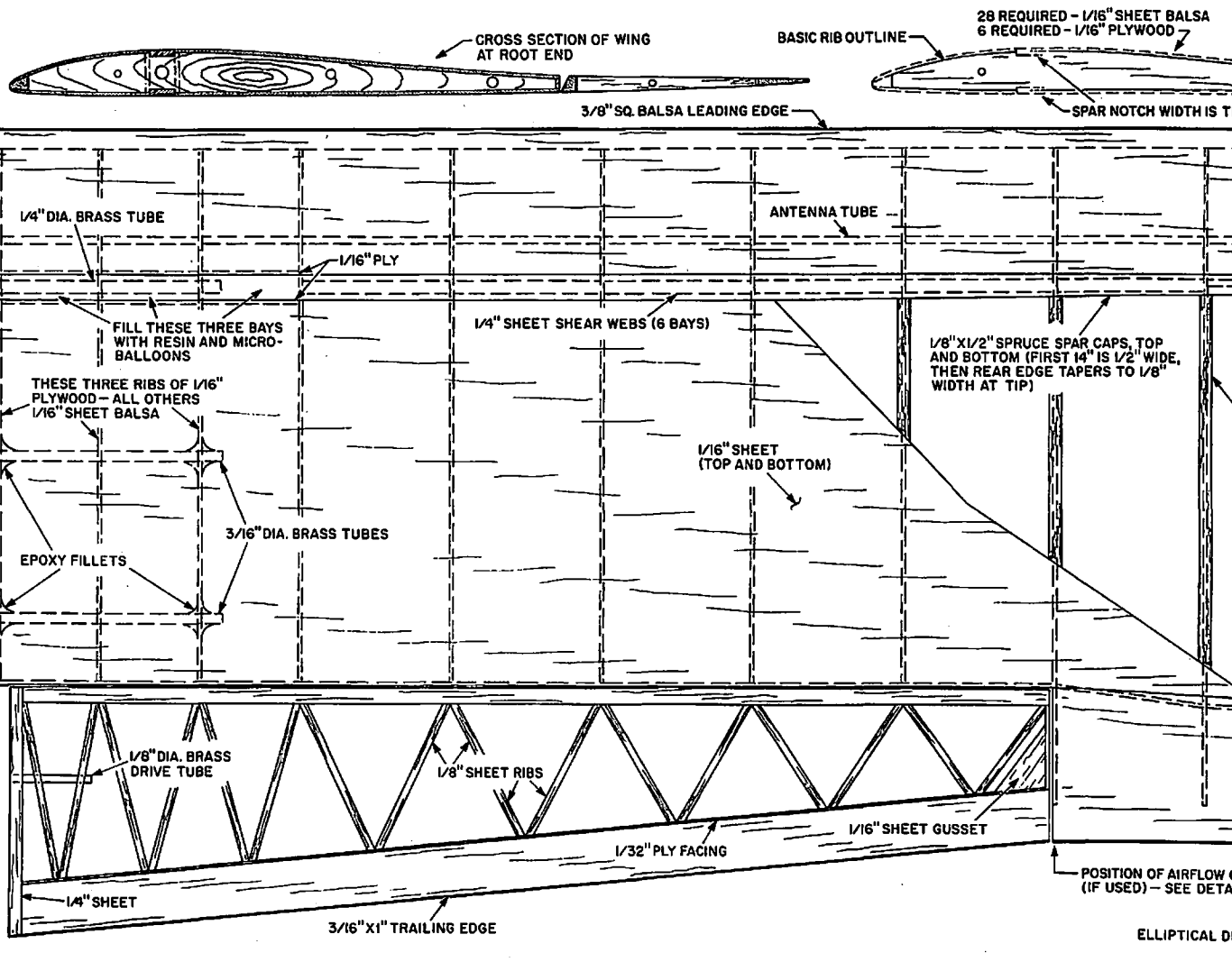
CONTROL FUNCTIONS
Rudder and Elevator

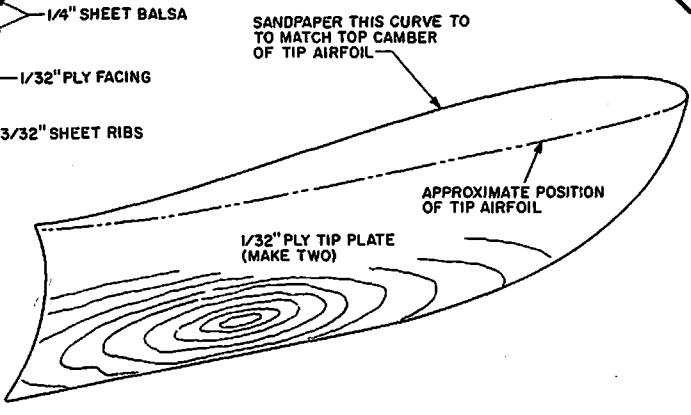
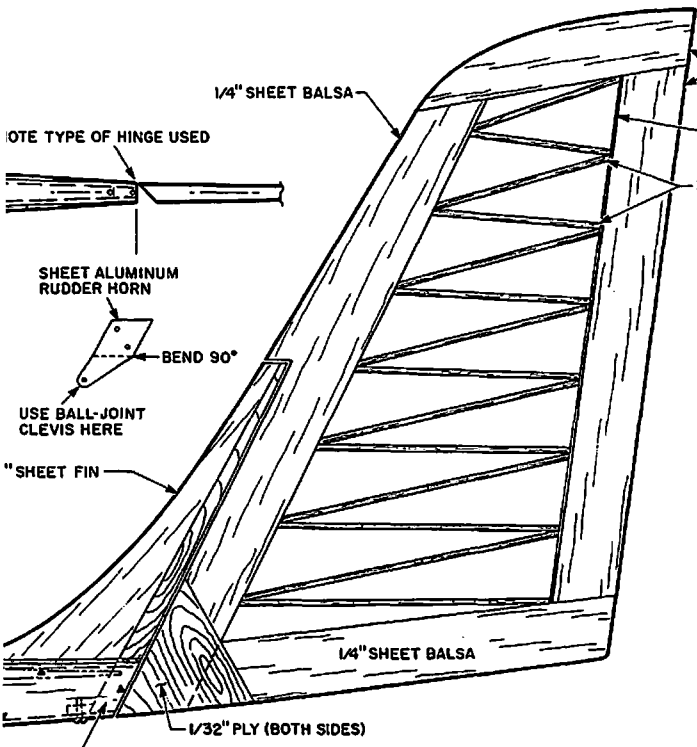
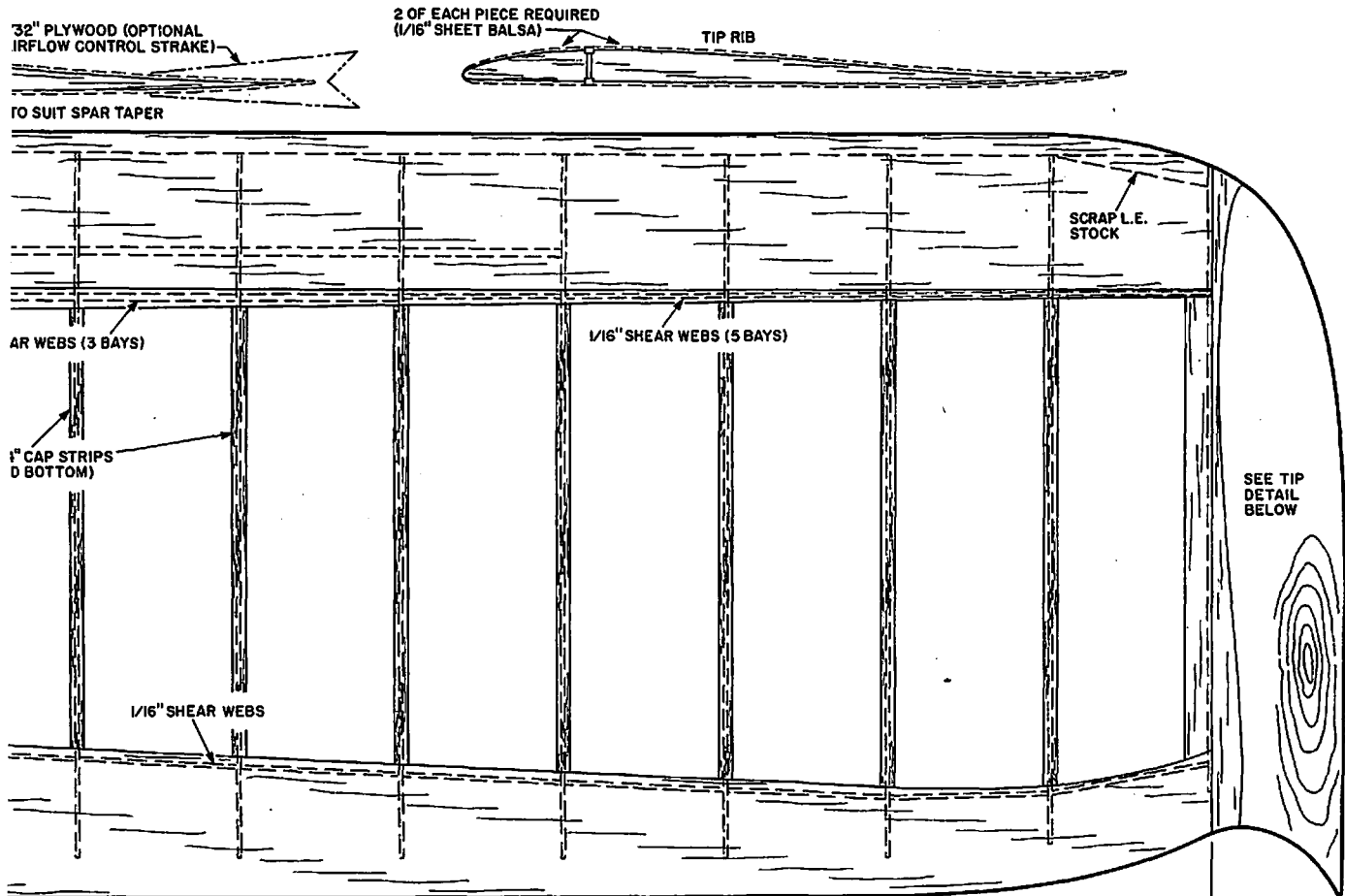
BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa, Ply & Oak
Wing	Balsa, Ply & Spruce
Empennage	Balsa & Ply
Wt. Ready-To-Fly	48 Ounces
Wing Loading	4.9 Oz/Sq. Ft.
	(7.3 Oz./Sq. Ft. Effective Loading)

hold, so I stick them to the glass with double sided tape and then I can sand them. The T.E. can be sanded with great precision if it is placed about 1/4" from the edge of the glass. Sand with a sanding block all the way to the glass and you will have a perfectly uniform and thin T.E.

I recommend that the ship be covered with MonoKote. The other coverings are





NOTE: ALL WOOD IS BALSAs UNLESS OTHERWISE STATED

3 PIECES OF 1/8" PLYWOOD OR RUDDER POST

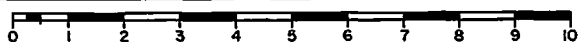
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WINDFREAK

DESIGNED BY ROGER SANDERS

DRAWN BY PAUL PLECAN



linkage made by Dodgson Designs (2904 so., West Camano Drive, Camano Island, Wash. 98292 — about \$5.00). This is cut apart and the two ends are filed so that they fit together snugly inside a brass tube. A cast aluminum boat tiller has a couple of pieces of brass tubing telescoped inside of it so that it fits around this joint snugly. The brass tubing is drilled so that the set screw can extend through them. The piece of brass that is around the linkage is not drilled, however. The set screw then is placed solidly against the inner brass tubing after the two linkages are set into place.

You will have to make up a control horn for the rudder because no commercial horns extend far enough forward to come up to the hinge line. If you do not have the connection at the hinge line, you will have differential rudder throw.

You really must have differential in your elevator, however. I make up my own servo arms from blank discs since the servo arm offset really should be about 60 degrees, not just 45 degrees as is typical standard aileron differential servo arms. Use ball links where indicated. The linkages to your servo **must not have lash** in them when dealing with large surfaces that are fully flying in responsive aircraft! Under absolutely no circumstances should plastic tubing pushrods be used! It is advisable to put in new gear trains in your servos and replace the upper servo case as well so the servo will be as tight as possible. Always clean the servo pots before installing them in a new aircraft. If a servo turns the wrong way, take it apart, reverse the wires to the motor and to the ends of the servo pot, re-center the servo by rotating the pot as needed, and clean it. You should then be able to use it for a long time with good reliability.

I always install new nicads in each plane I build. It is cheap insurance. In addition, I have to take the battery pack apart to make it fit and the installation is semi-permanent. Most of today's radios simply run on 4 cells in series, and there is no magic to wiring them up. I also like to be able to charge the batteries without removing the hatch since I often fast charge on the field after an hour or so of flight time. Since the wall of the rounded fuselage is thick, no conventional jack will mount into it, therefore, I use a couple of pieces of brass tubing for contacts and stick telescoping sized brass tubing inside of them for charging. When the ship is assembled the wings cover the charging tube holes (drag, remember?). I refuse to use slide switches in my radios. They are unreliable. They are cheap, and they are too big. Have you ever seen a slide switch in a full scale aircraft or in medical instrumentation? Of course not, they are too unreliable. Use miniature toggle switches. If you drill a small hole in the

end you can operate it with a wire that sticks through the side of the ship (low drag). The switch can be epoxied in place, no need to mount it with a nut.

The wing rods may all be 3/16" music wire. I used a 7/32" one in the front for increased strength, but it certainly isn't necessary. You may get the 7/32" rod from Airtronics, it is the same one used in the Grand Esprit.

When hooking up the differential elevator control, you will find that a standard clevis will bind against the servo shaft. To get around this, a different linkage must be used. Although there are drive pins that are threaded and snap into the top of a servo arm, I don't like these because they are only driving the rod on one side of the servo arm. I prefer to take a Du-Bro Solder Link and simply solder the pushrod to the side of the clevis and turn the clevis around backwards. With some careful positioning and wire bending, you can get the necessary clearance (see photos). This is a very rigid attachment.

For pushrods, I use the best quality double butted bicycle spokes because they are tapered so that standard brass tubing can be run over them. The brass can be used as a guide or bearing. The hard chrome plating on these spokes will wear a very long time against the brass. A tiny drop of oil is desirable. Guides must be used for rigid linkages. A similar tapered rod is now available from hobby dealers, but the price is absurd compared to a spoke. When soldering anything to these spokes, be sure to sand through all the plating. There is three layers: Chrome, nickel, and copper. You must solder to bare steel for a solid joint.

A problem can sometimes appear when thick wing fillets made of resin and micro-balloons are used - - - the wing rods can crack the fillet. To avoid this, drill out the wing rod holes in the fillet so the rods do not fit tightly. Finally, spoilers will make the ship much easier to land. Feel free to use them, but do not use them on the top of the wing alone. Either put them only on the bottom, or top and bottom, but not the top alone. The reason for this is that top spoilers will cause the ship to sharply pitch down when they are actuated. This is true with any ship, but conventional designs with their long leverage arm prevent things from getting out of hand. In my opinion, bottom spoilers are superior to top ones, but top and bottom are the best yet. The ship will simply slow down and sink without changing pitch when top and bottom are used together.

The radio antenna is run down the inner section of a NyRod which is mounted in the wing. When using this type of antenna system, you will probably find it necessary to have a Teflon insulated antenna wire, since vinyl insulation is reluctant to be slipped down 3' of plastic tubing without

grabbing and crimping. Teflon wire is much stiffer and slicker. If your present antenna wire is not suitable (try it first), then simply cut some Teflon wire to the identical length and change the wire. If the length is the same, it will not change your radio tune. Be sure to put a few inches of Teflon wire into the antenna hole between the wing and fuselage when making the wing fillet so that the holes stay open. The resin will not stick to the Teflon. When the resin is cured, simply remove the short piece of wire and a perfect fit between the fuselage and wing will be available for your receiver's antenna.

TRIMMING AND FLYING

Trimming is very important in this design as its crispness will show up trim errors in exciting fashion! The C.G. is critical. The correct point will be found to range across the width of the spar. Unlike conventional ships, you cannot fly this one nose heavy since there is not enough elevator force to overcome the nose heavy condition and very high speeds will result. Therefore, do not allow the C.G. to range ahead of the spar. The ship will be completely pitch unstable if the C.G. is much behind the spar. While conventional ships can be flown (with great difficulty) when the C.G. is too far aft, this design has such rapid pitch response that it will be unflyable in this condition. I like a rearward C.G. position and find that about 1/8" ahead of the rear edge of the spar to be ideal. For initial testing, the center of the spar would be a good place to start.

The wings **absolutely** must be free from warps! If you built the wings flat or with polyhedral, then simply lay the various sections on a flat surface (I use the 1/4" plate glass) and look closely. If you built the elliptical version, the situation becomes more difficult. The technique I use is to lay the wings together with the trailing edges facing each other on a flat surface. I weight the wings at about mid-span where they start to curve upward. A book works well for weight, place it on the spar. I then examine the root to see that the flat section is parallel with the flat surface. It almost surely will be if you build the wings true to begin with because the inner section of the wing is extremely stiff. If it is not, work over the MonoKote until it is true. The wing is so stiff that you will have a tough time warping it much with MonoKote, but slight corrections can be made. To set up the tips, you will need a yardstick with a **straight** edge. The wings should have identical curves in them so all that is necessary is to lay the yardstick across the bottoms of both wings and observe the non-reflexed sections. The flat parts of both wings should be parallel to the yardstick if the wings are perfectly true. I initially left the wings in this form and did not add washout since Ken Bates indicated that

washout would destabilize the wing. However, I found I had marked tip stall problems in tight turns. This was a bit unusual in its character, in that the ship would tighten up and spiral dive when large amounts of up elevator was added. It would not produce nice tight flat turns. I then added about 3/16" of washout to each wing tip. The results of the washout were amazing. It is hard to believe what a little bit of the right kind of warp will do. Turns were then extremely tight and flat. No adverse affect was noted on stability, therefore, I consider 3/16" of washout to be essential. Note that the 3/16" is measured at the 10" chord point, not at the end of the reflex. It is, of course, measured between the yardstick and the wing. Both wings must be identical. I washed out about the last 20" of the wing. If you built the wings identically and de-warped them correctly, the trailing edges should very closely follow each other along the full length of the wing curvature. Don't forget to de-warp the elevators. The tops of these should be flat. Remember to de-warp the rudder as well. Re-check all structures after testing and also again in one month.

Assemble the ship and adjust the radio and linkages so that you have about 30 degrees of rudder throw. Actually 20 degrees is plenty but you never know when you might want a little extra. The elevator should be adjusted so that the outboard tip matches the fixed re-curve on the outer section of wing. If your C.G. is right, this setting will produce a slow, flat glide and probably ideal stability and pitch response. However, I realize that seasoned pilots may prefer the C.G. at a different location. If the C.G. is further forward, excessive up elevator will result in increased drag which should be avoided. More aft positions are okay, but the margin of stability and trim control range gets very narrow.

There is a way to safely test glide a glider without ever letting go of it, and I highly recommend it. Simply run with the ship and carefully note whether it wants to lift from your hand, sink, or stay neutral. You should not exceed its normal airspeed when doing this, of course, but since normal airspeed is probably in the range of 15 to 20 mph, this should not be problem unless the wind is blowing hard. What you are looking for is a ship that tends to remain neutral in your hand. If it tends to lift, I can guarantee you it will balloon up and try to stall. It is a bit more difficult to determine if the ship is trying to sink, and you may find that you can run and release it for just a moment to see if it wants to stay where you left it or if it wants to dive. This is really easier to do than it sounds. Once you have got the ship so it is neutral by moving the C.G. or elevator or both, you can go ahead and toss it with confidence. You must have airspeed, so give it a good shove! Be

ready on the controls as it will tend to climb a bit and you will want to prevent a stall. However, that is far preferable than having the trim off so that it won't fly slowly and it immediately hits the ground. Always maintain adequate airspeed.

Winching is easy. The only way to get into trouble is if you do not use enough up elevator! If you launch it at middle trim, it will go extremely fast and not climb and it gets a bit hairy. It works much better to launch at full up trim and even add a bit of up stick partially up the line. It is nice and stable on tow and presents no problems. Be sure that the tow hook is bent enough so that it is slightly more than 90 degrees so that the tow ring will not slip off!

Landings tend to bend the hook because it hangs out quite a bit, and rather than straightening it, it works better to leave it bent. It will settle in one position and won't bend any more and all you have to do is make sure the hook is slightly more than 90 degrees so the tow ring won't slip off. No further adjustment will be necessary.

When flying in wind, I suggest that you do not ballast until you have tried the performance of the ship without ballast. It really will go quite fast with a little down trim. If you do want to ballast, you have a genuine problem as to where to put it since there is no room inside. There are a couple of ways around this. First, you can build in some ballast boxes made of 1/8" ply at the C.G. in the fuselage. This box should be sealed with resin or epoxy on the inside, and it should be closed with a large nylon wing hold-down bolt. This box can then be filled with liquid mercury. Mercury is heavier than lead. In fact, two tablespoons of mercury weigh over a pound, therefore, only very small ballast boxes are needed. Mercury eats most other metals, so be sure that your wing rods are coated with resin if any of them extend through the ballast box.

Ballast boxes can be built into the wings that will accept the usual lead rods or lead shot. I really don't like that much because the weight can burst through a wing in really rough landings. Furthermore, there really isn't much room in the wings because they are so thin. Probably the best way to add ballast is to take 1/4" sheet lead about 2" wide and 4" long and tape it to the top of the wing with some masking tape. It looks ugly, but the tape streamlines it somewhat and the lead will fly free in a bad landing. The lead should be curved to the contour of the wing and be placed at, or just slightly ahead of, the C.G. This type of lead can be obtained from X-ray supply houses. They are commonly used to counterbalance X-ray tubes.

When landing, you will find that coming in high and hot is not very satisfactory because the ship just keeps going and is hard to get slowed down

and stopped. I find that it works better to come in at medium speed and then do one or two quick stalls to slow the ship just before landing. The stall lasts such a short time and you can recover so quickly that you can still maintain excellent directional control, but the stall causes gross amounts of drag which brings the ship's speed down in a hurry. The ship does not have to be flown as fast on landing approach as a conventional ship, because you do not need as high an airspeed to control it. You can get through ground turbulence very nicely at medium speeds.

When coming down from killer thermals, you may find that spinning the ship doesn't result in altitude loss as rapidly as you might wish. Inverted flight is probably the best way, but this is difficult to do if you are only a speck in the sky. I have come down in 20 to 30 degree terminal velocity dives, but the speeds obtained under these conditions can only be described as awesome. There is simply no question that you can lose in excess of 2000 feet per minute under these conditions, however.

For those of you who think I might be exaggerating about the abilities of this ship to hang together under extremely high speed conditions, I have a story to relate: One time I was in very strong lift at extremely high altitude and was rapidly losing sight of the ship. I attempted to go inverted, but as the ship came around, I lost sight of it. I asked one of the observers to tell me what it was doing, and he reported that the ship was doing large outside loops at very high speed. As I had neutralized the controls when I lost sight of it, I added some up elevator at this point and again neutralized when I thought I should have leveled out. Apparently the ship must have been at the bottom of an outside loop and inverted when I added the up, because when the ship was again spotted several seconds later, it was in a vertical dive and going at incredible speed. I finally spotted the ship myself a few seconds later, and by this time everybody was yelling to pull up. All the while the ship continued to accelerate at fearsome velocity. I had the sense to very gently pull up elevator to recover from this dive, but that ate up several more seconds, and about the time I had pulled up 45 degrees, I heard, "You lost something!" Expecting to see the ship blow apart at any moment I continued my gentle pull out, and finally got it slowed down and flying under control again. I had come down from nearly out of sight to about usual launch height in a matter of a few seconds. One of the observers was a power pattern flyer, and he flatly stated that he had had his .60 powered pattern ship in full power terminal velocity dives and that the Windfreak would have smoked right by it at the speed it had been going.

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First Annual SOUTHWEST JUMBO RC FLY-IN

By Chuck Cunningham

Photos By Jerry Smith



All attendee's (hopefully) standing in the rain. Angelo Toasti - most distant contestant from Kansas City, Missouri.

The hot dry Texas skies were shattered by the throaty sounds of 55 jumbo RC aircraft assembled at Thunderbird Field, Fort Worth, Texas, for the First Annual Jumbo RC Fly-In. Entrants came from all over the Southwestern United States, and interested spectators came from as far away as Georgia, California, and Mexico City to participate in, and witness, this super fun fly-in.

The sight and sounds of the big birds was one to remember, and the several thousand spectators who lined the road near the field on Saturday were treated to modeling sights that were unheard of just a short time ago. You really cannot begin to appreciate the big model until you see so many of them, both on the ground and in the air. Early in the morning a lone modeler was flying a standard size Ugly Stick (before registration started) and it looked absolutely tiny. Even my Lazy Ace, which is a pretty good sized aircraft just shrunk when placed along side many of the entrant's aircraft.

The entrants from Tulsa, representing the Tulsa Glue Dobbers really stole the entire show. They appear to be far ahead of the rest of us when it comes to getting the most out of the biggies. Picture three double size Ugly Sticks, each sporting a 10' wing span, powered by Quadra engines, making a fly-by down the runway, then turning around and making another pass just about five feet off of the ground, inverted. These dainty birds only tipped the scales at 35 lbs. each. They are fully aerobatic. Full plywood sides and foam wings added just a bit to the overall weight.

Now, look at the five Nosen Gere Sport bipes, powered by several different kinds of engines. One with an

engine lifted directly from a chain saw, one with a prop drive unit, one with a Jenkins V-drive twin .60 engine, and several with Quadra engines. Five Lazy Aces also made their appearance, powered with .61 engines, and each flying very nicely.

How about Terry Miller's Sweet Sixteen, 16' span of foam flying airplane, powered by a Fox .78. A fantastic sight to see in the air; it even flew backwards in the gentle winds.

Nosen scale kits seemed to be predominate at the Fly-In, and each flew quite well. My latest design, a semi-scale Eindecker completed and test flown just before the fly-in (designed and built in 8 days) pleased me very much as it flew very well on a Webra .91. I plan to use it as a test bed for other large engines also. The pilot, a very large plastic dog's head drew just about as much attention as did the 9' red and white airplane.



The Fly-In was a low key event, with no pressure on anyone to fly or to do any kind of special stunting, but each pilot seemed to be anxious to grab as much air space as he could. Strict frequency control was maintained, and the few crashes that did manage to occur were the fault of the pilot/builder rather than from any outside cause.

On Saturday evening, a simple "buy your own meal" at a cafeteria was held; and then afterwards all who wished to come were invited to my home to partake of a cold keg of beer. During the day, on Saturday, the entrants were treated to free Texas Pride beer, courtesy of the Pearl Brewing Company of San Antonio, Texas. The free drinks were very much needed as Texas and the entire central part of the Nation was undergoing a drought and heat wave at this time. Temperatures were 101 hot degrees, and in Texas 101 degrees is generally coupled with much higher humidity than the temps in the desert states. It was hot, and dry, and the beer and soft drinks were welcome.

Flying started at about 8:00 a.m. on Saturday and wound up at 4:30 p.m., then began again Sunday morning. I had been announcing all day that at 9:30 a.m. Sunday morning we would be presenting a surprise that no one should miss. Everyone was out early Sunday for the surprise, along with about 500 early morning, thrilled spectators. The planned surprise was to be a fly-by of a full size Pitts Bipe, and a Bucker Jungmeister, both putting on an aerobatic display, complete with smoke, followed by a Stagger Wing Beech, a Curtis Robin, and 3/4 size P-51, and two other restored antique aircraft. The real surprise was that the 45 day long Texas

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Don Apostolico's, from Broken Arrow, Okla., Nosen Cessna 310 twin Webra .61's, 11/8 props. All up weight 28 lbs. Wing span 10' 2". Covering and finish - MonoKote and Super Poxyl enamel. Pro-line retracts - gear drilled out to accept 3/16 wire struts - Sonic cylinders. 8 servos and flaps. Looked super in the air. Flew with engine cowls removed. Won Most Impressive and Outstanding trophy.



Richard Helm from Owasso, Oklahoma - Nosen Mister Mulligan. Powered by Suevia, 20/6 prop, all up weight 18 lbs., wing span 9', covering is Permagloss Coverite. Aircraft had total of 30 flights. Only modification was larger wing struts. Won Best Scale award. Looked great in the air - especially in slow flight.



T.G. McNeely (45) from Oklahoma City, Oklahoma. Original aircraft called "Bee Boo" or "Big Bird". Powered with a Quadra 18/6 prop (air flow), weight 23 lbs., wing span 97", covered with Coverite. Finished with acrylic enamel. Unique features include loud speaker aboard and speaks to crowd over 2M-FM. Pulls banners, drops toilet paper (up to 3 rolls one at a time). Drops paratroopers - up to 6 on command or 1 at a time. Built of cardboard and wall paneling. WOW!



Clipped wing Nosen Cub by Wendell Roberts and Terry Dench (43 & 29) from Little Rock, Arkansas. Quadra powered 16/6 prop, weight 17 lbs., wing span 7' 10". Covered with Coverite and finished with K & B Super Poxyl. Completely detailed after actual full size aircraft hangared at Batesville, Arkansas. Excellent interior detail. Flew well.



Hawker Fury by Steve Ponder of Fort Worth, Texas. Aircraft incomplete - no engine or radio gear. Magnificent detail and workmanship.



Mr. C. cranking her up. His latest 7 day wonder. (Wonder it flys!) Nice smooth landing approach.



"Super Stick" a design effort by Morrall and Pringle of Tulsa, Oklahoma. Members of Tulsa Glue Dobbers. Aircraft powered by Quadra, 18/6 prop, weight 35 lbs., wing span 8' 6" (2400 sq. in.). A Phil Kraft Ugly Stick enlarged 1.7 times. 1/8" ply and foam construction. Balsa tail construction trainer for Quadra. Morrall and Pringle plan to kit this bird with landing gear kit, wing kit and fuse kit available. Plans will be available in 3 months. Kit priced between \$150.00 and \$175.00.



Nosen Gere Bipe by Bill Nickell. Power Max .80 with Du-Bro prop drive. Weight 24 lbs., wing span 8'. Covered with Permagloss. Hand carved pilot (foam). Two servos on elevator. Aileron and rudder mixed for coordinated turns. Flew superb!



Nosen Gere Sport, built by Garland South (55) from Cleveland, Oklahoma. Powered by modified McCullen chain saw engine. 18/8 prop, weight 25 lbs., wing span 96". Covered with Sky Loft and MonoKote. Modified his own engine. Tail wheel is Tatone nose gear for .19 size plane.



Nosen Gere Sport, built by Kenny Jenkins (Lazy Ace in near ground) of Jenkins R/C Aircraft Inc., North Kansas City, Missouri. Powered by special engine drive - Jenkins V power, two Kraft .61's mounted to a reducer 1.9:1 ratio turning a 24/10 prop at 6,000. Jenkins plans to market this drive, with engines, in the near future. Engine sounded like a twin when opened-up.

drought broke at 9:30 Sunday morning and the rain came down in buckets. It kept up until 1:00 p.m. and virtually drowned out the second day of the Fly-In.

Due to the distance that most entrants and interested spectators had traveled to attend the Jumbo Fly-In, it was planned to wind up all of the official proceedings at noon on Sunday so those who wished could start the long drive home. As it worked out, we did pass out the trophies, and all of the "goodies" that had been purchased as prizes, along with two Sweet Sixteen kits donated by Terry Miller, and most sloshed their way into their cars, vans, and motor homes for the return drive. That afternoon the sun peeked out and another couple of thousand spectators wandered out to see the biggies, but most had gone. Despite the much needed rain, everyone had a super time.

The trophy for the most outstanding airplane was won by Don Apostolico's Nosen Cessna 310 powered by twin Webra .61 engines which yanked this 28 lb. bird along like crazy. Don's specialty with this aircraft is making a long diving approach at the runway, then twisting over into knife edge flight about 4' off of the ground, and then pulling up after about 200' of this. Beautiful sight. A well deserved win. Richard Helm with a Nosen Mr. Mulligan, powered by Suevia, a beautiful looking and flying airplane took the best scale trophy. Pete Morrall made off with the best non-scale award with his double size Ugly Stick, though really the award should have been divided between Pete, Wesley Duncan and George Pringle, who all collaborated in bringing the big Sticks to life. All of the winners are from Tulsa, Oklahoma, or towns, nearby and are members of the Tulsa Glue Dobbers. It

seemed that at least fifty of the Dobbers made the trip to Fort Worth to show off, and show off they did.

Angelo Tosti, from Kansas City, Missouri, won the trophy for coming the longest distance. Tosti was flying a Lazy Ace with Jenkins V-Power twin .40 engines and a Gere Sport with Jenkins V-Power twin .60 engines. Both flew simply great, and the sound of the coupled twins is like no other that I have heard.

One of the most interesting airplanes to show up was the Big Bird, flown by T.J. McNeely from Oklahoma City. This plane sported Quadra power, with twin booms supporting the tail surfaces. Nestled neatly at the rear of the fuselage was a CB radio and loud speaker. Unwary spectators were treated to the sound of a talking aircraft both on the ground and in the air. T.J. can remove

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UNDERSTANDING AND USING TRIM



Stick arrangement shown for Mode II

By Shu W. Gee

Most all full size airplanes have trim controls in the cockpit. Prior to take-off, aileron and rudder trim are set to zero, and elevator trim is set for take-off which is not necessarily zero. After take-off, the elevator trim is adjusted for climb; at cruise, the elevator trim is again adjusted. The rudder trim is adjusted so the airplane flies straight by centering the ball on the turn and bank indicator, and the aileron trim is adjusted so that the wings stay level. During approach for landing, the elevator trim is adjusted for approach speed. If a running take-off is to be made after landing, the elevator trim is reset for take-off prior to advancing the throttle for take-off. As you can see, the elevator trim control is quite busy during flight, and the rudder and aileron trim controls are not quite so. Then why should RC model flying be different?

Many modelers do not have any aeronautical background, nor do they have the benefit of full size airplane flight experience. For those modelers, an explanation of how an airplane behaves in flight, and the effects of the trim controls may be helpful. This article explains how trim varies in flight, and how the author adjusts and uses the trim controls on his models. Although many modelers can and do fly without touching the trim controls on the transmitter, the proficient use of these controls can result in smoother, easier, more precise control of the model, and a greater satisfaction with one's own performance.

An airplane is **trimmed** for straight and level flight when you can take your hands off of the transmitter controls and

ABOUT THE AUTHOR

Shu W. Gee taught Army Primary flying, which included aerobatics in Stearman's, PT 19's, and PT 23's. He was an airline captain for 10 years and he is presently an aerospace engineer with the National Aeronautics and Space Administration. He is a scratch-builder and flyer of R/C models.

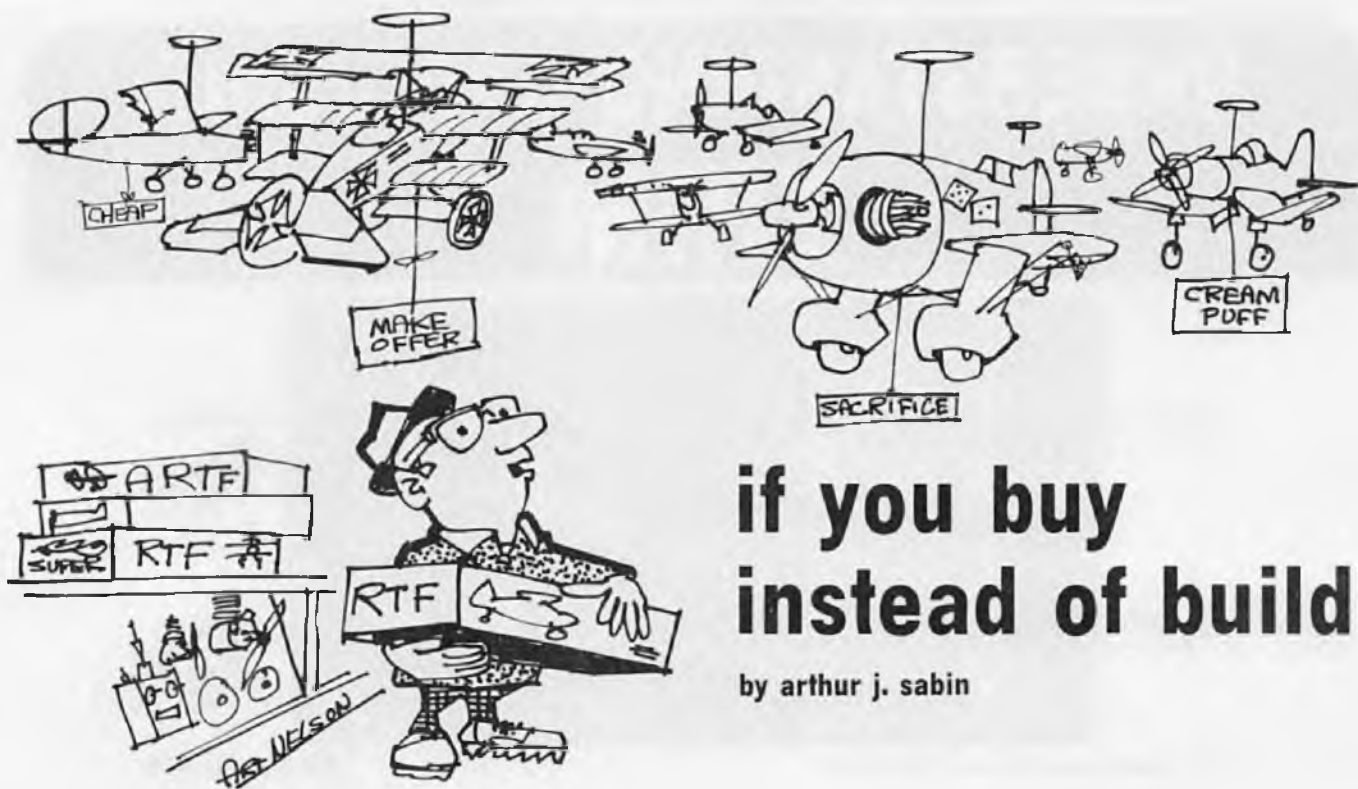
the airplane continues to fly straight and level. The trim controls on the transmitter, or the control surfaces on the airplane, may or may not be at their zero positions.

An airplane in steady flight will fly at a constant angle of attack and a constant speed for a given elevator position. If you want to go faster, you open the throttle and the airplane will stabilize at a new speed; but this also requires a new elevator position to maintain level flight. These elevator position changes can be accommodated by the trim control on the transmitter. Thus, in the pitch axis, one might perceive that the airplane speed is dictated by the elevator trim setting, and the throttle setting determines whether you climb, fly level, or descend. In the roll and yaw axis, trim changes are caused by engine effects; these changes are generally small, unless there is a warp in a flying surface, in which case the trim changes become severe with speed. It should also be mentioned that even in the case of true flying surfaces, a mis-trim condition (that is, a slight offset of the rudder or aileron is compensated for by the other control) also causes severe trim changes with

speed. It is because of these constantly changing trim requirements that modelers have resorted to engine thrust line offset and symmetrical airfoils to counter these effects. Trim changes with speed can be minimized through design and construction — but they cannot be completely eliminated.

Most airplanes are designed with wing stabilizer angles such that the elevator is near zero during cruise. Unless the airplane is grossly underpowered, the approach speed for landing is slower than cruise and, hence, a different trim setting is required. On my models, once the full throw adjustments are made in pitch, I adjust the trim so that the model flies at the best approach speed when the trim control is full up and hands off the pitch control. This way I can always set the approach speed which makes the flare, float, and landing consistent and precise. The elevator trim is near zero for take-off, climb, and cruise, but always full up for approach and landing. In case it was not clear, I do not hold back pressure on the stick during approach, but move the stick as required for maneuvering and landing. Throttle is used to adjust the rate or angle of descent. The control stick is used for maneuvering, and any constant pressure or constant displacement of the stick is taken up with the trim controls. In all flying, it is good practice to get on the trim controls as often as necessary. The airplane should always be trimmed for hands off flight.

So get out there and start using those trim controls; that's what they're for! If you try it, you might like it — and you might even see an improvement in your flying. □



if you buy instead of build

by arthur j. sabin

Ask the typical R/C enthusiast which he prefers, building or flying and most often the response will be both. Nothing beats the creative satisfaction you get from making a kit or scratch-built component come "alive." On the other hand, who can argue with the pleasures experienced when **your** bird invades the sky, roaring off for the adventure we call radio controlled flight. No doubt about it, the RC'er has a dual personality . . . he can express himself in the creative as well as the participatory aspects of this sport. Perhaps that's why R/C modeling is so appealing to such a variety of people and talents.

Let's ask an honest question. Is there enough in the way of satisfaction, excitement and pride in R/C for those who can't or won't build their own flying craft? For many, the answer **must** be yes, because, for one reason or another, they can't or don't build their own. Perhaps it's the press of time; maybe they have had trouble coping with the loss of a plane after all that hard work; or it's just that the fun in R/C for them is in the flying, not the building. Most modelers, I believe, go through stages where flying is "where it's at" and then find that they get much more satisfaction out of building some long dreamed of project and are either fearful of flying or find greater satisfaction in simply the construction phase.

We should appreciate and not deprecate those who prefer either phase of our avocation without participation in the other. Consider the fact that while the title of this magazine is "R/C Modeler", both the writers and readers have the modeling as well as the



ABOUT THE AUTHOR

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operating aspect in mind. There is no need to call it "R/C Modeler and Pilot"; it's understood that both are involved, not necessarily, though most frequently, in the same person.

If you fall into that group of R/C enthusiasts who prefer to fly and not build for any reason that satisfies you, there is no shame, nor are you a "second class" R/C citizen; you've just

made a conscious choice as to which phase of the sport, at this time, you prefer.

Assuming you are a Flying rather than Building RC'er, or that you are, for any reason, interested in acquiring a built-up model, there are a number of considerations which deserve discussion. Hopefully, you'll get some pointers that will be of real value to you in finding the already built model that's right for you.

Let's begin with the "RTF" or "ARTF" type planes; for the uninitiated, these letters translate into "Ready To Fly" and "Almost Ready To Fly" aircraft put out by commercial enterprises. MRC and others have a line of planes where, within an hour or so after opening the box, you're in the sky. Basically aimed at the beginning pilot or the one who wants a plane and radio and engine in one package all at one time, they have helped initiate many into the R/C fraternity. The Lanier and Pilot lines offer the largest selection of quickly put together planes where you supply and install all components. Again, the primary assist is for the novice who doesn't have the time or talent to build or who (wisely) would rather not invest months of love on a balsa kit when their flying skills don't deserve it.

Assuming you don't want a plastic construction plane or that your flying skills are sharp enough to handle a variety of aircraft, what alternatives do you have for obtaining an already-built aircraft? First you have to decide how far you want that plane built; do you want just the basic shell? Do you want it covered? Engine installed? Radio gear, too? Do you have a specific plane or

built-up kit in mind or are you willing to shop around and see what's offered? Once you have answered these questions and you have a price range in mind, here are ideas on finding that already-built aircraft.

(1) Your local hobby shop. Frequently customers will trade in planes or ask the store to sell a plane where the builder is tired of the model or prefers the money or merchandise. My local mecca, Stanton's Hobby Shop, has a ceiling full of models all the time, most of which are for sale. Also, talk to the people at your hobby shop and ask whether they know of anyone who likes to build and would be interested in building for you. Sometimes hobby shops have bulletin boards for selling and swapping; check this out.

(2) Your local club. This is a great source for ready-builts. Swaps, trades, outright sale are all possibilities. Is there a newsletter; if so, put your "ad" in it, announcing your desire for such and such type aircraft and for the person interested to contact you. Watch for "auction night" or "swap day" at yours or surrounding clubs and see what's available.

(3) An R/C show. Attending one or more of the R/C shows can combine the pleasure of seeing the displays, demonstrations and general fun with shopping for your ready-built. Frequently shows offer "swap-shops" or will find that modelers are willing to sell what they have brought along. Naturally, you'll pay more for that show display model because of the care it will exemplify; on the other hand some great deals have been made at the "swap-shop" areas.

(4) Advertise for builders — in your club bulletin, other club bulletins, on the announcement board in the local hobby shops or in magazines. Spread the word around at the field (and everywhere else you run into R/C people) and the bread you have put out on those waters may well yield just the person or plane you're looking for.

(5) There are a few commercial houses that specialize in building to order, although they typically have a limited number of ready-builts on hand. You'll find these places advertising in RCM and other magazines; check the classified ads too. They'll send you a price list and description.

But finding one or more sources for a ready-built is only part of the story. The balance of this article deals with the problems, possibilities and alternatives involved and makes some concrete suggestions based on personal experience. If you haven't guessed it, I'm one of those who buys most of my R/C models. Although I have probably built a dozen or so kits, early on I learned that I just didn't have the proper skills for its kind of good building that is demanded when you're flying pattern

ships, bipes or Stand-Off Scale planes. Thus, I'd like to share some of the experiences and the attendant insights I have gained over my buying-to-fly years.

Consider what you really want in the way of a plane with great care. I have found more success and satisfaction when I have a definite plane in mind, then simply looking around for what's available. Let's say (as it was for me) a Top-Flite P-47. Check your resource list from 1 to 5 as detailed above with that plane in mind. If no one has one at hand, then focus on finding someone to build for you.

Beyond selecting the plane (perhaps with a couple of alternatives), make up your mind as to just how far you want your builder to go. I have found that there are two points of construction that work best for me. One is to contract to have the plane roughed out. Specifically that means completing fuselage, wings, tail and hinging all surfaces and having all cowl and motor mount work for my engine. That leaves me to do the covering, detailing, engine and gear installation.

The other route is to contract for a completed plane. Now the problem is, what do we — me and my builder — mean by completion. I mean that the plane is to be "ready to fly", gear installed, all covering and detail completed, engine installed, really ready to fly. I work this out in the following way: I agree to supply the complete radio (don't forget mounting tray, switch harness and the like), the engine with prop and spinner, the kit, the wheels, and my favorite Super MonoKote covering in the colors I want. The builder does all the work, supply glues, using his tools and paying for the tank (pushrods where not supplied with the kit), clevises, hinges and all needed hardware. If you go this route, be certain you lay out everything that you know he will need. Create a list, checking off each item because that which you don't supply, you must reimburse the builder, who adds these costs to the basic labor charge. You may question the matter of the tank. I have found most builders like a certain brand of tank as well as "their" brand of engine mounting hardware, pushrods, glues and the like; it's best to have him buy and you pay.

Furthermore, and this somewhat controversial, I suggest that you and your builder agree that he or some special friend of his who is a super good R/C pilot fly the plane for a couple of test flights as part of the deal. Now of course you're going to ask, and who pays if it crashes? My response is, the contracting buyer does. Look at it this way; you are supplying the major "ingredients" and you are supposed to be certain they are right — the radio, the engine, the kit. Assuming the builder is as good as your judgement says he is,

he is going to build it right. He will also have enough of an investment of time and love not to want it to crash, so you can bet he will fly it with greatest care or find someone who will. Consider also the fact that if he doesn't do the trim flights, you have to, without the intimate knowledge of the plane gained from building it and that added information that every good builder carries — **he knows how he builds**, so he can sense what's happening a lot better than you can. Besides, if the engine or radio is defective and cause a loss, you would have lost the plane anyway. For what it's worth, I have gone this "you test fly it after you build it" route and it has worked out beautifully for both parties; the builder gets the pleasure of flying or watching the plane fly. You get the satisfaction of knowing it will fly, has flown, is trimmed out and is really ready to go.

I have found that my greatest success and satisfaction has come from having a plane built that I know intimately through having built one myself. In that way, I know what I want in better detail, such as small modifications of the kit (beef up the landing gear area) or the kind of detailing I want. Also be certain you have specified such building aspects as whether you want the charging cord in or mounted through the fuselage, as well as whether there will be flaps, etc.

It is recommended that you enter into a simple letter agreement about the building; putting it in writing avoids conflict or misunderstanding. Spell out what you supply, what the builder supplies, how long it is to take and what payment the builder is to receive. I have done this with every purchase and never had a disagreement.

Now how do you know this is the builder for you, or, put another way, how do you know which one is for you, because often you have more than one available. Here are some guidelines that may help:

(1) Get some idea of building experience; how many years and with what type of aircraft.

(2) If the builder has built that particular kit, you will more likely get a better product; in any event, get a builder who has successfully built and flown the kind of model you want.

(3) Is the builder able to handle the operating features you want — flaps, retracts, etc.? Remember also to expect to pay more for these features.

(4) Get pictures of completed models if you're working by phone or by letter.

(5) If you can visit with the builder, examine his building; look for pride of workmanship. I have found that a great deal can be learned just by visiting a builder's workshop.

(6) Get an idea of how he handles such matters as pushrod installation, surface hinging and weight and balance

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DICK HANSEN'S SUPER FLOATS



Dick Hansen's floats on his modified Taurus. Optional water rudders were connected to rudder horn.

Editor's Note: While covering the Northwest Seaplane Championships (RCM, October, 1978) we noticed that approximately half of the contestants were using the same float design. They appeared to be a bit different from the floats that we were accustomed to seeing and they definitely did their job

better than any floats we have ever seen. In short order we found that the design had been developed and refined over a period of 15 years by Dick Hansen of the Skyknights R/C Club of Portland, Oregon.

Dick cuts the foam cores for his fellow club members and agreed to share the

design with our readers provided that we make a clear statement that he is not in the model manufacturing business and does not have the time available to produce them.

Now that we have fulfilled our part of the bargain, Dick Hansen tells how he builds his super good floats.



The bottom profile is the first cut.



With the parts from the first cut stuck lightly in place with transfer tape, the end shape is cut.

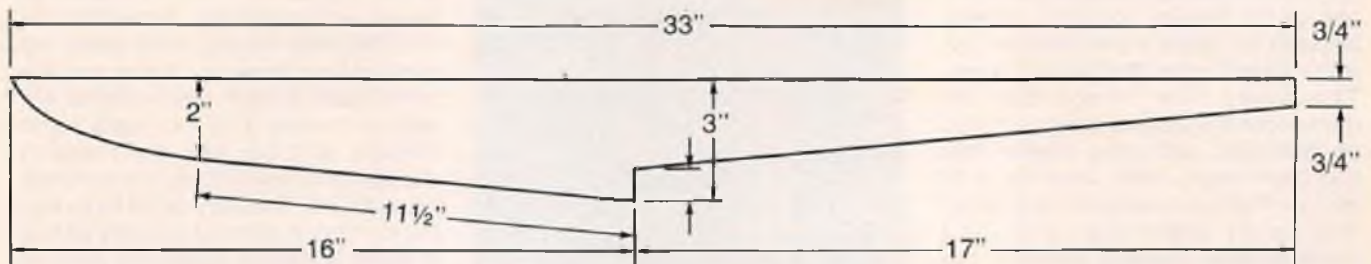


Two foam cores are easily made with only two hot wire cuts.

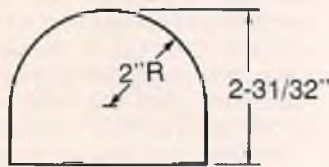


A few of the models using Dick Hansen's floats. Seen at Haystack Reservoir.

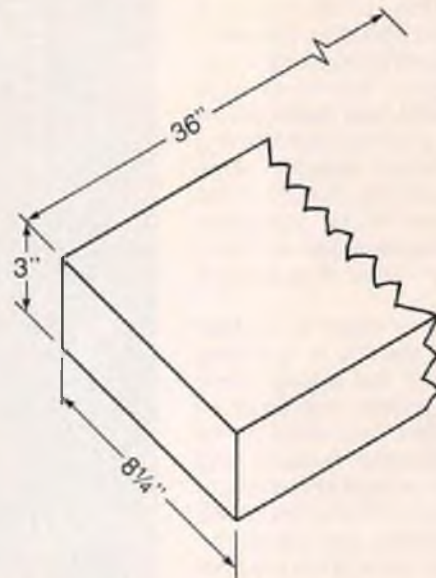
NORTHWEST SEAPLANE CHAMPIONSHIP FLOAT CORES



SIDE PATTERN MAKE 2 EA.



END PATTERN MAKE 4 EA.



EXPANDED BEAD FOAM BLOCK

BY DICK HANSEN PORTLAND SKYKNIGHTS

Make two side and four end patterns from plywood, or your favorite hot wire pattern material as per plans. Mark all patterns with reference marks for even cutting.

Foam block is the expanded bead type 3' long 3" deep and 8 1/4" wide. Attach the side patterns to the foam block flush and parallel to the top with 3M #465 transfer tape available at stationary stores. Hot cut the bottom of the float. Remove the side patterns slowly and steadily as the transfer tape can damage the foam if the patterns are removed too quickly. Tack the foam back together again with four small strips of transfer tape, equally spaced. Attach the end patterns, two per end, 1/32" below the top and spaced 1/8" apart. Hot cut the ends starting from the bottom of one side. Do not let the wire cut-out through the bottom of the foam between the end patterns. Hesitate at

the bottom of the pattern to allow the center of the wire to catch up and then move directly across to the second end pattern and repeat cut. Remove the end patterns and separate the floats with one vertical cut down the center. Pull the bottom pieces off of the floats carefully.

Sand with a long even sanding block and then vacuum the foam dust off of the floats. At this point some builders install a plywood backbone down the top of the floats with epoxy glue. Do not use polyester resin or regular model airplane glue on foam as it will melt it. Do not use white glue or any water soluble glues. I prefer to cover the floats first and then install 1" wood dowels to within 1/2" of the bottom of the float. These dowels are hollowed out from the bottom 1/2 of their length. Use a 1" wood bit to cut just through the covering, and finish drilling the foam with 3/4" bit. The foam will compress as the dowels, bevelled slightly, are twisted into the hole until they are 1/16" above the top of the float. Excess epoxy glue is spread around the

area for strength.

Cover the floats with your favorite material. I use 1/32" balsa on the top and rear bottom; 1/16" balsa on the forward bottom with a hardwood step. Again, I use the 3M#465 transfer tape for an adhesive, then seal the edges with cyanoacrylate glue; cover again with either silk, nylon, fiberglass, cloth, etc. Use dope, polyester resin, epoxy resin, etc., for finish. The floats should be mounted with the step as near the aircraft's Center of Gravity as possible and the top of the floats parallel to the wing cord.

The tips of the floats should be extended beyond the propeller at least 3"-4". The float cores can be shortened to 30" by cutting 3" off of the ends and cutting 1" off of the step.

Follow these instructions carefully and you, too, can be in the magic top ten at the Northwest Seaplane Championships at Haystack Reservoir, Madras, Oregon, Saturday June 30, and Sunday July 1, 1979. □

It never ceases to amaze me, how a small event will mushroom into a project that will take months to complete. On one lazy Saturday (I do most of my flying on Sunday afternoons), I was propped up in one of my favorite positions, looking between my shoes at the television set, watching an English World War II movie. The story line concerned an underground German factory that had to be destroyed, and every attempt that had been made, failed because of its access. The final solution to the problem was to fly some fast and very maneuverable bombers between the cliffs guarding the factory, and bomb the wall of the stone cliff above the factory, thereby effectively burying it.

The plane they used was the DeHavilland Mosquito MK IV Bomber. I was really fascinated by the plane. It was apparently highly maneuverable (although that could have been camera technique), fast, and they kept referring to it as the "Wooden Wonder." After enjoying the movie, the thought of the plane wouldn't leave me, so I proceeded to get some more information on it and, besides, whoever heard of a wooden WW II aircraft?

Like the history of many of our best planes, the P-38 and the B-17 among them, the Mosquito had a tough start. The concept of a bomber that carried no defensive weapons, but relied on its speed as a defensive weapon (and made of wood in an age of aluminum) didn't sit very well with the British Air Ministry. The factors that saved the plane was the sure shortage of aluminum that would be experienced in a war, the use of existing furniture manufacturing shops where it could be built, and the success that the DeHavilland Company had experienced with wooden planes in the previous decade.

All arguments and doubts came to an end, when the "Wooden Wonder" showed its capabilities. With a top speed of 380 mph, a cruise speed of 265 mph, a ceiling of 34,000 feet, and a range of over 2,000 miles while carrying a bomb load of 2,000 pounds, the Mosquito became one of the outstanding aircraft of the war. This information really wetted my appetite.

I had two Enya .40 engines sitting in my "Clipped Wing P-38" (a long story all by itself), and if the wing span of the Mosquito was set at about 65" and I could keep the wing loading at a reasonable figure, I could have a very exciting model.

DeHAVILLAND MOSQUITO BOMBER MK IV SERIES II
Designed By : Richard Mellen

- TYPE AIRCRAFT
- Stand-Off Scale
- WINGSPAN
- 66 1/2 Inches
- WING CHORD
- 16" at Root
- TOTAL WING AREA
- 650 Sq. In. (approx.)
- WING LOCATION
- Mid-Wing
- AIRFOIL
- Symmetrical
- WING PLANFORM
- Double Taper
- DIHEDRAL, EACH TIP
- 1 3/4 Inches
- D.A. FUSELAGE LENGTH
- 49 1/2 Inches
- RADIO COMPARTMENT AREA
- (L) 11 1/2" X (W) 3 1/2" X (H) 3"
- STABILIZER SPAN
- 25 Inches
- STABILIZER CHORD (incl. elev.)
- 5 1/2" (Avg.)
- STABILIZER AREA
- 175 Square Inches
- STAB AIRFOIL SECTION
- Symmetrical
- STABILIZER LOCATION
- Mid Fuselage
- VERTICAL FIN HEIGHT
- 8 1/2 Inches
- VERTICAL FIN WIDTH (incl. rudder)
- 5" (Avg.)
- REC. ENGINE SIZE
- (2) .40 Cu. In.
- FUEL TANK SIZE
- (2) 8 Ounce
- LANDING GEAR
- Conventional
- REC. NO. OF CHANNELS
- 5
- CONTROL FUNCTIONS
- Rud., Elev., All, Throt., Flaps
- BASIC MATERIALS USED IN CONSTRUCTION
- Fuselage Polyurethane Foam & Ply
- Wing Balsa, Ply, & Hardwood
- Empennage Balsa
- Weight Ready-To-Fly 144-160 Ounces
- Wing Loading 31-35 Oz./Sq. Ft.

The next step was to purchase a plastic model of the Mosquito and start drawing plans. Fortunately, Revell had such a model in its catalogue. Unfortunately, Revell is no longer manufacturing the kit in the United States. Fortunately, my younger brother is the Executive Vice President of Revell, so I called him, apologized for the time when he was three years old and I told him the can of Boraxo was the can of tooth powder, and requested his help in locating a kit. He really came through, and the next day I was in possession of a very dusty, but complete Mosquito kit. The story of his foray into the kit morgue will most certainly be told at office Christmas parties for years to come.

About the same time, I became acquainted with a material called polyurethane foam, and I was using it to make and repair wing tips. I seem to be able to damage wing tips even on a high wing plane with a trike gear. Polyurethane has several real advantages over the polystyrene foam that we have become used to. Since the polyurethane foam has no texture, it is very easy to sand and cut. I have used everything from a jig saw to a bread knife on it and it doesn't rip, gouge or tear. I use coarse garnet sandpaper to get the bulk down and the results look as smooth as if I used fine sandpaper on it.

Another nice feature is that unlike polystyrene, any glue adhesive, or resin, can be used on it and the foam is not affected. As if this isn't enough to have you running out to get it, it's also fuel proof, and is about three times lighter than balsa blocks. The material I used is rated at two pounds per cubic foot. Need more? How about low cost. A 2' x 4' x 2" slab is less than \$10.00, and is sufficient for the

entire project. If the polyurethane foam is not available in your area, you can order it C.O.D. from Hastings Plastics, 1704 Colorado Ave., Santa Monica, Calif. 90404, attention Mr. Tolliver.

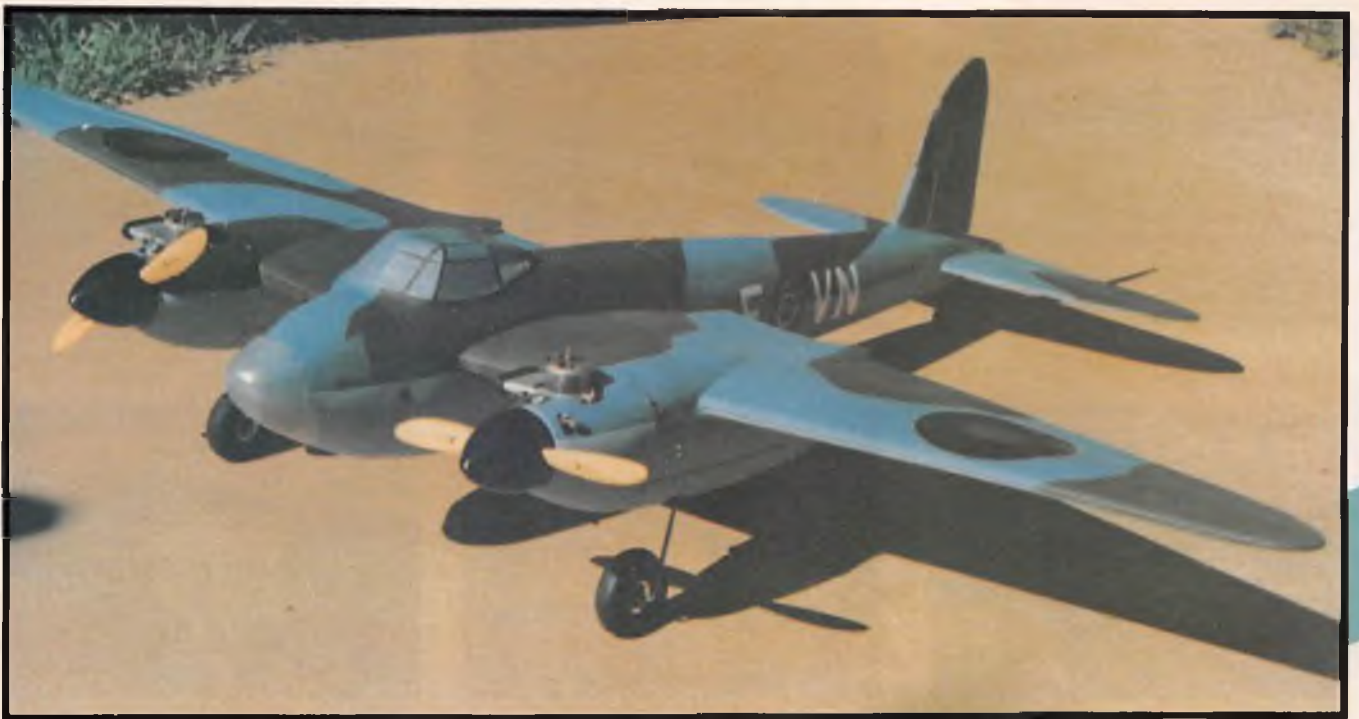
The thought struck me that with the use of Sig Ply-lite, and the polyurethane foam, the entire fuselage could be built for less than \$8.00, and we are talking about a fuselage that has a length in excess of 49" and is as much as 6" wide in some places. The construction time would also be dramatically reduced, because of the ease of handling the foam.

Since you probably have not used polyurethane foam before, let me take a few minutes to describe how it handles, and some do's and don'ts.

The foam has no texture. This means

If you've been afraid of scale --- particularly multi-engine scale designs --- the DeHavilland Mosquito MK IV Bomber is what you've been waiting for. Combining all the assets of the full-scale aircraft in speed and maneuverability, it can easily be trimmed to be as docile as a low wing trainer.

De HAVILLAND MOSQUITO



that the finished product will be just as smooth if you use coarse garnet sandpaper or fine finishing sandpaper on it. The difference of sandpaper grit is the speed at which the material is reduced to the desired shape. I found the best way to handle the blocks of foam

greater detail later. After the glass

with the wing.

CONSTRUCTION

Wing: Since the wing is rather straightforward, I won't dwell on it very much in this article, but I will just try to detail some of its problem areas.

The wing must be constructed upside down (sorry about that) to accommodate the plywood sections that make up the nacelles. The two sections of the wing must also be constructed separately and, when completed, joined with the proper dihedral.

Since the wing tapers from a root of 2" thickness (W1) to a thickness of 1/2" at the tip rib (W11), the top 3/8" x 1/4" spar is blocked up 3/4" at W11, and pinned to the plans at the center section. Ribs W1, 2, 5, 6, 7, 8, 9 and 10, are cemented to the top spar so that they follow the line of the plan, and are perpendicular to the work bench, not to the top spar. The bottom 3/8" x 1/4" spar is slid through the slots in the plywood ribs W3 and W4 and this assembly is cemented to the top spar. At the spot where the two sections of W11 will be, the two spars are cemented together, and then W11 is placed.

The leading and trailing edges are now cemented into position and, when dry, the scrap filler at W6 and the bottom 1/4" x 1/4" spar is cemented. The top spar is cemented when everything is dry and the wing is lifted from the plans. Note that the bottom 1/4" x 1/4" spar ends at W8, but that the top 1/4" x 1/4" spar ends at W7. Even at that, the bottom 1/4" x 1/4" spar will have to be tapered and shaped between W7 and W8 to allow for proper contour of the top and bottom 3/32" sheeting.

text to page 54

MK IV BOMBER

is to take the majority of material off with a knife, use coarse garnet to get you almost where you want to be, and finish with 100 grit sandpaper. You have to be very careful not to over-finish the foam. The material reduces very easily and it's very easy to take off too much and a mess to add contour back on.

Try to approximate where the finished blocks will be (after sanding) when gluing the foam blocks together, and do not go beyond that area with the glue. If you do, you will notice that the foam will sand away leaving the glue flash behind. This glue flash cannot be sanded away without further reducing the foam (the foam being so much softer), and you will have to get rid of it with cuticle scissors, which is a time consuming job and gives disappointing results.

The foam is fairly easy to dent before the glass cloth and finishing resin are applied so be careful where you lay it and how you handle it.

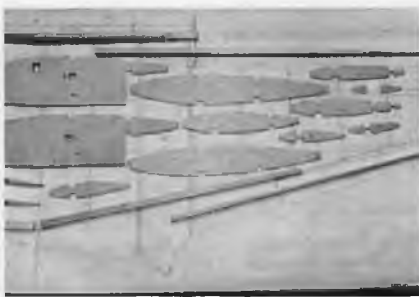
Two ounce glass cloth is needed to give the foam a durable finish. The 2 ounce cloth is used throughout the model except on the cowls and tank access hatch areas where 8 ounce cloth will be used, and will be described in

resin has set. don't over-sand. If the cloth is cut through in sanding, you will have an area that will finish poorly and dent easily. If this happens, re-glass the foam, but watch the weight.

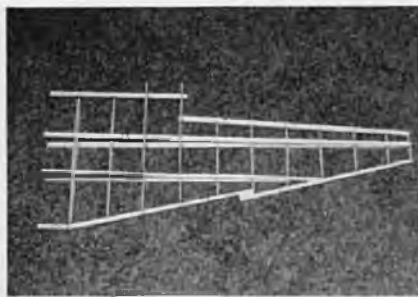
The foam must be glassed before trying to fill any areas with micro-balloons and resin, otherwise you will be trying to sand smooth an area which consists of soft foam and hardened filler. The only thing that will sand, of course, is the soft foam that hasn't been glassed.

As stated previously, the foam reduces very quickly and you soon find yourself in a cloud of green dust. To protect your marriage and home-life, I would recommend sanding outside, preferably on the grass. That way there is no clean up, lots of fresh air, and the color of the foam is just about the color of the grass, and doesn't show. As far as I could find out, the foam is non-toxic (my dog ate a piece before I could stop her and liked it better than her canned food), but with the smog and cigar smoke that I already am pumping in and out of my lungs, I figured I didn't need to add polyurethane foam dust, so I used a cloth wrapped around my face covering my nose and mouth when doing large areas where a lot of dust will be generated. Try to be as inconspicuous as possible. It really shakes up the neighbors to see someone with a mask on prowling around.

If all of the above admonitions haven't scared you off, let's start construction



Cut out wing parts.



Framed up wing.



Detail of 1/4" sq. spar between W7 and W8.



Wing mounting block.



Plywood braces and top sheeting.



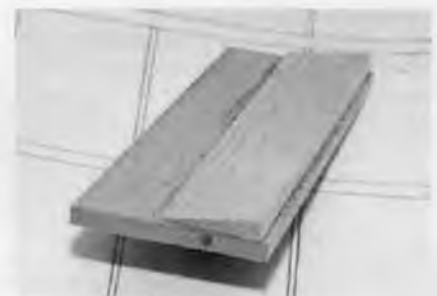
Stationary section between flaps and control horn.



Aileron bellcrank and pushrods.



Flap and motor bellcranks.



Flap construction.



Servo area in wing for flap, aileron, motor - 1/4" plywood is used for the servo tray and the cases of the servo's extend through the top of the wing.



3° down thrust.



Leading edge reduction for FW1.



3/8" sq. motor mount stock.



FW1 alignment to leading edge.



Sandpaper to contour foam to top of wing.



Foam contoured and cemented.



Nacelle bottom.



Micro-balloon filler at stationary section between flaps.



Hatch frame work.



5/16" sq. rails contoured.



Foam block cemented.



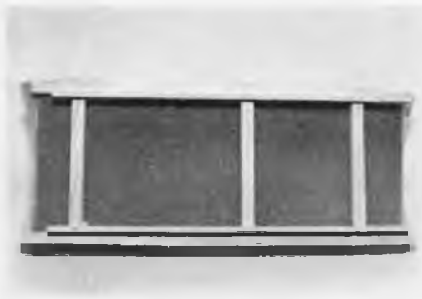
Saran Wrap shield – ready to glass.



Glassed with 8 oz. cloth.



Micro-balloon slurry.



Hatch bottom complete.



Hatch in position.



Fuel filler parts.



Fuel filler complete.



Landing gear position – fuel tank inst. (note alteration in bottom 3/8" x 1/4" spar to accommodate this tank) – fuel fillers.



Parts for cowl alignment.



Alignment pieces in place.



FW4 cemented to foam block.



Foam relieved to fit FW1.



FW4 and foam block fitted to FW1.



Cowl contoured - note glue flash.



Cowl of FW1 - ready to glass.



Glassed cowl with 8 oz. cloth.



Micro-balloon slurry.



Cowl with foam removed and opening cut in FW4.



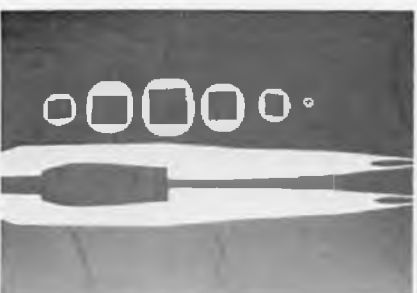
Cowl mounted of FW1.



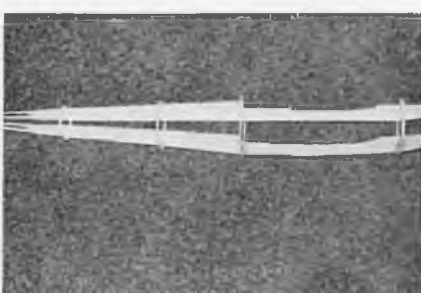
Hatch and cowl installed - wing tip view.



Wing root view.



Ply-lite sections cut out.



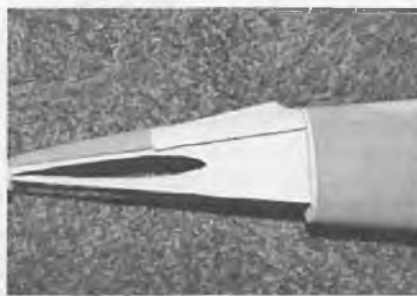
Fuselage frame work.



Foam placement.



1/8" balsa wing saddles.



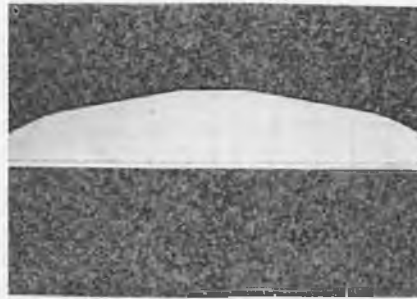
Balsa rudder base.



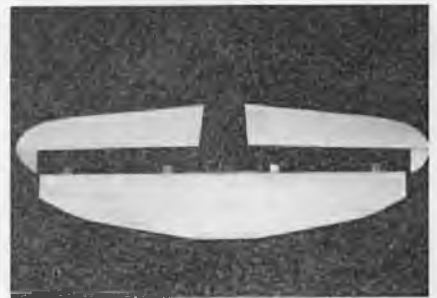
Rudder frame work.



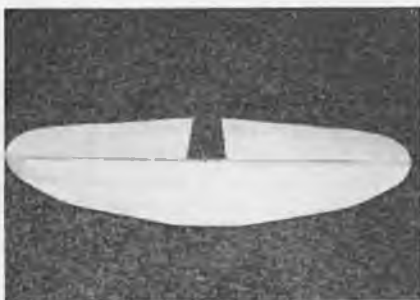
Rudder installed.



Horizontal stabilizer frame work.



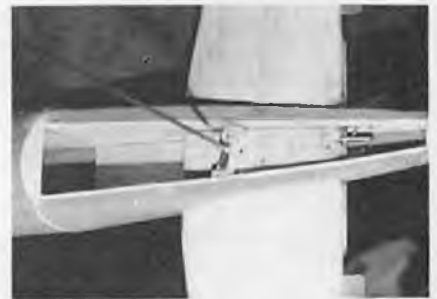
Stab complete and ready for elevator.



Stab and elevator.



Rudder control arm.



Control horn soldered in place. Hardwood material drilled and relieved.



Pushrods in place - rudder view.



Pushrods in place - elevator view.



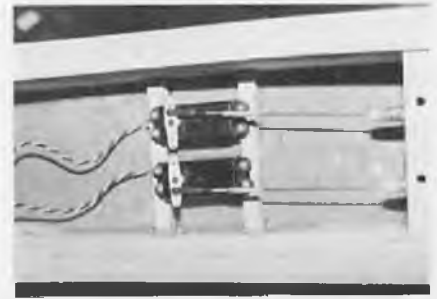
Top view - completed tail.



Side view of completed tail.



Servo installation in wing for throttle, aileron and flap.



Servo fuselage for rudder and elevator.

Note that the leading and trailing edges are tapered and the center sections of the wing (3/8" x 3/4") leading edge has a triangular shape with the tip cut off. This leading edge must also be slotted to accommodate W3 and W4. The trailing center section, consisting of the 1/4" x 1/2" balsa strip, and the 3/4" x 3/8" hardwood wing bolt mount are placed after the two wing sections are joined. The skeleton photo is incorrect on this point.

After both wing sections have been framed up and are dry, they are joined with a dihedral of 1 3/4" at each wing tip. After dry, the trailing edge for the center section (1/4" x 1/2") is cemented. This balsa piece goes straight across the two wing sections. The photo showing the frame up of one section is in error here, but subsequent photos show the proper installation. It was discovered that this made the area stronger and easier to work with, and was altered from the original design. Unfortunately, I could not alter the photo.

Now the hardwood mounting block (3/4" x 3/8") is positioned with epoxy.

The plywood braces are now cemented. You won't find these on the plans. A piece of 3/32" plywood is cut to the proper width, placed against the top and bottom spars where it is to be attached, and a pencil line is drawn, and the proper cuts are made. The reason that I did it this way, is that it is very accurate and a slight variation in the amount of the dihedral won't lead to complications with the sheeting. The 3/32" balsa strips at the end of W11A and W11B are not placed at this time, nor is the 1/4" plywood firewall, nor the foam wing tips. The top of the wing is now sheeted with 3/32" balsa completely and also the leading edge segment (from the leading edge to the halfway mark in the 3/8" x 1/4" spar) of the bottom of the wing. When dry, shape and sand the leading edges. Remember that the center section of the leading edge is flat with a 20 degree slant inward (see fuselage wing cut-out).

The stationary section, between the two flaps, is made out of 3/8" balsa sheet. Before cementing, bend the prongs of the control horn to conform with the plans, and install. The 3/8" balsa is then relieved for the horn operation, and cemented. This will appear to be weak, but after the nacelles are attached, micro-balloon filler completed for contour, and resin and cloth placed, they will be very strong.

The bellcranks and their plywood bases are installed next. Juggle the position of the bellcranks so that the 1/16" piano wire pushrods don't interfere with each other. The plywood base with the flap and motor bellcranks can also be slid front or back to help in alleviating congestion. Now the planking of the bottom of the wing can be completed.

The flaps are made from 3/8" balsa with a piece of 3/8" x 1 1/2" tapered trailing edge glued to it. The flaps are installed temporarily and both the flaps and center section are shaped to conform to the top and bottom shape of the wing. The flaps hinge at the upper 1/4th of the flap and the bottom 3/4th is slanted back to accommodate the downward flap movement.

The ailerons are installed next, and shaped. When this is done, the flaps are set in full up position, the aileron in neutral position, and the 3/32" balsa strips are cemented to the W11's and, when set, are shaped to conform to the wing and aileron shape. By doing this, the foam is not left standing out from the body of the wing unsupported.

The foam tips are now added and contoured, and the wing is ready for the finishing of the nacelles.

Firewall: The firewall FW1 consists of a 1/4" plywood plate cemented to the leading edge of the wing, W3, W4, and backed by two 3/8" square motor mount stock. The W3 and W4 ribs are already set up so that the firewall has a 3 degree downward tilt. The leading edge of the wing must be sanded so as to continue the line of the contour set up by these ribs so that the firewall sits flush with no gaps between the leading edges of W3, W4, and the leading edge of the wing. After this is cemented with epoxy, the hardwood motor mount material is placed as shown on the plans to reinforce the firewall. At this time, add the 1/4" former FW3 to the back end of the ribs W3 and W4, and the 1/4" former FW2 to the firewall with epoxy.

Nacelles: We are now ready to put the foam on the nacelles. Start at the top of the wing and tape a sheet (I used double sided Scotch Tape) of sandpaper (medium garnet) to the wing. The sandpaper should be wider and longer than the finished foam part. Now take a block of foam which has been cut just a little longer than will be needed and, keeping the front of the foam block against the top back of FW1, rub the foam block back and forth (from wing tip to wing root), and after a minute or two you will have the foam block contoured on the bottom so that it will fit closely on the wing after the sandpaper is removed. The foam is now contoured from firewall to tip, and cemented to the top of the wing and finished with 100 grit sandpaper.

The sides of the nacelles are now foamed and contoured. In this case, the sides are glued on first and then sanded to shape in the same manner as the fuselage described later. The back section is made by gluing two foam blocks together to get a wide enough slab, rough contoured to fit FW3, the bottom of the wing and center section between the flaps, and cut out to allow the flap horn to operate freely. The section is now cemented in place, and

contoured.

The wing, flaps, ailerons, and nacelles are now glassed with 2 ounce cloth and sanded lightly.

Access Hatches To Fuel Tank and Landing Gear: Two strips of 3/32" plywood 1/2" wide are cut to run along the inside of the Ply-lite nacelle side. They are cut to fit between the motor mount material backing the firewall and the former FW3. They are also positioned so that 1/4" of the strip is above the nacelle side and 1/4" below the side. The three 1/4" square balsa cross pieces are now glued to the plywood strips, firmly holding the strips to the Ply-lite sides. The 5/16" square balsa strips are now laid on the foam and plywood edge of the nacelle opening and against the plywood strip, with the ends of the 5/16" square balsa touching FW1 and FW3 and cemented to the 3/32" plywood strips only. When dry, the 5/16" square balsa is sanded to conform to the contour of FW1, FW3, and the glassed foam sides.

A foam block is now added to the assembly. It is glued to the contoured 5/16" square rails, and the 1/4" square braces only, and is contoured to match FW1, FW3, and the 5/16" square sides, and the nacelle contour of the plans. When the hatches are finished, they are removed from the nacelle and a sheet of Saran Wrap is placed over the access area, up the inside of the walls formed by FW1 and FW3, over the top of FW1 and FW3 smoothly, and extended well over the finished foam and Ply-lite sides of the nacelle. The hatch is now replaced on the nacelle and we are ready to glass the hatch without bonding the hatch to the nacelle, thanks to the Saran Wrap.

The hatch is glassed with 8 ounce cloth and Sig finishing resin. The cloth is extended over the edges of both 1/4" plywood formers (FW1 and FW3). This is the area where the sheet metal screws are used to attach the hatch to the nacelle. After the resin has set, a slurry of finishing resin and micro-balloons is mixed and this is trowled over the hatch. When set, the hatch is sanded to contour, and removed from the nacelle.

Fuel Fillers: There are commercially available fuel fillers on the market, but I prefer to make my own because it is easier to control the size, position, and length of various parts. Brass tubes of 1/8" outside diameter are used and are cut to a length that will leave 3/8" of the tubes sticking out on both sides of the foam Ply-lite nacelle wall. A flat piece of brass sheet 1/32" thick is cut to 3/8" x 3/4" square and two 1/8" holes are drilled in it (see photo). The brass plate will be cemented with epoxy against the Ply-lite side of the nacelle (wing tip side), so position the tubes in the brass plate so they will stick out the required 3/8". The tubes are then soldered to the brass plate, installed through 1/8" holes drilled through the

foam Ply-lite wall, and cemented. Make sure the filler assembly will be positioned below the tank (when the wing is upright) and both the air relief tubes in the tank end 1/16" or more below the top wall of the tank. During the flight, this arrangement will lose some fuel from the tanks on maneuvers that tip the nacelle downward, but I have never found this to be a problem. If it worries you, however, a cap for one of the tubes can be fashioned, using a short length of neoprene fuel line, over one tube (after filling the tank with fuel) which has one end crimped shut and sealed with Zap.

Landing Gear: The landing gear is bent from 5/32" piano wire, and is held in the landing gear rails with three metal straps and screws. The center of the wheel should be even with the leading edge of the outside wing panel, and the wheels tipped slightly inward to facilitate ground handling. Slots are cut in the hatch covering to accommodate the 5/32" wire. Make sure that the slots are long enough to allow for the backward movement of the landing gear on landing, and wide enough to allow the hatch to be slipped on and off the landing gear.

Cowl: The following is a step by step procedure that I worked out. After reading it, you can decide if it is better than the one you have used before. Since the firewall and engine are tilted down 3 degrees, I wanted the front of the cowl to do the same so that the spinner will have an equal gap between it and the FW4 plywood part. To accomplish this, and to also make sure that the engine shaft is centered in the opening, a 4" piece of 3/8" x 1/2" of balsa was used, along with a 1/2" thick piece of scrap balsa which has a square 3/8" x 1/2" hole cut in it. This piece is centered on the center shaft line on FW1 and spot glued to FW1 with a drop of Zap. The 4" piece of 3/8" x 1/2" balsa is cemented on FW4 so that the center of the 4" piece is on the center of FW4 and is perpendicular to FW4.

Two foam blocks (that are 2" thick) are glued together to form a 4" thick block, and a hole is cut through it so that the 4" balsa piece will go through it and relieved so that it will fit flush against FW1. Now the FW4 is cemented to the foam block and, when dry, the assembly is fitted to the scrap block on FW1 and the foam is contoured to shape. Note that on the photo, I got carried away with the glue on the foam and now I have a rubbery flash between the two foam pieces to deal with.

After the sanding is completed on the foam, the foam and FW4 section is removed from FW1 and the piece is now glassed with 8 ounce cloth and, when dry, with resin and micro-balloon slurry, and sanded. The opening on FW4 is accomplished by drilling a 1/4" hole in FW4 and finishing the cut-out with a saber saw. The foam is now scraped

out, the scrap block on FW1 is knocked off, and the cowl is finished.

As you are undoubtedly aware, we have produced a cowl that is not the required 4" long but 4 1/4" long. The extra 1/4" fits over FW1 to accept the sheet metal screws. Part of the 1/4" lip is cut away (at the bottom) where FW2 takes over for anchoring the cowl, while the remainder of FW1 on the bottom is used to secure the front of the hatch, with sheet metal screws.

Engines: As you have noted, I elected to install my engines upright instead of inverted. I realize that an inverted installation would have given me a cleaner silhouette on the plane, and if you decide to invert your engines, be my guest, but before you do, read the next paragraph carefully.

The name of the game in twin engine aircraft, is engine reliability. Unless both engines accelerate at about the same rate, take-offs will be a wild ride, especially with a tail dragger like the Mosquito, since the plane will turn into the slower running engine. Actually it is almost impossible to taxi this plane with only one engine running. While in flight, if one engine quits, a twin will spin into the dead engine. The correcting procedure for this is to cut the throttle back to idle, correct with rudder and aileron, give it a little throttle, re-correct, and get it landed as quick as possible. Of course to do this, you need time which means height. Low flying can be dangerous to your twin.

Who needs it!

Even if you get it back down in one piece, the chest pains last for a while. In short, my engines (Enya .40's) are much more reliable upright than inverted. The choice is yours.

Fuselage: Cut out both sides and formers F2 through F6 out of Sig Ply-lite, and former F1 out of 1/4" plywood. The F1 former will be placed under a lot of stress when putting the framework together, and some of the areas of F1 are too thin for Ply-lite to hold.

Start by cementing F2 and F3 in place with epoxy. After dry, formers F4, F5, and F6 are cemented. When everything is dry, squeeze the front of the sides together and epoxy F1 in place.

The sides are now ready for foaming. By pressing the framework against the foam sheet, indentations will appear in the foam and give you lines to cut the foam out with. Since the foam we are using is 2" thick, and the sides are less than 1" thick, slice the cut-out sections of foam in half with a bread knife, and you will have made both sides of the section at the same time. Use any cement that you want to use to glue the foam on the Ply-lite. I found that Sig Contact Cement held very well and accelerated construction. There is one precaution when using any cement on the foam, and that is, again, to keep it off the finished sanding line. Make sure the

foam ends 1/8" below the wing saddle area, and that the Ply-lite saddle area conforms to the finished wing area. This is where the 1/8" balsa will be laminated to add strength to the wing saddle. The rest of the foam sides are finished flush with the edges of the plywood. When sanding the foam to contour, the edges of the formers are used to give landmarks to the contour. Sand carefully! The foam, as previously stated, sands quickly, and it is easy to leave the formers standing out like ribs on a starved horse.

The top and bottom sections of foam are added next, with the exception of the area between F5 and F6 and, of course, the cabin area. The nose section can now be made. This section is solid and is made by cementing two 2" slabs of foam together.

The base of the rudder section is made from a block of balsa, and after it is contoured, it is cemented to the plywood sides along with the foam sides. Note that this block extends 1/4" inside the Ply-lite side, and extends from F5 to just the end of the stationary section of the rudder. The remainder of the area between F5 and F6 is filled in with foam to cut weight. This plane has a short nose moment when compared to the tail moment. An ounce of weight saved on the tail of this plane will alleviate a 5 ounce counterweight at the nose. So keep it light. More on this later.

Vertical Stabilizer: The construction of the vertical stab is fairly straightforward. The ribs are made from 3/32" x 1/2" strips of balsa and are contoured after being installed in the grooves cut in the leading and trailing edges.

The stab tapers from a rounded leading edge to a height of contour about 2/5ths or 40% back from the leading edge to the 1/4" thickness of the trailing edge. The stab also tapers from the base to the tip, ending at the tip at 1/8" thickness at the leading and trailing edges. The outline of the base is shown on the plans.

After the leading and trailing edges are tapered, the ribs are cemented and contoured. The 1/16" sheeting is added and, after dry, a 3/32" capstrip is cemented to the top of the stab and sanded to contour after dry. The base of the stab is left open, and is cemented with epoxy to the balsa block on the fuselage.

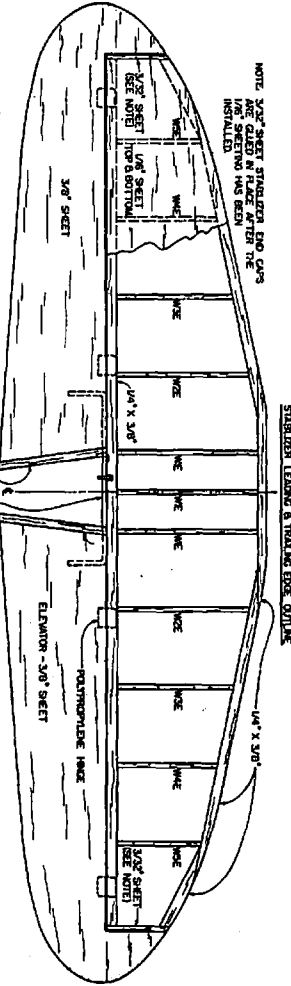
Horizontal Stabilizer: Only two things to mention here. The 3/32" balsa capstrips at the ends of the stab are placed after the sheeting is finished, and contoured to shape as was done in the vertical stab, and the elevator horn is installed off-center as shown in the plans. The horn is much too long to be accommodated by the fuselage contour, and is cut off after the first hole. Save the leftover piece. It will be used for the

text to page 141

ADDITIONAL DETAIL TO SHEET 1



ENGINE MARQUELLE OUTLINE



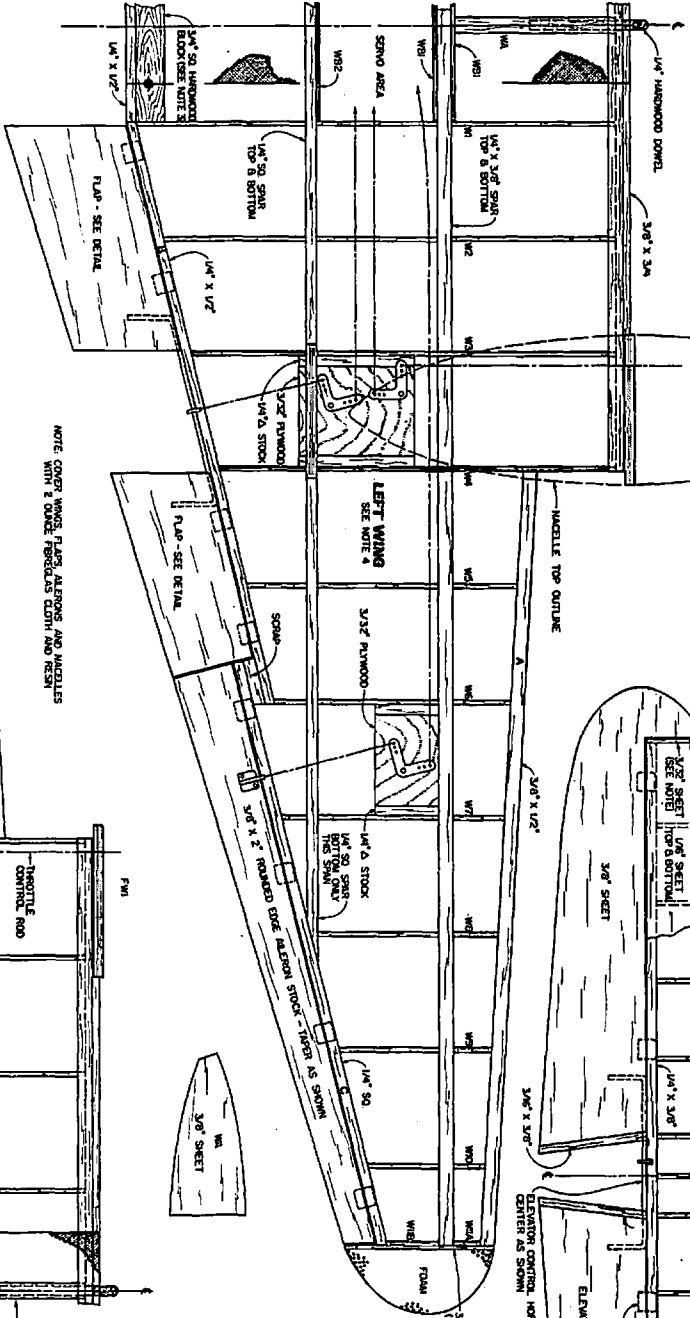
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STABILIZER LEADING & TRAILING EDGE OUTLINE

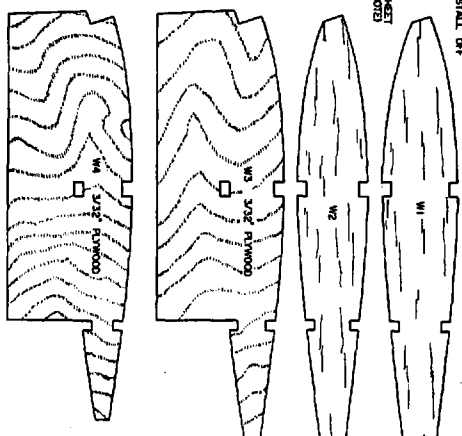
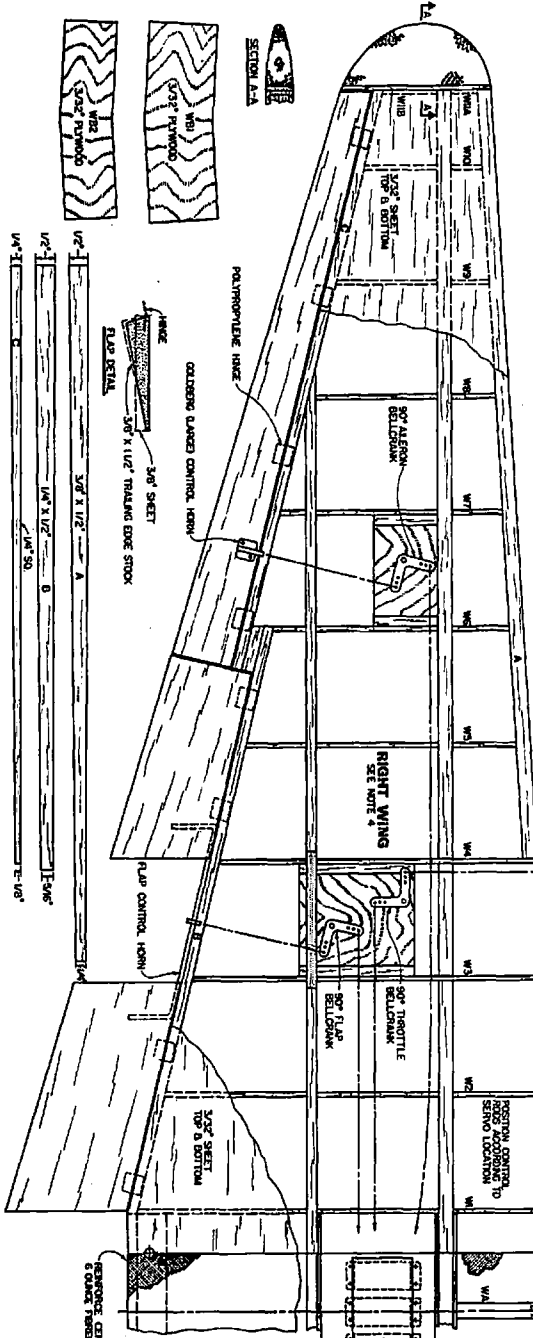
ELIMINATE 3/8\"/>



ALL STABILIZER RIBS ARE 1/2\"/>



NOTE: COVER WINGS, FLAPS, ALERONS AND MARQUELLES WITH 2 OUNCE FIBERGLASS CLOTH AND RESIN



ALL WING RIBS ARE 3/8\"/>

- NOTES**
1. ALL WOOD IS Balsa UNLESS NOTED OTHERWISE.
 2. FILL ALL FITS WITH 2 OUNCE FIBERGLASS CLOTH AND RESIN.
 3. INSTALL HARDWOOD SPOKE BEAT SUPPORT BLOCK AFTER THE WING PANELS HAVE BEEN ADDED TO THE FRONT DRIVE SHAFT. PLACE THE BLOCK AT THE BASE WING PANEL STRUCTURE IS ASSEMBLED OVER THE PLAN SHEET.
 4. THE BASE WING PANEL STRUCTURE IS ASSEMBLED OVER THE PLAN SHEET.

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RCM LOOKS AT REV-OLUTION



Rev-olution II, .60 power with rigid rotor no fly bar system.

It seems that publishing an R/C magazine is a pretty complex business. An aspect unique to our operation is the number of phone calls and letters that we receive from modelers seeking information on products and to verify or dispel rumors that run rampant through the hobby. We do not consider ourselves as watchdogs over the model industry and certainly do not feel that an advertiser is entitled to special consideration. His product is, however, a subject of our concern, as we feel a strong obligation to provide the true facts to our readers.

During the past few months we have received inquiries concerning the Rev-olution helicopter manufactured by American R/C Helicopters, Inc. After hearing several uncomplimentary rumors, our curiosity was aroused. Had something changed since we ran a rather comprehensive construction article on the Rev-olution II in our January, 1978 issue? We made a phone call to American R/C Helicopters and asked if we might pay them a visit, discuss their machines, and possibly have a flight demonstration. The answer was an enthusiastic affirmative.

We went to their factory and were given a tour of their facilities. John Simone, Sr., President of American R/C Helicopters, was delighted that we were interested enough to check them out as he was more familiar with the scuttlebutt than we were. He very openly answered our questions and discussed everything we asked except Rev-olution performance. Rather than talk performance, he wanted to demonstrate first and then talk.

We fully expected to see John Simone, Jr., putting their chopper through his bag of tricks and realized that his familiarity with the machine would give him a distinct advantage. We were not, however, quite ready for Curtis Croker, a handsome young man, eleven years of age. Not knowing that a youngster of his age wasn't supposed to be able to fly an R/C helicopter, Curtis unloaded his gear from his mom's car, fueled up the chopper cranked up the engine, and had the machine in the air in a matter of a couple of minutes, all unassisted.

At the same time, a nonchalant young lady, Tricia Copfer,

was getting her Rev-olution airborne. Tricia has been flying about nine months and usually only flies on Sundays. Curtis has been flying for approximately a year and only when it does not interfere with his school work.

While they were limbering up their thumbs, we loaded our camera and asked for a sustained formation hover. Quickly the three helicopters were maneuvered into formation and held there for a good ten minutes while a slow moving fat photographer roamed around shooting the group from several different angles. The slow moving part was deliberate to see



Curtis Croker with his gear and he knows how to use it.



Three models of the Rev-olution in a sustained formation hover.



Everyone knows that an R/C helicopter cannot fly inverted but there it is.



Curtis Croker, age 11, has been flying his Rev-olution I, .40 power, for about a year. Maybe Snoopy is really flying it.



Tricia Copfer has been flying her .60 Rev-olution II only on Sundays for 9 months.



Mike Mas with his .40 powered Rev-olution I. Mike placed second in Expert class at 1978 AMA Nats.



The formation hover viewed from the distaff end.

how well the trio of fliers could hang in there for an extended period of time. They hovered alright, as if they could do it all day, until they were asked to land them.

Next came the hot dog maneuvers. Curtis, Tricia and John were joined by Mike Mas and Lowell Draper. For an hour we were treated to the wildest imaginable aerobatic show. Inside and outside loops, rolls, Immelmans, Cuban Eights, inverted flight . . . so much was happening so fast that it is difficult to remember. It is probably safe to say that we observed more helicopter performance in that hour and a half than we have in all the years of our association with helicopters combined. We recognize that their demonstration was staged to impress us and they did.

In our conversations with John Simone, Sr., following the flight demonstrations, we discussed a number of topics including comparison of various other helicopters. John frankly admitted that there was one other machine that had a slight edge on aerobatic capability. He also stated that he could revise the Rev-olution line to out-perform that machine but he felt that he had good reasons for not doing so. The main reason is a very practical one, it would call for considerable weight reduction which, in turn, would result in a more fragile machine. The trade-off is a replace parts or replace the total machine decision. Even the master pilots occasionally have mishaps.

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The Dixie Belle made her routine trips on the Mississippi River with cargoes of passengers and freight.

DIXIE BELLE

A
MISSISSIPPI
RIVER
STERN
WHEELER



Bob Gregory's rendition of the Dixie Belle contains a wide variety of electronic and mechanical gadgetry. The gang plank raises, lowers, and swings by R/C.



A bag of fertilizer and baskets of tomatoes are among the details on the lower deck.



Most of the details are functional (spot light and bell shown in this photo). Decks are made of basswood, used by model railroaders for house siding.



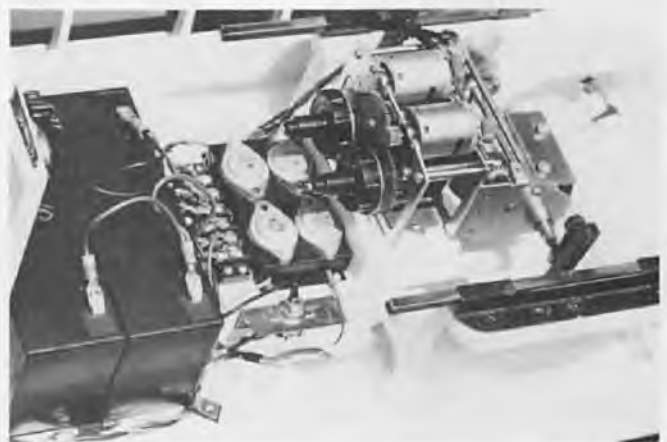
The wheel house is waiting for the Cap'n to come aboard.



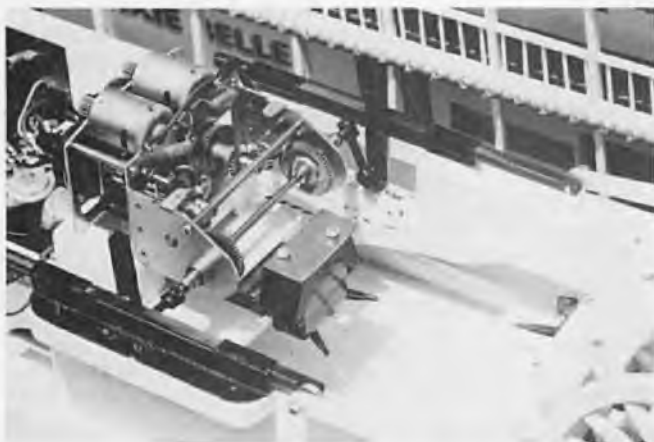
The paddle wheel contains dozens of individual pieces.



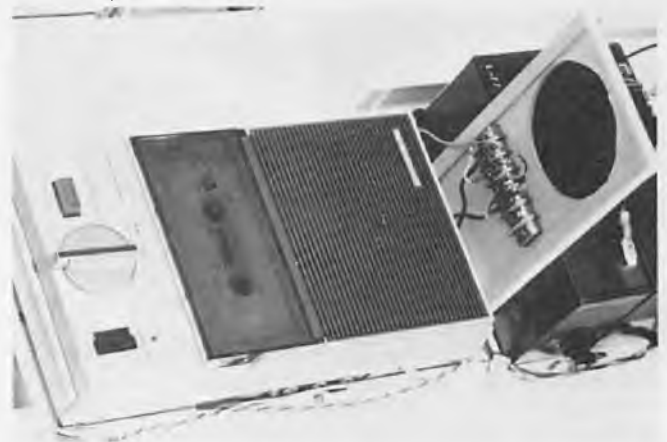
The radio compartment houses a Hobby Shack Cirrus radio operating a maze of clever mechanisms.



Muscle for driving the walking beams comes from a MRC M-4 Sherman tank transmission. A Vantec reversing electronic throttle gives complete proportional control. Two 12 volt gel cell batteries provide the electrical power.



A view of the MRC tank transmission and the walking beam mechanism.



A tape recorder plays Dixie Land jazz cassettes. The upright speaker is part of the Simcoe electronic horn tuned to simulate a steam boat whistle.

Is there a true modeler anywhere who doesn't have a soft spot in his heart for a Mississippi River steamboat with the stern paddle wheel methodically churning up the muddy river water?

Bob Gregory of Westminster, Calif., not only had the soft spot, he had the inspiration to do something about it. The result is his Dixie Belle with vital statistics of 5' 10" overall length, 12" beam, and weighs 36 pounds. The three

decks and wheelhouse are covered with a multitude of authentic details. Some 25' of railing rim the upper decks, the upright posts being made from round toothpicks. In the ornate gold trimming around the edge of the decks are 280 grain-of-wheat white lights.

The stately lady was constructed of various types of hardwoods assembled primarily with Elmer's glue. The design for the model came from doubling the dimensions published about 30 years

ago in a construction article in Science and Mechanics Magazine, Craft print #196. (Ed. note: We have been unable to find any trace of Science and Mechanics Magazine and can only assume that it is now defunct. Unfortunately, Bob Gregory's drawings have deteriorated to the extent that they are no longer usable.)

Bob requested that we mention that a long time model boater, Del Park, to page 140

RCM PRODUCT TEST

Jomac Products DODGE CHALLENGER 928



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

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

SPECIFICATIONS

Name	DODGE CHALLENGER 928
Car Type	1/12 Scale Race Car
Manufactured By	Jomac Products Inc. 12702 NE 124th Street Kirkland, Washington 98033
Mfg. Suggested Retail Price	\$90.00
Available From	Both Mfg. & Retail
Length	13 3/4 Inches
Width	6 1/4 Inches
Height	3 3/4 Inches
Wheel Base	7 1/2 Inches
Track	4 3/4 Inches
Weight	42 Ounces
Suspension	Front — Independent/Ackerman Rear — Controlled-Flex Chassis
Radio Compartment Gear Ratio	3.67/1 (15T & 55T)
Fuel	Six 1.2v Sub 'C' nicads (supplied)
Mfg. Rec. Engine Range	.05 Electric (supplied)
Speed Control	Ribbon wound resistor (supplied)
Recommended No. DI Channels	2
Recommended Control Functions	Speed & Steering
Basic Materials Used in Construction:	
Chassis	Molded glass-filled polyethylene
Shaker Plate	Molded nylon
Gears	Drive/Brass: Driven/Molded
Shafts	H.D. steel
Wheels	Molded
Tires	Molded long wearing sponge
Body	Self colored Cyclocac
Plans	Not Required
Instructions	Yes (5 page manual)
Photos	Yes (plus diagrams)
Kit Includes	See Text

RCM PROTOTYPE

Covering & finishing materials used	See Text
Engine Make & Disp.	As supplied
Muffler Used	Not Required (electric)
Radio Used	Cirrus Series 700

gauges and colors of wiring and heat-shrink tubing too, but what turned us on is that the wires are already cut to exact lengths and **the ends are already stripped**. Even the heat-shrink tubing is cut into pieces of the right length required for the various places where it is used. This pre-cutting not only saves a lot of fiddling but it really simplifies assembly instructions and wiring diagrams when they can print things like: 'the 3 1/2" length of thin red wire goes between point A and point B.' If you take your time, follow the written instructions,

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Many of the avid readers of RCM's Product Tests will check the kit retail price early in their perusal of the reports. If you happen to be one of these and are familiar with prices for model airplane kits you just might form an early impression that \$90 for a car kit is expensive. So, we will be equally early in our narrative and state flatly that this Jerobee kit is complete --- complete --- complete and, for the materials provided, the price is extremely reasonable. Bear in mind that the kit includes an .05 electric race motor (R.O.A.R. approved legal), six General Electric Sub 'C' size nicads, a variable resistor speed-controller and a rapid-charger. If you had to buy these items individually their cost alone would blow a sizable hole in your exhaust pipe.

When we said that the kit was complete we had good reason to be so definite. All we had to provide to complete the model shown in the pictures was a little 60/40 solder, about 2' of electrical tape, four drops of Hot Stuff and, when we were finishing the body with the decals provided, we decided to add side-trim stripes and racing striping on top as we already had some of Joe Bridi's good stuff available. Naturally, we supplied the radio ourselves.

But that is still only half the story. The kit includes different

RCM PRODUCT TEST

G.S. Products
HOWARD DGA-15



One of the classics out of the "golden era" of aviation is the Howard DGA-15. This sleek monoplane has all those features characteristic of the era --- straight wings, wheel pants, close-cowled and powerful radial engine. G.S. Products of La Grande, Oregon, has done a fine job of scaling down the DGA-15 to a 57" version suitable for either AMA or sport scale. Both land and water versions are possible with the same model. This is accomplished through a removable belly pod to which the entire landing gear is attached --- much like the real aircraft.

Plans and instruction booklet are clear and easy to follow. The average modeler should have little difficulty in building this model although some patience and care are necessary during fuselage construction. The wing construction is noteworthy. G.S. Products has devised a cardboard jig which insures a true wing every time. Other notable features include pre-shaped leading edges on tail surfaces as well as rounded and tapered fuselage stringers and wing struts. While we have not completed assembly of the pontoons as yet, they, too, seem to be well-designed.

G.S. Products also provides covering material. The real DGA-15 was ply covered. To simulate this (at reasonable cost and weight) the model is covered with "golden panel" --- a high grade, hard cardboard. The material is easy to apply and finishes very well. Our only difficulty was in fitting "tight" areas such as landing gear strut covers and wing strut housing. We finished our model with Sig Dope with a final coat of Glaskote Clear by Coverite.

Flying the model does require some skill on the rudder and a light hand on the elevator. The short coupled tail makes take-offs a bit tricky --- particularly if power is marginal and/or a grass runway is used. Our ST.46 had to work very hard (swinging on 1 1/5 prop to clear the cowling) to get up flying speed on rather high grass. Considering the high wing loading,

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

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

SPECIFICATIONS

Name	HOWARD DGA-15
Aircraft Type	Sport Scale
Manufactured By	G.S. Products Corp. P.O. Box 488 La Grande, Oregon 97850
Mfg. Suggested Retail Price	\$109.50
Available From	Both Mfg. & Retail
Mfg. Recommended Usage	Sport or Stand-Off Scale
Wing Span	57 Inches
Wing Chord	7.8 Inches
Total Wing Area	445 Square Inches
Fuselage Length	39 Inches
Radio Compartment Dimensions	(L) 8" x (W) 6" x (H) 3.5"
Wing Location	High Wing
Airfoil	Semi-Symmetrical
Wing Planform	Constant Chord
Stabilizer Span	18 Inches
Stabilizer Chord (incl. elev.)	6.5" (Avg.)
Total Stab Area	117 Square Inches
Stab Airfoil Section	Flat
Stabilizer Location	Top Of Fuselage
Vertical Fin Height	6.5 Inches
Vertical Fin Width (incl. rud.)	6" (Avg.)
Mfg. Rec. Engine Range	.35-.61
Recommended Fuel Tank Size	8 Oz.
Landing Gear	Conventional
Recommended No. Of Channels	4
Recommended Control Functions	Rud., Elev., Throt., Ail.
Basic Materials Used In Construction:	
Fuselage	Balsa
Wing	Balsa
Tail Surfaces	Balsa
Hardware Included In Kit	See text
Plan Size	43" x 60" (1 sheet)
Building Instructions on Plan Sheets	No
Instruction Manual	Yes (14 pages)
Construction Photos	Yes
Kit Includes	Shaped Parts
Mfg. Rec. Flying Weight	Not Known
Wing loading based on rec. flying wt.	Not Known

RCM PROTOTYPE

Weight, Ready To Fly	84 Ounces
Wing Loading	27.18 Oz./Sq. Ft.
Covering & finishing materials used	See Text
Engine Make & Disp.	Super Tigre .46
Muffler Used	Slim Line
Radio Used	Kraft
Tank Size Used	8 Oz.

straight wing, large cowling, and short coupling, it seems reasonable to recommend a .60 to minimize take-off and landing problems. □

ABOUT THE AUTHOR

Dan Santich is well-known in the modeling world for his designs and contest participation. His first design to appear in RCM was the Rapier in the April 1970 issue. The August issue of that same year contained an article of his entitled "Hints, Kinks, and How-To's for Goodyear Racing", and his FAI Pattern ship, the Cardinal, was featured in the February 1972 issue of American Aircraft Modeler.

Following his retirement from the Air Force he was employed by Top Flite Models as their Chief Designer. His efforts there resulted in the P-47 Thunderbolt and the Freshman Trainer.

Now living in North Carolina with his wife and two boys, he is employed by Ingersoll-Rand as a design engineer and belongs to the Winston-Salem R/C Club.

MAGNUM 40

Designed By : Dan B. Santich

TYPE AIRCRAFT

Sport

WINGSPAN

56 Inches

WING CHORD

9 3/4 Inches

TOTAL WING AREA

546 Square Inches

WING LOCATION

Shoulder Wing

AIRFOIL

Double Reflex, Symmetrical

WING PLANFORM

Constant Chord

DIHEDRAL, EACH TIP

None

OVERALL FUSELAGE LENGTH

42 Inches

RADIO COMPARTMENT AREA

(L) 9 3/4" x (W) 2 1/4" x (H) 2"

STABILIZER SPAN

18 Inches

STABILIZER CHORD

6 1/2" (Avg.)

STABILIZER AREA

112 Square Inches

STABILIZER AIRFOIL SECTION

Flat

STABILIZER LOCATION

Mid-Fuselage

VERTICAL FIN HEIGHT

6 1/4 Inches

VERTICAL FIN WIDTH (incl. rudder)

6 1/2" (Avg.)

REC. ENGINE SIZE

.40 Cubic Inch

FUEL TANK SIZE

8 Ounces

LANDING GEAR

Conventional

REC. NO. OF CHANNELS

4

CONTROL FUNCTIONS

Rud., Elev., Ai., Throt

BASIC MATERIALS USED IN CONSTRUCTION

Fuselage Balsa & Ply
 Wing Balsa & Ply
 Empennage Balsa
 Wt. Ready-To-Fly 64 Ounces
 Wing Loading 17 Oz/Sq. Ft.

What's in a name? One of the most difficult tasks for me, I find, is picking a name for my designs. Take the Top Flite Freshman. When I designed that airplane I nearly went bananas trying to decide on a name. Obviously I wanted one that was at least somewhat descriptive. From the time I first drew a line on paper I was thinking about what I was going to name it. I wrote down every name that came to me, even if I was eating lunch or driving to work. Of course, once the design becomes popular we use the name without account for the literal meaning because what was an adjective is now a noun. It is the modeler who ultimately decides the fate of a design, regardless of the name. I think the "Ugly Stick" is a good example. That airplane could have been named "Chicken Squash" and it would still be the same excellent design. So perhaps the name is not all that important, at least to the modeler anyway.

It is a known fact that the majority of R/C modelers are sport fliers who could care less about contests. Just give them a half decent day, a place to fly, some fuel, and the sky belongs to them. Unfortunately, however, the kind of airplane that fits the needs of these modelers is not that abundant in the hobby shop. Why? For one thing some kit makers believe that only contest winning models sell. This is certainly true to a degree but what happens when the plane stops winning? Or when there is a change in rules that necessitates a design change or even abandonment of the existing design? They gather dust on the hobby shop shelf, usually. But the good sport model will sell on and on. Unfortunately, only a few manufacturers recognize this and even fewer supply the sport modeler with the creativity necessary to capture their interest. I think the sport modeler is the most under-rated, least heard, and most laken for granted individual in the entire realm of modeling. And yet he makes up over 80% of our modeling population!

When I design an airplane it is usually because I can't find exactly what I want in the hobby shop. Being basically lazy, I would really prefer punching out die-cut parts and gluing ready-made pieces together. But no sooner do I design one up for myself then everyone who sees the model wants one also. This is great for the ego, but a heck of a lot of work. But it is a labor of love (and little money!) and I have always enjoyed sharing my ideas. It is a great kick to go to any flying field in the country and see a model of my design being enjoyed by someone I don't even know. The satisfaction derived is hard to describe. And so I now offer to you a model called the "Magnum 40."

The Magnum 40 is a terrific "hot dogger". But don't let that scare you because it is also a pussy cat, being very

docile and responsive in slow flight. It is an excellent airplane for fun flies, sport pylon racing, or just plain fun flying. The wing being a 15% airfoil with 546 square inches area carrying 4 pounds around with a .40 size engine on the nose, amounts to an airplane capable of just about anything.

The Magnum 40 has the greatest speed differential capability of anything I have ever flown. It is a real kick to literally burn up the sky with high speed passes, snaps, loops, rolls, pylon turns, etc., and then to throttle back and tool around at almost a walking pace. With a little breeze it will actually "fly" backwards! It will loop tighter than a control-line model and square maneuvers are hard to believe!

Have I got you interested yet?

HARDWARE REQUIRED

Hinges	Du-Bro H-15
Horns (4)	Goldberg
Clevis (4)	Goldberg
Aileron Bellcranks (2)	Goldberg
Landing Gear 12"	Prather
Wheels, 2 1/4" dia.	Kraft
Tailwheel, 7/8" dia.	Perfect
Tailwheel bracket	Goldberg
Exit Guides (4)	Klett
Windscreen	Sig .030 butyrate
Blind nuts, 6/32 (5)	Sig
Allen head screws,	
6/32 (10)	Sig
Engine mount	Sig Large or CB RR 40
Blind nuts, 4/40 (4)	Sig
Allen head screws,	
4/40 (4)	Sig
Fuel tank, 8 oz.	Pylon Brand
Fuel line, medium 1'	Sullivan
Spinner, 2 1/4"	CB
Thread	
Throttle Cable, 18"	Du-Bro
Pinking Tape, 2 x 24"	Sig
Tube, 1/4" I.D.	K & S
Large servo grommet	
Covering Material	
2 1/2 rolls	Solarfilm

BILL OF MATERIALS

Construction

2 — 1 1/2" x 2" x 10"	balsa
1 — 1/2" x 3" x 8 1/2"	balsa
2 — 3/16" x 3" x 48"	balsa
5 — 3/16" x 3" x 36"	balsa
2 — 1/2" x 1/2" x 36"	balsa
8 — 1/4" x 3/8" x 36"	balsa
1 — 1/4" x 1 1/2" x 2 3/4"	balsa
3 — 1/8" x 4" x 36"	balsa
3 — 3/32" x 3" x 36"	balsa
7 — 1/16" x 3" x 36"	balsa
2 — 3/8" x 1 1/2" x 36"	balsa
	aileron stock
1 — 1/4" x 6" x 6"	plywood
1 — 1/8" x 6" x 12"	plywood
1 — 1/32" x 2" x 2"	plywood
1 — 3/32" x 3" x 6"	plywood
1 — 3/8" x 3/8" x 12"	hardwood
	servo rails
1 — 3/32"	piano wire
1 — 1/16"	piano wire

The performance capability of this airplane and its unusually good flying characteristics are, for the most part, due to the airfoil. I have been experimenting for years with variations of this airfoil. I have used it on pattern ships, gliders, pylon racers, and even propellers. In fact the P-47 Thunderbolt that I designed for Top Flite has it partially and by now the flying qualities of that airplane are almost legendary.

you in figures why something won't work and then someone like me comes along and blows their minds. What I think we have here is the "Coke Bottle" theory found on most jet fighters, except where, in that case, the reflex was applied to the fuselage, this is on the top surface of the wing. It was found that by reflexing the fuselage at various stations, the drag was reduced considerably which allowed a much greater speed potential.

attack that generates the most lift in any airfoil. Unlike their full scale brothers, our models are almost always in a continuous change of attitudes and angles of attack. The double reflex airfoil can handle these conditions better than a standard symmetrical, because it will hold the airflow laminar (parallel) beyond the two-thirds point of the wing chord. This happens because as the air reaches the high point it suddenly

MAGNUM 40



A hot-dogger and a pussycat --- the Magnum .40 is both. It'll do just about everything in the book, but is completely docile and responsive in slow flight. For fun-flies, sport pylon, or just plain flying pleasure --- the sky is all yours with the Magnum 40.

By Dan B. Santich

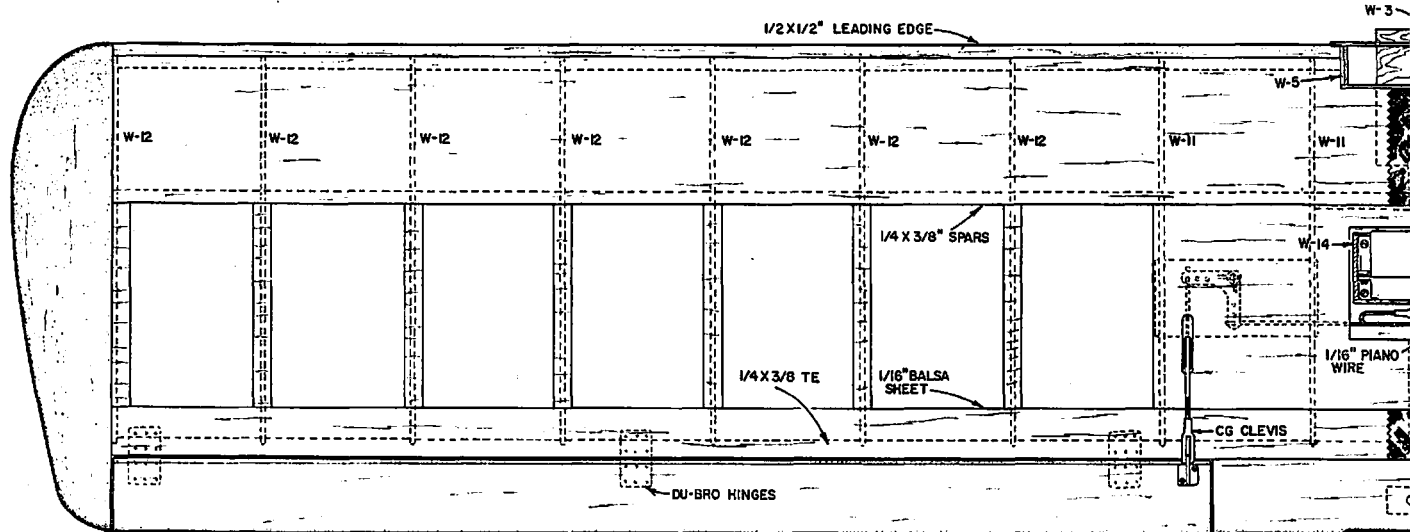
Actually the airfoil having a reflex top section is nothing new. Birds have had it for some time now! But when an acceptable method becomes the "norm" we tend to resist any changes, especially if it is somewhat radical or counter to our understanding.

I am a "rule of thumb" designer and admittedly ignorant to the laws of aerodynamics. But what works, works, and that is what really counts. The theorists can sit around all day and show

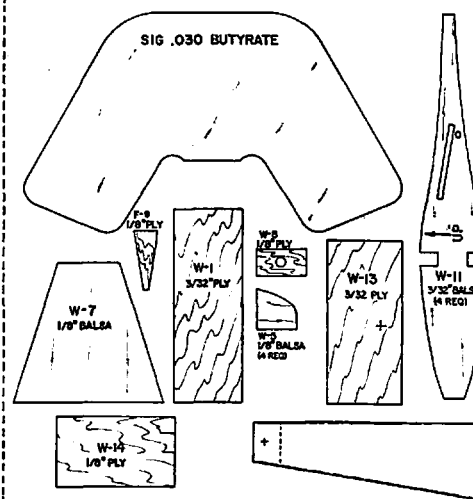
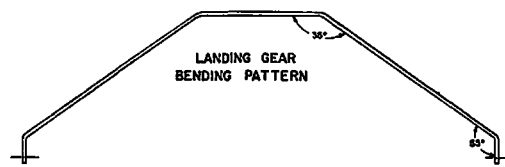
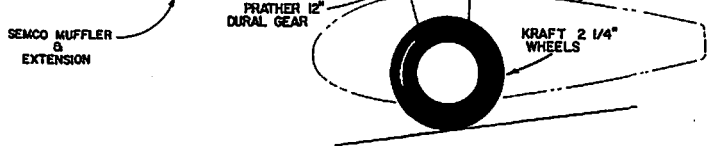
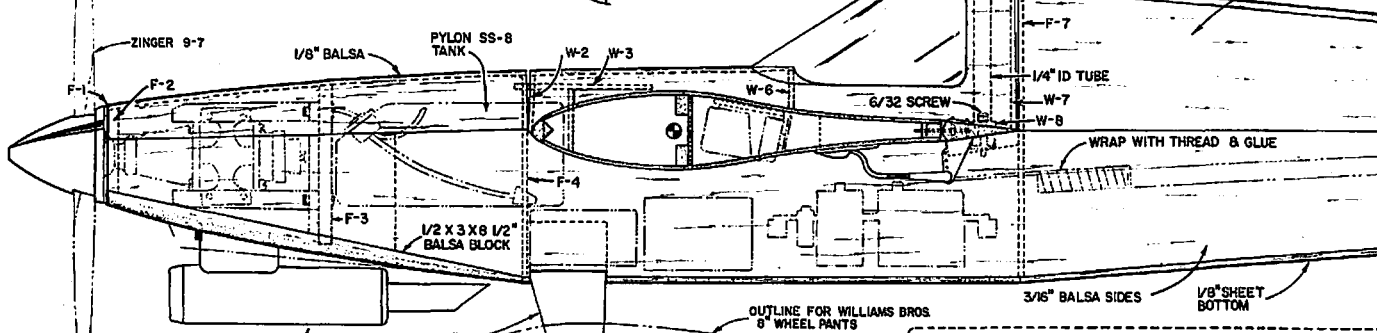
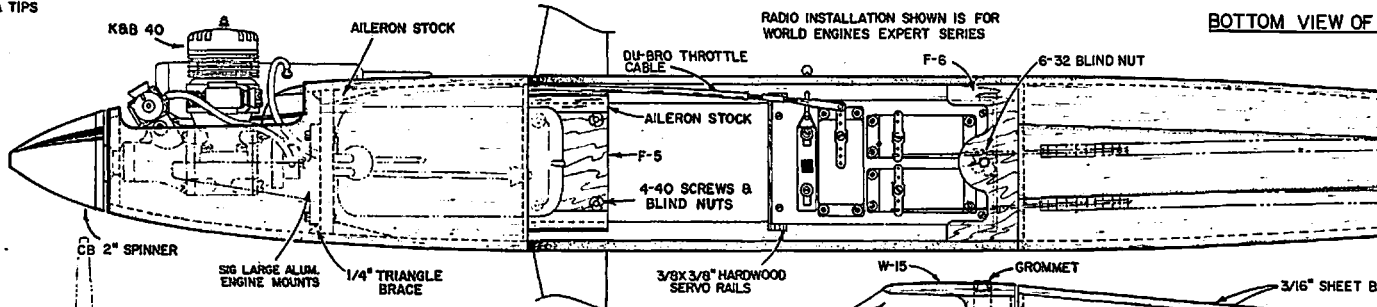
In this case, by reflexing the top surface of the wing, what we have done is increased the distance the air must travel from leading edge to trailing edge. This amounts to an increase in lift without a corresponding drag increase. Since air has no directional grain it could care less what attitude we are in when we pass through it (not counting ground effect). It is when we change direction within that body of air that things happen. It is the initial change in angle of

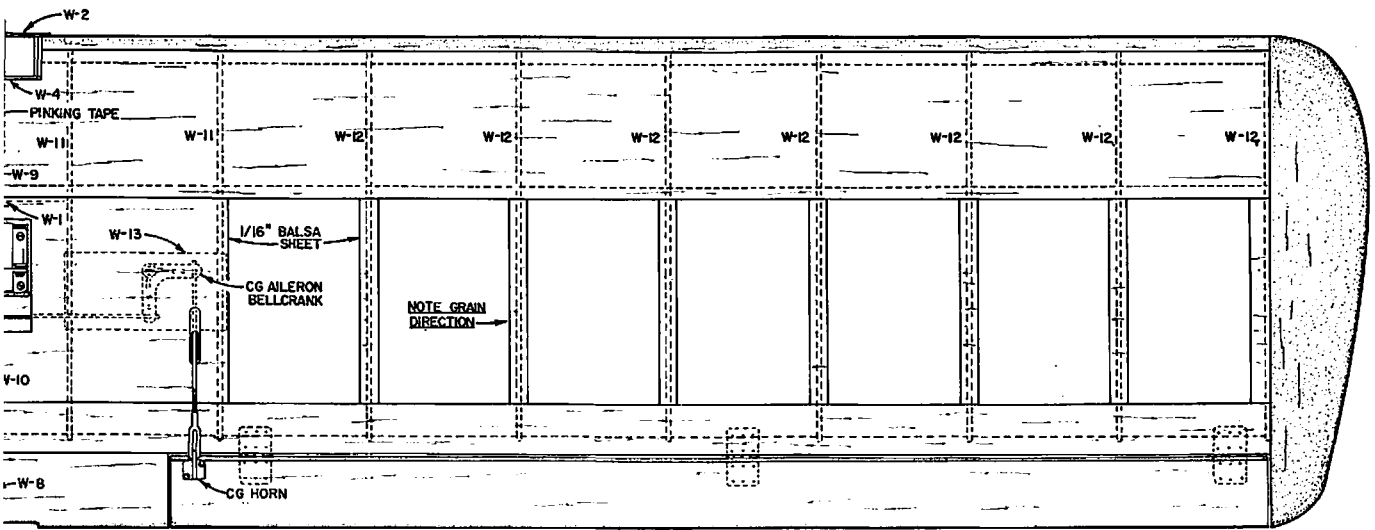
encounters a "down hill rush" to meet the air at the trailing edge. As it accelerates down hill the air on the surface forms a layer of super tight microscopic bubbles which rotate in the direction of the main air flow and form a powerful low pressure area within the reflex zone, holding the main air flow laminar even under conditions of extreme and abrupt changes in angle of attack.

text to page 68

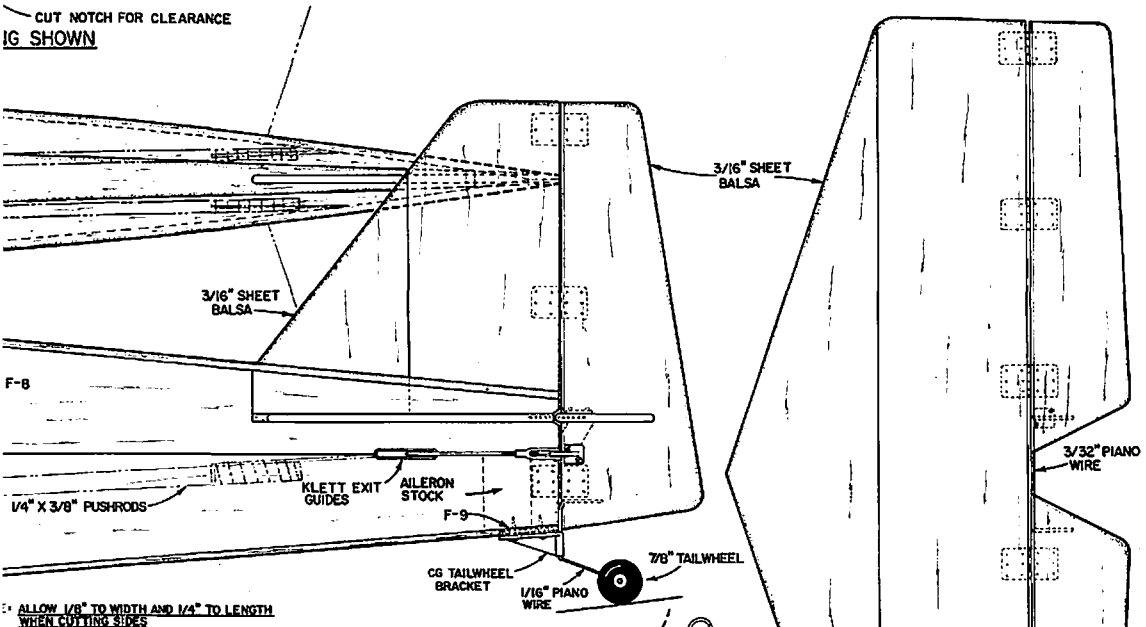


1-1/2 X 2 X 10" Balsa TIPS

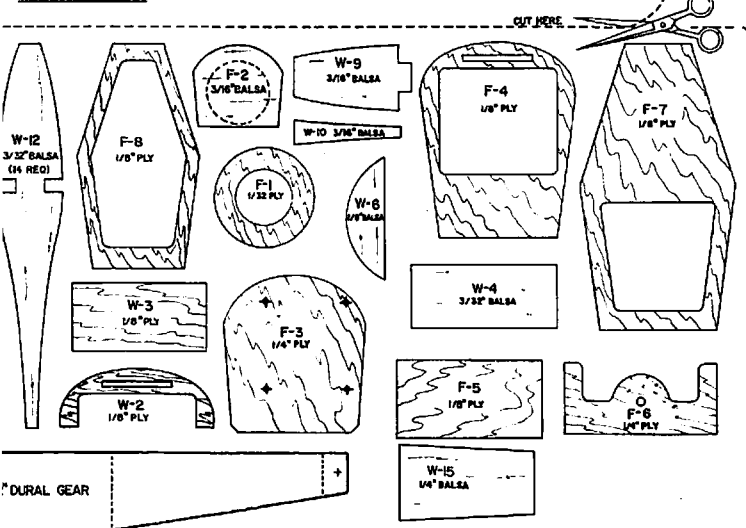




CUT NOTCH FOR CLEARANCE
 IG SHOWN



ALLOW 1/8" TO WIDTH AND 1/4" TO LENGTH
 WHEN CUTTING SIDES



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'MAGNUM 40'

DESIGNED, DRAWN & INKED BY: Dan B. Santich





Completed nose section showing side mounted K & B .40 with Semco muffler.



Landing gear position lends itself to good ground handling.



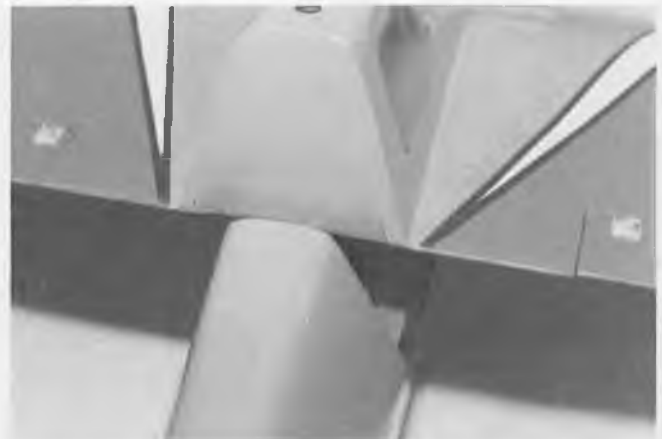
Forward view of radio compartment.



Servo installation is tight but sufficient.



Plywood tongue fits into slot in forward bulkhead.



This is how you get the wing off and on. Don't forget the notch.

Does this sound reasonable? Who knows. But like I said, it works and I can promise that if you build this model you are in for one of the most enjoyable experiences of your modeling life.

CONSTRUCTION

I have located the individual parts on the lower portion of the plans to facilitate construction without having to dismember them completely, something which I personally hate to do. Included with the article is a complete list of

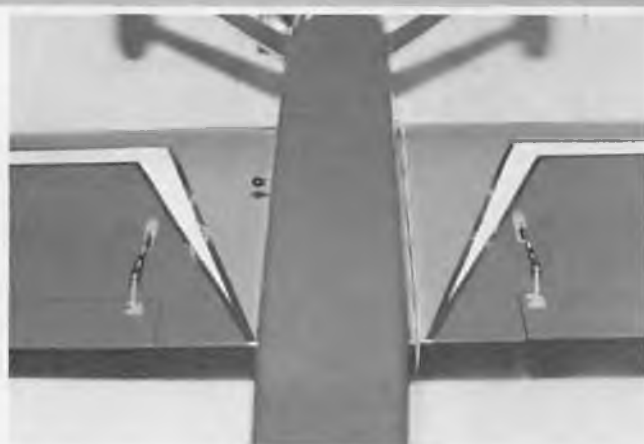
building materials as well as necessary hardware. The proper selection of balsa is essential and this is where you have the advantage over a kit. In a kit you take what they give you. Here you can get just what you want. Be picky because after all it is your money. Titebond glue is recommended for all joints with the exception of the wing capstrips (Pain). Since the reflex of the airfoil will want to let the capstrip lift up, I suggest you use Hot Stuff or Jet Glue.

Fuselage: We will start with the fuselage for a good reason. It is the mount for the wing and it will be much easier to line up when we get to that point.

Cut out all parts identified on the plans for the fuselage. When you cut the 3/16" balsa sides be sure to allow 1/8" to the width and 1/4" to the overall length. This is because the plans are flat and do not account for the curvature or slant. Mark the bulkhead locations of F-4 and F-7 on



Cut-out in leading edge of wing allows clearance for fuel tank.



Bottom view of fuselage with wing in place.



Close-up of notch in rear of wing for removal.



Angle tailwheel back for better ground tracking.



Nose section showing CB aluminum mount installed.



View of rear wing hold-down plate.

one fuselage side and glue them in place. Make sure they are vertical by checking them with a triangle. Glue on the opposite side making sure it is even and parallel. When dry, line up on a centerline and glue F-8 and the tail end together. Drill the holes for your aluminum engine mount in bulkhead F-3 and glue it in place, holding the sides with rubber bands. Glue F-2 in place, notch the 1/2" x 3" x 8 1/2" nose block for F-3 and glue in place. Mount the dural

landing gear to F-5 and glue to the inside of the fuselage. Add the 1/8" bottom sheet all the way back and glue F-9 in place. Add the triangle aileron stock to the top of F-5 for strength. Also glue triangle aileron stock to the rear of F-3 and the triangle braces to the front side. Glue F-2 to nose and, when dry, glue the 1/8" balsa sheet to the top. Glue F-1 to the front end and cut out the center of F-2

Cut the 3/16" top rear section to

shape, and glue in place. Mount horizontal stab, check alignment, and glue. Add the 3/16" fillets to the top of the stab and then glue the 3/16" fuselage top rear section in place. When dry, glue the 3/16" vertical fin in place and check alignment. Cut out the right side of the nose for your engine, allowing clearance for muffler.

Wing: Cut out all wing parts from the plans. To make the ribs quicker, cut yourself a master pattern from thin



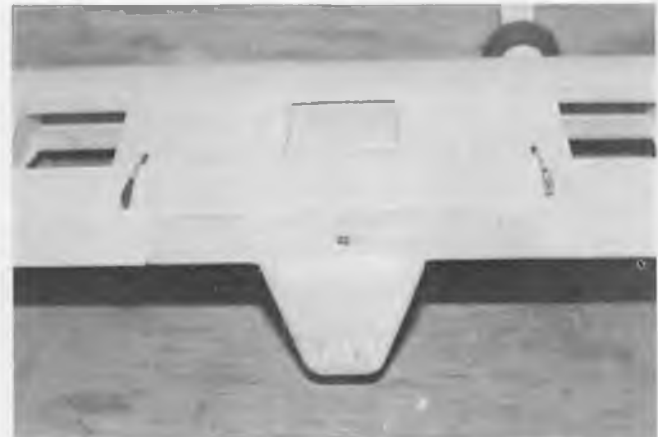
Guide tube for wing hold-down screw.



Bottom view of fuselage.



Cut-out in wing leading edge before covering.



Completed wing viewed from bottom, sanded and ready for covering.



View of wing panel showing reflex. Note cross grain capstrips.



Close-up showing fin and stab installed.

aluminum. This will speed up the task and they will be closer to each others shape. Pin the top 1/4" x 3/8" spar to your table and mount the ribs, supporting them at the back with a 1/2" x 1/2" balsa strip. Notch the leading and trailing edges with an X-Acto saw for your ribs and glue in place. Add the top 1/4" x 3/8" spars and sheet the leading and trailing edges. Glue ply brace W-1 to spars. Glue W-13's in place in the notches of W-11 and insert the

connecting 1/16" piano wire. Mount the aileron bellcranks and threaded pushrod wire. Sheet the remaining center section and add the capstrips. Note the grain direction. Make cut-out for servo.

Turn the wing over and complete the top sheeting and capstrips. Add the 1/2" trailing edge and glue W-8 in place. Drill hole for screw and check alignment. Add wing tips. Check the wing fit on the fuselage and align with the stab. Cut notch out of the front portion of the wing

and glue W-4 and W-5's in place. With the wing on the fuselage, slip ply tongue W-3 into slot of F-4 and glue W-3 to the top of W-4 and where it touches the wing at the rear. When dry, remove the wing and glue W-2 to the front, making sure to angle it back slightly (see plans).

Glue W-6 and W-7 to the top of the wing and add the 1/8" balsa top section. Glue W-15 on top and drill a hole for the 1/4" ID tube. This tube is for access to

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RCM PRODUCT TEST

Mile High Models 1/2A HORNET



The 1/2A Hornet is a general sport aircraft manufactured by Mile High Models, and available at retail dealers for \$20.95. This attractive, easy to build, easy to fly model proved to be a delight right from the start. We're sure you'll agree that walking out of your favorite dealer's store with a kit tucked under your arm for just a shade over twenty dollars has been a good beginning! Well it was and, as things turned out, the situation continued to improve. For example, packaging was done well, with all parts bundled into their own separate category, i.e., all stick balsa together, sheet balsa another bundle, etc.

Only one sheet, 24" x 36", was necessary for plans, and between it and the fine little four page instruction manual (complete with photos, by the way) we felt we'd have no problems in the building department. And we didn't. Looking over the accessories, we found screws, blind nuts, "living" hinges, elevator horn and clevis, an Ace motor mount, and aileron torque rods. About the only thing missing here was a couple of brackets for the aileron torque rods, but after discovering goodies like the Ace motor mount, we felt we were still ahead of the game.

Building was easy, thanks to good material, clear instructions, and a well done plans sheet. The wing turned out to be especially easy to build... was true and strong. Adhesives used included Sig-Bond Aliphatic Resin, Hot Stuff, and Duro 5-Minute Epoxy. We covered and finished our little Hornet with Kwikcote black and orange (the **only** colors for a hornet, we think). The elevator was hinged with Kwikcote and the model was prettied up with D.J. and Bridi white trim tape.

After our radio gear was aboard, our eager little Cox Tee Dee .049 bolted down, and the 1 ounce Sullivan tank filled "lippin" full, we and our Hornet were ready to buzz.

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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	1/2A HORNET
Aircraft Type	Sport
Manufactured By	Mile High Models 4805 Baja Court NE Albuquerque, New Mexico 87111
Mfg. Suggested Retail Price	\$20.95
Available From	Retail Outlets
Mfg. Recommended Usage	General Sport
Wing Span	37 Inches
Wing Chord	6 Inches
Total Wing Area	220 Square Inches
Fuselage Length	29 7/8 Inches
Radio Compartment Dimensions	(L) 6" x (W) 2" x (H) 2 1/2"
Wing Location	Shoulder Wing
Airfoil	Flat Bottom
Wing Platform	Constant Chord
Dihedral	3/4 Inches
Stabilizer Span	12 Inches
Stabilizer Chord (incl. elev.)	4 Inches
Total Stab Area	41 Square Inches
Stab Airfoil Section	Flat
Stabilizer Location	Mid Fuselage
Vertical Fin Height	3 1/2 Inches
Vertical Fin Width (Incl. rud.)	4 Inches
Mfg. Rec. Engine Range	.049
Recommended Fuel Tank Size	1.5
Landing Gear	None
Rec. Number of Channels	2
Recommended Control Functions	Elevator & Ailerons
Basic Materials Used In Construction:	
Fuselage	Balsa & Ply
Wing	Balsa & Hardwood
Tail Surfaces	Balsa
Hardware Included In Kit	See text
Plan Size	24" x 36" (1 sheet)
Building Instructions on Plan Sheets	Yes
Instruction Manual	Yes (4 pages)
Construction Photos	Yes
Kit Includes	Printed Parts
Mfg. Rec. Flying Weight	22 Oz.
Wing loading based on rec. flying wt.	14.6 Oz./Sq. Ft.

RCM PROTOTYPE

Weight, Ready To Fly	19 Ounces
Wing Loading	12.4 oz./sq. ft.
Covering & finishing materials used	See Text
Engine Make and Disp.	Cox T.D. .049
Muffler Used	No
Radio Used	Royal
Tank Size Used	1 Ounces



Mike Grady's beautiful rendition of an A4D in Israeli Air Force colors. Mike describes the detailing of his model built from a Bob Violett kit.



Looking into cockpit with canopy raised. Complete instrument panel and gunsight on glare shield.



Leading edge slat appears to be open but actually uses air brushed shading to create the illusion. Paint chipping and color feathering are clearly shown.



Speed brake is another air brushed effect. Engine bearing oil discharge streak runs across speed brake. Paint scraping above horizontal stab is clearly shown.



Hump back to house electronic gear is distinctive Israeli feature. A myriad of details are seen in this photo. Weathered finish and 20mm gun powder burns are authentic.

AN APPROACH TO SCALE DETAILING

Why build an A-4? The jet aircraft is a product of my era. They were the aircraft I dreamed of flying and, as such, the motivation of the ducted fan assembly as a workable off the shelf product opens a new family of airframes to model.

The jet airframe has many similarities to later propeller drive aircraft and yet offers a somewhat unique challenge in terms of finishing techniques.

In addition to my job at RS Systems, I have been building precise scale models for Fairchild Industries and other aerospace companies for the last 5 years and have developed techniques for weathering and detailing that I thought would be applicable to an RC model.

The success of these techniques have led to the presentation of many of my scale models to Senior Military and Government officials including the Shah

of Iran.

These straightforward finishing procedures apply simple graphic arts techniques to RC modeling in an innovative way.

To begin, I selected Bob Violett's A-4 for its authentic detail and proven capabilities as an airplane. The kit's construction is conventional, with a glass epoxy fuselage with built-up wings and tail. I cover all built-up surfaces with K & B resin and 3/4 ounce glass cloth.

The resin was rough sanded and given a heavy coat of K & B primer.

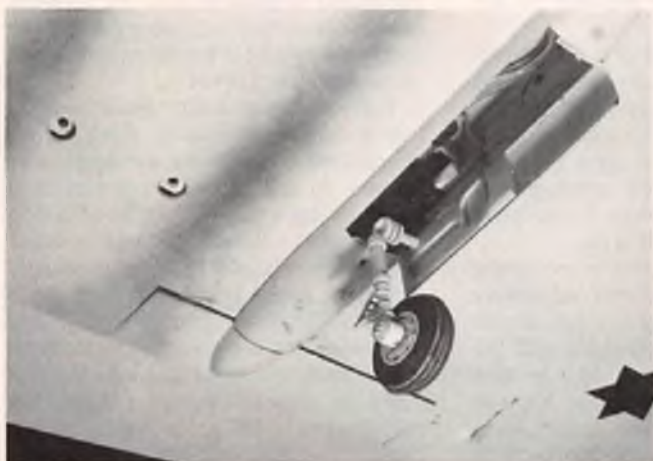
At this stage of a model, I stop building and start planning the finish. In fact, I have disciplined myself to write down in a step by step plan how the aircraft will be painted, where detail will go, in what sequence the colors are to be applied, etc. I find this planning saves weight (several ounces in an aircraft the size of an A-4) as well as time because you

don't tend to forget important details in the finishing sequence.

This planning stage is also the time to organize your scale documentation to insure that your model conforms to the documentation available. It's rough to paint an airplane and then try to find documentation to fit the model.

Many details of my aircraft are constructed from sheet styrene plastic. I purchase the material .010" to .015" thick, Hot Stuff it to 1/16" balsa and then build pre-finished, structurally sound aircraft details. All the vents, louvers, exhaust, lights, etc., are built in this manner as well as the entire cockpit interior. This composite material is strong, light, easy to paint, and can be used in areas that are impossible to sand. Sheet styrene is also easy to cut (by scoring and breaking) and easy to glue with Hot Stuff, acetone or

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Landing gear details. Peg in landing gear coils holds door open. Robart strut covers. Fiberglass landing gear fairing is removeable for access to B & D retracts.



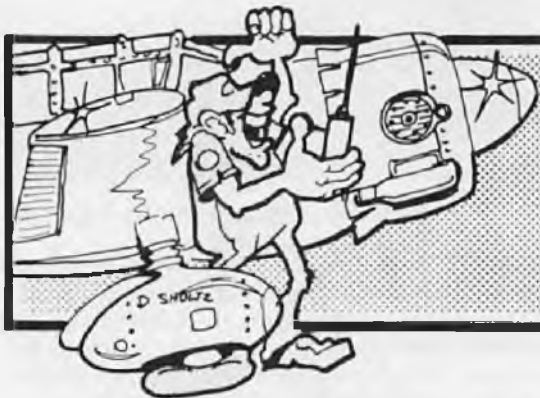
Ejection seat, control stick, and R.H. switch console can be seen inside cockpit. Angle of attack sensor, pitot tube, and windshield blower are details on nose.



Top center of wing shows auxiliary air intake for ducted fan. L.E. slat detailing can be seen. Pneumatic lines for retracts and servo leads enter fuselage.



View from rear showing flaps extended.



SUPER Scale BY DICK PHILLIPS



I don't think I have ever seen anything catch on (and catch fire!) the way Super Scale has done. For the benefit of those of you who have not yet ventured into the area of the very large model, I thought I'd do a bit of a re-cap on my own rationale behind this interesting development.

First, there are both advantages and disadvantages of building quarter scale (and larger models). The disadvantages are relatively few, in my experience, and so I'll cover them first. Storage space can be a problem, especially after you have two or three of the big birds around. Building space is required in order to construct a fuselage that is 5' x 7' long or a wing that is 8' span or better. I have found a common household door to be the best solution to the building board problem. They are large enough to accommodate most of the larger models, they take pins well and they can be stored out of the way while the glue dries. In many cases, your building supply dealer will have a damaged one which he'll let you have at an attractive price. The damage is usually one side or along an edge which precludes use as a door but does not interfere with its use as a builders board.

Another problem is the transportation of the larger model. I could get my 9' J-3 in my Volvo station wagon, with one more conventional model without any problem, along with the usual field box, fuel, etc. The Cub wings were in two sections and this made things a bit easier. A full length 9' wing would probably encroach into the passenger area in anything but the largest station wagon. A van, or pick-up truck with a cover over the back is ideal and will carry several models in the larger sizes. One group in New York State is restoring an aging Chevy truck to resemble a WW I ambulance as a means of getting their many large models to contests and



Bob Brown's Citabria - modified from Bud Nosen kit.



Cliff Nix with his scratch-built, Quadra powered Piper J-3.

displays. The vehicle fits well into their area of interest, all but being part of the display. Not to mention the fact that it will attract a good deal of attention on the highway!

Finally, there is a bit of a problem at the field in that these large models, and especially those which have half-wings, take longer to assemble and disassemble. You take up a bit more room in the pits as well, although this would only be a problem if you have many fliers and little pit area.

On the plus side, there are many details which make the large model very attractive. When using the gas fueled engines, such as the Quadra and the unconverted Cox/Roper, fuel is less than 1/10th the cost of glow fuel. A gallon of regular gas and the appropriate amount of two cycle oil will provide enough fuel for approximately four hours flying. That's time in the air, by the way. Fuel mix is 20:1 and this mixture contains more energy than an equal amount of glow fuel and is burned more efficiently than glow fuel, resulting in better 'mileage' from an equal amount of fuel.

No starting battery is needed with these engines, which means you can start (and re-start) without a starting battery at any time. This is especially handy when you are out at the end of the strip and accidentally kill the engine and your starter battery is always in the pit with the rest of your gear.

The models themselves present a number of advantages over more conventionally sized birds. Not least among these is that they may be constructed from materials other than the usual (and expensive) balsa wood. Most of the straight grained softwoods such as pine, spruce, cedar, poplar, basswood, etc., etc., may be used with

little concern for the slight additional weight gained by their use. Materials such as foam core, mentioned in a previous column, corrugated cardboard, aluminum and steel are now well within the capabilities of the larger engines and the prop reducers, due to the significant increase in torque available.

The larger model is easier to detail since there is more room in which to work and the fine detailing required for a super detailed model is larger and, therefore, less of an eye-straining chore. As time goes on, more and more good things such as wheels, for example, are becoming available and, as interest grows, I have no doubt we will see more and more products for the super scaler coming on the market.

The most significant advantage of these large models is their flying characteristics. They fly extremely well indeed. In one case, a conventional sized model which was a bit of a dog when built as drawn, became a super flyer when enlarged to twice its original size, with a gas engine up front. As a general rule, they fly more slowly (and scale-like) and are easier to fly in that it takes them longer to get into trouble. They are very stable, approaching the performance of full scale flight and are most impressive in the air.

It is interesting to note something here which is quite a common occurrence. One person in an area (usually considered to be some kind of nut) will decide to build a large model. His contemporaries are scornful of his interest and bad-mouth the project right up to the moment it flies. Oddly enough, there is usually a large group present to watch the initial flight of the giant bird and, generally, they leave the field with thoughtful looks on their faces and in due time, several will admit they too have a large model on the building board and approach the 'nut' for help and advice. When this happens, there is soon a pool of expertise within the organization, help and shared experiences are freely exchanged, and not too far down the road, the large models become more common than the conventional ones.

If you have been toying with the idea of building **big** and just haven't gotten around to getting something started, get

started - - - you'll find it is easy, inexpensive and fun (inexpensive in relation to what we have been used to, by the way). In the equivalent of a gallon of glow fuel, using the Quadra, there is about 40 hours flying compared with what you usually get out of a gallon of glow fuel.

There are undoubtedly other considerations depending on individual circumstances, but those mentioned are the major advantage and disadvantage factors in building large models. Be careful though - - - once you get hooked you'll find yourself totally committed to the larger models!

One correspondent has suggested that, as modelers, we approach the construction of large models from the wrong angle. He suggests we are conditioned by our past experience to just build larger models. His background, before becoming a modeler was in home-builts, and his approach is to scale **down** from full scale, rather than as we presently do, scale **up** from models. This is not to suggest that we can only build from full scale plans - - - quite the contrary. His point is that we should be building **in the same manner** as do the home-builders. I suspect we would build much more air-worthy models by taking his advice.

One way to do so would be to join the Experimental Aircraft Association (EAA) which has much good information available for the home-builder which translates into Super Scale very easily, both as to materials and to methods. I am not certain if material is available from EAA without becoming a member, but I am sure the \$20.00 annual fee is worth it for access to the material available from them. (EAA, P.O. Box 229, Hales Corners, Wisc. 53130.)

When it comes to flying the big birds, it is quite important that we check our models frequently and carefully before putting them in the air. In most cases, our bracing wires, struts, etc., are working, rather than decorative, as is often the case with smaller models. A loose screw, a strut or flying wire not tuned to its design stress, or any of a myriad of details not correct, could lead to the loss of a model or a possible serious accident. Sure, we all do this religiously anyway with conventionally sized models (don't we?) and it's a bit more important in dealing with the larger models. One club has developed the practice of someone other than the modeler doing a final inspection before take-off and they have found this to be good practice. The builder is so familiar with his own construction that he may not "see the forest for the trees" and miss something that someone less familiar with the model often catches. Sounds like a good idea and one we could all use to advantage. I'm sure.

Richard Hershey of Lakeport, Calif., has recently flown his J-3 Cub from the

Sid Morgan plan, and on floats. Dick calls the Cub a 'stand way off scale' model and he has altered the original plan quite a bit in building the model. Mine weighed 16 pounds on wheels and there were many who commented on my building it out of 1/4" steel plate or some such material. Dick Hershey's weighs 21 pounds on wheels and 28 pounds on floats. I wonder what they'd think of **that**? Dick has water rudders on his floats and they appear to be non-retracting although he did not mention it in his letter. He has added a sub-rudder to the bottom of the fuselage which is pretty well standard in both model and full scale practice. It sure helps at low speeds. Dick is using hand carved props which he has metal tipped; they look really great and are quite utilitarian as well, in that water will chew a wood prop to ratty splinters in no time at all. Dick sent me a color print of the Cub and, while they are very nice to look at, they present some problems for RCM in that it is necessary to turn them into black and white for use in the magazine. As you will have noticed, RCM uses a good deal of color within its pages, but



not too often in the regular columns. Black and white is easier to use and much less expensive, so if you are sending me pictures of your latest bird, please send black and white glossy prints. They should be needle sharp as some loss of quality is inevitable in the various steps of the reproduction process. What I'm saying is, if it's poor quality to begin with, it's going to be terrible in print. Size for best reproduction is a 5 x 7 minimum size although this is not an absolute. It's just a great deal easier to make use of and the reduction in size makes for a sharper final print in the magazine. Please don't think I don't want your color prints as I'll be delighted to add them to my own collection, but black and white is less complicated to reproduce and less costly as well. If you are working on something you feel might be of interest to others, please let me have copies of the prints, there are lots of us freaks around who are interested in **big** and we'd all like to see what you are up to.

I've had some comments and inquiries about servos for use in the larger models. The following letter from

Ron Occhionero of Maple, Ontario, typifies these letters:

Dear Dick,

I have read your column with a great deal of interest. Some questions have arisen, however.

What size of servo are you using with these large ships and are they standard type. Do you use mass balance on your control surfaces to relieve pressure on the servos.

I am using mini-servos at present and I think they might not be heavy enough. I realize that they have the muscle to move the surfaces, but they might be overworked in doing so.

*Sincerely,
Ron Occhionero
Ontario, Canada*

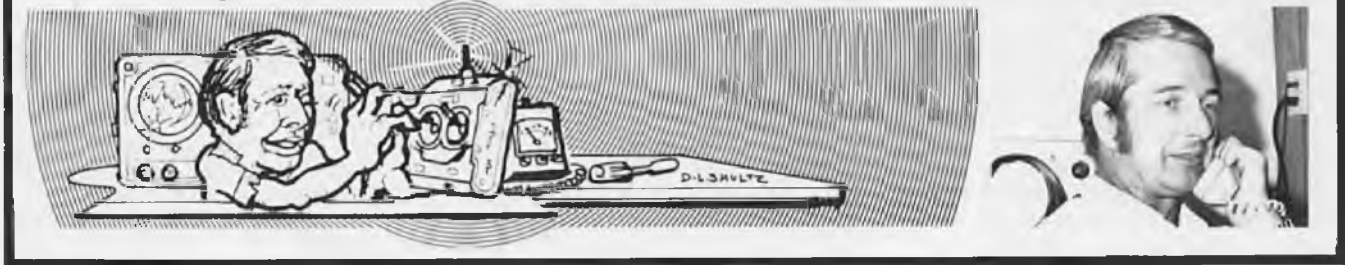
I have been using EK SM Servos (I presume that means Super Mini, or some such) and they have been adequate to the job of moving the large control surfaces involved. The work involved uses battery capacity at a much higher rate than in a 'normal' sized model. Additional battery capacity is required, not so much to produce the power, as it is present, but to provide the capacity to operate for a period of time. Standard 500 mah battery packs last about half as long in the larger model as would be the case in the more conventional size. Therefore, it is necessary to either provide additional capacity, or decrease the flying time in order to provide reliability for the larger model.

I have flown my flight pack right out, and it is a scary feeling to have that big model wandering around up there with minimal (or **no**) control over it. A 100 mah pack is the answer and it should last as long as a charge in the TX. With the big Cub, I get three 20 minute flights on one charge in the RX pack, and that's about it.



EWH servos, amps and cases. The servos are 1 1/8 high, 7/8 wide, and 2 1/2 center to center on the mounting grommets. The arm is 1 1/4 from tip to tip. Starting torque is claimed to be seven pounds with ten pounds at speed. They will operate plugged into the receiver of almost any positive pulse receiver.

The Automatic Field Charger detailed in a recent issue of RCM (D & D to page 102



International Radio Control Frequencies

Recently had an opportunity to talk to Chris Olsen who is head of the FAI CIAM RC Aerobatic Sub-Committee which is the committee that establishes the rules used at World Championships. Chris mentioned that there was a move to try to get a set of RC frequencies standardized at the up-coming World Administrative Radio Conference of the International Telecommunications Union to be held in 1979. At that time, all current allocations of the frequency spectrum will be reviewed and possibly reassigned.

If you were at Springfield in 1977, you probably know that we had a real problem. In many countries the 72 MHz frequencies are not legal and therefore are not used. Therefore, competitors from these countries had a problem with no 72 MHz equipment available to them and knowing that 27 MHz is a real disaster in the U.S., the day was saved at the last minute when a special dispensation was granted, allowing use of 30 to 40 MHz frequencies. But, I'm sure there were a lot of harsh words and a lot of people unhappy with the organizers.

This could all have been avoided if we had established RC frequencies that are legal all over the world.

Chris has talked to representatives of many countries, and the consensus is that the 72 MHz band is a good choice. However, Chris' native England seems to be resisting and is pushing for something up in the 400 MHz range. This, in spite of the fact that they are currently experiencing some difficulties. They suspect that the problems are caused by reflections just as we see in our UHF television. Fortunately, all we get on TV is a ghost. The reflection doesn't crash our TV sets.

Unfortunately, I wasn't able to help define the cause or solution to the problems they're having. Maybe it is just as well, because I'd feel a lot better seeing 72 MHz accepted for World Championships because we've had years of experience using it. I'm sure the 400 MHz stuff will be usable someday, but it might take a few years to work out the bugs.

While talking to Chris, I had a chance to ask about some of the new Master's rules which were a little nebulous. For

instance, the snap in the avalanche was not specified as an inside or outside. Chris said either was acceptable. The wording was kind of strange in that it says you **may** do up to 14 maneuvers in the finals. This would imply that you could do 12 or 13 with a total of 450 points and still be okay. Chris said this was intentional. He also said it is okay to qualify with one plane and fly another one in the finals. This is where I think they really made a big mistake. How would you like to work for ten years and finally make the U.S. team. You go to the World Championships and get to do the qualifying maneuvers, most of which the novice flyers can do. You might be the best in the world at knife edge, reverse point rolls, square loops with half rolls, etc., and never get a chance to show it. It would be like making Borg and Connors play badminton for the first four rounds at Wimbledon, or the NFL playing touch football during the regular season. If I go to the World Championships, I'd sure like to play the same game during qualifying as in the finals.

While we're complaining, let's look at some of the maneuvers. Triangle rolling loop — one second on the climbing 45° leg. Why specify time? Even our fast planes can't do this maneuver with one second legs. Cobra roll — this is one of the most ill defined maneuvers I've ever seen performed. The K Factors are messed up also. A vertical roll or aileron turn is equal to a slow roll? I guess I should quit talking about pattern competition in a radio column, but I just couldn't hold back.

Antenna Ground Planes

Dear Jim,

For several years now I have been troubled with numerous glitches on my Heathkit GDA 405 radio system installed in a standard "Ugly Stik."

I sent the complete radio back to Heathkit several times complaining of this problem, but received no answers and no solutions, but some pretty hefty repair bills. The problem seems to be related to plane orientation with respect to the transmitter since the glitches are not just random but seem to occur at about the same place in the sky when doing similar maneuvers (split S's, etc.).

Needless to say, I was delighted to read in your column in the May issue of RCM about the guy in California who

seemed to be having a similar problem with his GDA 405-2 receiver, and what he had done to correct it. I immediately made the switch of the two condensers recommended and went off to the old flying field confident that my old Ugly Stik was well forever. Well, my hopes were very soon dashed to pieces when the old "Stik" proceeded to go through the usual bump and grind routine. Oh well! Such is life.

For some time I have suspected that there might be some interaction on reflection from the large aluminum landing gear on my "Stik" but discounted this possibility because none of my friends with "Ugly Stiks" seemed to have any similar problems.

In desperation one day, I thought I would try "grounding" the gear to my receiver in hopes of neutralizing or cancelling any interaction from this source. I proceeded to "ground" the gear to the negative side of the receiver by means of a short wire from the negative side of the switch to the gear. To my surprise, this has completely eliminated the glitches which I have experienced for the past two years.

Now, not being any kind of a radio expert, I don't really understand why I was having the problem in the first place, much less why grounding the gear to the receiver should eliminate the problem. This fix is a real "jury" rig and I don't really feel very safe flying around with my landing gear as an integral part of my radio system. I hope maybe you can cast some light on what's going on here, and what might be a better cure for this problem.

Thanks for any help you can give.

Yours very truly,
Fred S. Voegeli
Atlanta, Georgia

I thought Fred's letter would be interesting from a couple of aspects. First, I'm sure there are other guys with similar problems that might be cured with the same fix. Secondly, it should remind everyone that there is still a little "witchcraft" in our RC equipment and although it works in most installations even though it is "tossed" in, there are some scientific guidelines that should be followed.

If you've been reading this column for some time, you probably remember our discussion of antennas and how the ground forms a mirror image. Without

going into a lot of detail, let me just say that an antenna is affected by its position relative to its ground plane. The ground plane might be the earth itself, or metal rods layed in the earth as in the case of commercial broadcast antennas, or a car body as in the case of mobile antennas. Good practice says you tune the antenna with this ground plane in place. Normally our receivers are tuned with no metal near the antennas. Fred's landing gear probably upset the antenna tubing and probably with a little luck, grounding it improved the situation. If you are having problems, it is not a bad idea to try to tune your receiver antenna coil **after** the radio is installed in your airplane. In the early days of RC, and even proportional, this was standard procedure. However, my experience says that with modern day equipment you shouldn't have to worry about this potential problem.

Battery Cycling

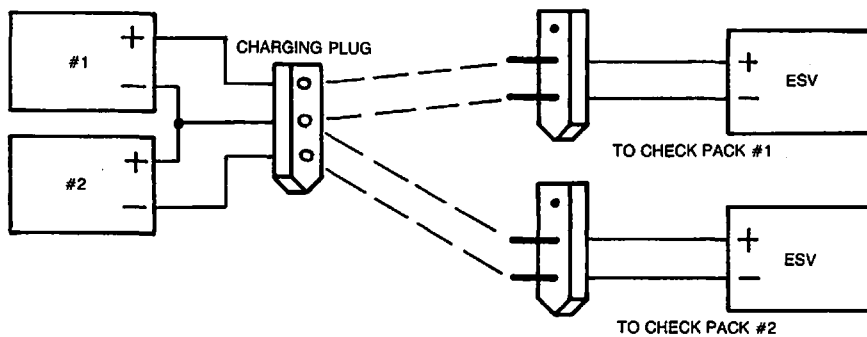
Dear Jim,

I have a question I'm sure you have been asked before concerning the cycling of nicad batteries. I have an M.R.C. 765 and a 5 and 7 channel Kraft. M.R.C. recommends cycling, saying it's good for the batteries, Kraft on the other hand says it's not. I've just purchased a Power Pacer to cycle my nicads. I would hate to think I threw away \$50.00 for nothing. Jim, I hope you can solve my problem one way or another. Is cycling good or bad? Also will it hurt fast rate batteries in the Kraft to be slow charged by the Power Pacer?

Let me know what your opinion is on cycling. I would appreciate any help you could give me and thank you for your help.

Thomas Duesler
Cobleskill, N.Y.

I don't know what the Power Pacer instructions recommend, but if it is like the old Flite Life, it recommends cycling after every flying session. This I definitely think is a mistake. I recommend cycling once every couple



WIRING DIAGRAM

of months at the most. I would agree with M.R.C. that this is good for the batteries, but I would agree with Kraft that more frequent cycling can actually be bad for the cells.

The slow rate will not harm the Kraft batteries, however, we have seen cases where these cells would not take a slow charge after they have been deep discharged. This probably indicates internal shorts in the cells which make them marginal, so you shouldn't be using them anyway. Don't throw away the Power Pacer but don't use it too often.

ESV Use

Dear Jim,

Referring to J. Sepulveda of Mexico (letter in June 78 issue) about EK ESV, I suggest he do the same as I on my two EK systems.

All that he needs is a charging plug (same as on the EK switch harness, but with 3 wires instead of two) available from EK.

Here is a wiring diagram as he asks for; adequate text not needed. Using the ESV as shown on the diagram permits checking one pack at a time, same as he checks his flight pack batteries.

Jacques LaLiberte
Quebec, Canada

Gel-Cell Charging

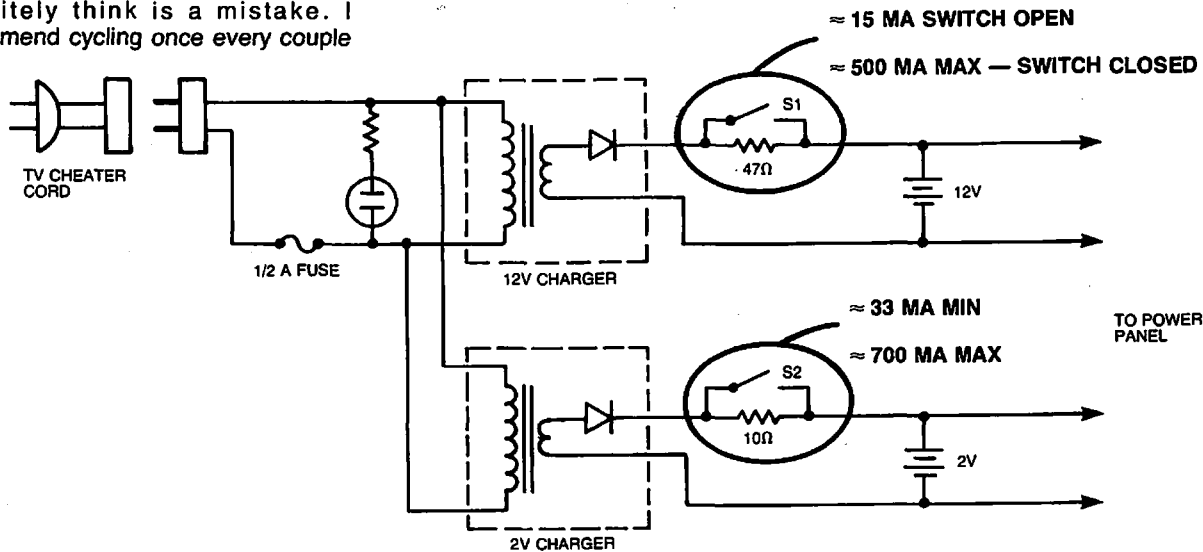
Dear Mr. Oddino,

In reference to your April column, concerning overcharging lead-acid and gel cell batteries, I am sending a partial schematic of my power panel. I am using a 12v gel cell and a 2v gel cell with the manufacturer's supplied chargers. I've installed a 47 ohm resistor shunted by a switch in the 12v charger lead and likewise a 10 ohm resistor in the 2v charger lead. This drops the final charge rates to 15ma and 33ma respectively.

After a flying session, I close the switches and charge at normal rates for two to four hours. Then I open the switches and trickle charge for a day or two. During winter months when the batteries are not used, I trickle charge them for 3 or 4 days about once a month.

The trickle charge rates are arbitrary. From experience I found that an 80ah automotive battery will stay fully charged without cooking with a 60 to 80ma trickle. I, therefore, chose somewhat lower rates for the lower capacity gel cells, which I believe would allow continuous charging without overcharging.

I measured the back leakage through the 12v charger at 1 micro amp and



SCHEMATIC

nothing measurable on the 2v charger, so I have permanently attached the chargers to the batteries. This takes a little of the work out of recharging after a flying session.

Sincerely,
David P. Lake
Stowe, Penn.

Sounds like a good approach to me, although it requires a little effort and could be disastrous if you forgot it in high rate for a day or two. You could add a timer to prevent this I guess.

While on the subject of gel cells:

Dear Mr. Oddino,

I find your column very interesting and informative. I wish to thank you for a very fine job. I have read your column in the July issue of RCM on the charging techniques of 12 volt gel cells. It would much be appreciated if you could give me any information on the charging of 8 volt gel cells with an amp/hr. rating of 2.6.

Sincerely,
Frank Ackerman
Ontario, Canada

The information in the July issue can be applied to any gel cell battery. Your 8v battery is made up of 4 cells, nominally 2 volts each. You would set your charger output voltage to $2.3 \times 4 = 9.2$ volts. The current limiting properties of the integrated circuit regulators shown will be acceptable for your 2.6 amp/hr. battery.

◆ Multiple Airborne Sets

Dear Jim Oddino,

I am a new modeler and am looking for the perfect situation, which I think is to have one transmitter and in the planes, boats, etc., have a receiver and battery and the number of servos needed.

For example, 1 radio (mine is 72.400 MHz) and have 3 different planes with the complete package in the planes and have the radio compatible with all of the packages. Question: Is there any way of doing this and if so, how much will it cost, how reliable is it, etc.? Please let me know!

Kevin Sheldon
Helena, Montana

I don't know if it is the perfect situation, but what you ask for is quite common practice. Many modelers have more than one airborne system tuned to the same transmitter. In fact, with many of the new plug-in module receivers, the additional receivers don't require tuning to your transmitter. Just plug it in and go fly.

Almost all manufacturers sell airborne sets individually, without transmitters, and many sell components, such as receivers, servos, batteries, and switch harnesses individually. Receivers are \$50.00 to \$100.00 and servos \$30.00 to \$50.00, depending on manufacturer. Battery packs run about \$17.00 and

switch harnesses about \$5.00.

The additional systems should be just as reliable as the original system. There is no compromise.

On the negative side, if your transmitter quits, you can't fly or sail anything until you get it fixed. You might also want to adjust all the trims for one plane and not disturb them. This is impossible if you are going to use the same transmitter for more than one plane.

◆ Information

Transmission Techniques

Mr. Dan Hoffman of Springfield, Penn., tacked the following message on a recent letter:

Some quiet day when you are scratching around for some subject matter, how about your views on the advantages of a "cw" modulated "locked in" xmtr. with the present state of the art digital program at audio Hz? Then we will have come full circle from the old Pulse Tone only far better. Oh well, I just had to ask that one.

Sounds like Dan remembers the early progression of RC systems. The very early systems used what was called "cw" for carrier wave. The pilot merely keyed the transmitter on for short pulses with a simple push button. The transmitter was off most of the time with no RF going to the receiver.

This left the receiver open to any interference that might be present, and at that time with super regenerative receivers being used, anything close to your frequency got in. Somebody came up with the idea of leaving the carrier on continuously and modulating it with an audio tone which would be keyed on by the pilot when he wanted to send a command. This proved to be a much more interference free system. Later, multiple tones were added for multi-channel with tuned reeds and tuned filters used to decode them.

Our present day systems are very similar to the early "cw" systems, in that we simply turn the carrier on and off. There is a big difference, though, in that we turn it off for very short periods and our receivers have automatic gain control (AGC). The AGC essentially makes our receivers less sensitive to interference as long as it is receiving the transmitter carrier. It has a time constant that holds it in this less sensitive condition during the short periods that we pulse the transmitter off.

Dan's idea of using a tone with our digital pulse train is not a bad one, and I'm sure every manufacturer has considered this approach. There is a basic problem however. We now have and want proportional control with super resolution. We want to detect changes in pulse width down around ten microseconds. To do this, we would need a much higher frequency tone, in fact one that would make the systems

illegal. Perhaps in the future, if and when we can get some high frequency channel assignments such as 400 or 900 MHz, the FCC will allow wider bandwidth and this scheme could be used. Picture a club transmitter that everyone plugged into with their private "tone." Everyone would fly on the same RF frequency, but each guy's model would only respond to his tone.

◆ Six Meter Frequency Allocation

Dear Jim,

I am in the process of combining two hobbies, Amateur Radio and R/C airplanes. I have come up against a dead-end and thought you might be able to help out. From all the literature and magazines I have read over the past year, Amateur Radio licensees can use 53.10, 53.20, 53.30, 53.40 and 53.50 MHz. My question is who set up these particular five frequencies? And why just these five?

Parts 97 - F.C.C. Rules and Regulations (Amateur radio service) makes no reference to these frequencies. The way I read the F.C.C. regs, pulse position modulation is defined as modulation type A2 which can be used on all Amateur frequencies above 50.1 MHz.

The above mentioned frequencies at 53 MHz seem like a poor choice since Part 97.61 (b) (13) designates 52.0 through 54.0 for Amateur repeaters. Do you know why other frequencies on 6 meters can't be used? Also 53.30 is designated as a RACES (Radio Amateur Emergency Service) frequency for making initial contacts with military units - Part 97.185 of the F.C.C. regs.

I suspect the 53 MHz frequencies for R/C just evolved by convention. Was this worked out by R/C equipment suppliers and the Academy of Model Aeronautics? Any light you could shed on the subject would be appreciated.

Best regards,
Andy Felix

Silver Spring, MD.

Welcome to RC Andy. I think you will find it very rewarding. To set the record straight, Amateur's can use other 50 to 54 MHz frequencies. The spot frequencies you mentioned are strictly recommended. I'm not sure who set them up originally, but I suspect that it was worked out with the manufacturers and AMA as you suggested. However, they represent a good choice for the following reasons: First, most ham activity is on the low end of the band. Most Amateurs don't want to make their neighbors mad by interfering with Channel 2 which is 54 to 60 MHz. Also the people who attempt to govern the repeater activity have honored "our" RC frequencies. This doesn't say someone can't use the RC frequencies for

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GOODYEAR F2G The Blimp With Gull Wings

In the early days of World War II, the need for an armada of aircraft led to the award of production contracts to any company that had aviation experience - - - and to some who didn't. Not in the latter category, Goodyear Aircraft had built the Navy airships Akron and Macon, then the ubiquitous blimps and components for other companies airplanes. They had the added advantage of years of mass production skills developed in the tire business. But it was still quite an undertaking when they were assigned the task, in February 1942, of turning out Corsairs under license from Vought. Despite shortages of everything, particularly engineers, test pilots, and skilled aircraft workers, in just a year they built a factory in Akron with a moving assembly line and flew their first Corsair — designated FG-1 - - - in February 1943. By February 1944, 1000 had rolled out and by VJ Day, 4,017 were completed, second only to Vought itself — who made 7,829.

The Corsair had proven itself an effective weapon in the Pacific so the Navy gave thought to improvements early in the war. Goodyear was assigned the task of mating the big new Pratt and Whitney R-4360 Wasp Major, a 4 row, 28 cylinder behemoth of 3,000 horsepower, to the bent-winged fighter. The idea at first was to try to keep the airplane as stock as possible so the new version would be easy to produce. But as engineering proceeded, more and more requirements were specified by the Navy and a bubble canopy added, causing extensive re-design. The increase in power changed the fine flight characteristics of the prototype. The most serious defect of the F2G proved to be poor lateral control and when sharp descents were made at low speed - - - as would be the case in a carrier landing - - - or wave-offs were made from aborted landing attempts, there were problems. After some experiments, an ingenious solution was found and applied to the F2G-2. The fin was jacked up a foot and an auxiliary rudder was built into the space. This was interconnected with the flap mechanism



Cook Cleland won the 1947 Thompson in this modified F2G-1 (Photo from Peter M. Bowers Collection – Castle Graphics.)



Cleland's No. 94 F2G-1 in an early configuration. It was later further modified and won the '49 race with a record 397.1 mph. (Photo from Peter M. Bowers Collection – Castle Graphics.)

and would deflect 12½ degrees to the right when the flaps were lowered more than 20 degrees. (The fin on the standard Corsair already had 2 degrees of built-in right trim to counteract torque.) This Mickey Mouse device seemed to have the right effect but a model builder would probably feel that the increase in total vertical tail area may have also contributed a lot to the improvement in performance.

In spite of its teething problems, the F2G was fast - - - reaching 450 miles per hour. On the day the Army-Navy "E" (for excellence in production) was awarded to the factory, Goodyear test pilot Don Armstrong, demonstrating the F2G to employees, climbed vertically to 12,000 feet at the rate of 7,000 feet per minute, rolled over and came down on a pass at more than 500 mph. The F2G could become airborne in 100 yards and clear a 50' obstacle in 200 yards. The end of the war cancelled the development program, but the airplanes went on to show their speed as racers in the post-war revivals of the Cleveland National Air Races.



An F2G fuselage separated on the major seams just below the cockpit rim and at the headrest. This part is shaped the same on both the F4U and the F2G. (Photo by Goodyear Aircraft.)



Practically a side-view drawing of an F2G-2 flying from the Patuxent Navy Test Center. (Photo 80G-275856 from the National Archives.)

Shortcuts To A Sport Scale F2G

The Corsair has always been popular with aviation buffs and model builders, but nothing like it is now, what with NBC having made it literally a household word with "The Black Sheep Squadron." (Keep bugging them about that cancellation, Robert Conrad!) A fair number of kits are available. I'm probably missing some (and will no doubt hear about it), but here is a list of the ones I know about: Jemco — F4U-1, 54" span, for engines .40 to .60. \$68.50; Royal — F4U-1D, 54½" span, for engines .40 to .50. \$74.95; Royal — F4U-1D, 61½" span, for engines .45 to .80. \$82.95; Sterling — F4U-1A, 36" span, for engines .049 to .10. \$29.95;

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102" BUD NOSEN TRAINER



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4 Channels
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8' 1933 GERE SPORT



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1/4 size Standoff
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10' CESSNA 310 TWIN



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- 1800 sq. in. wing
- 26 1/4" chord at root

- 4 channel radios required
- Designed for .60 engines with prop driver
- Very stable flyer
- Proof of scale 3 views
- Kit includes 21" canopy

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- 6" spinner is not included available direct only \$16.95
- Huge rolled Plans
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- Decals not included

BUD NOSEN MODELS, INC.

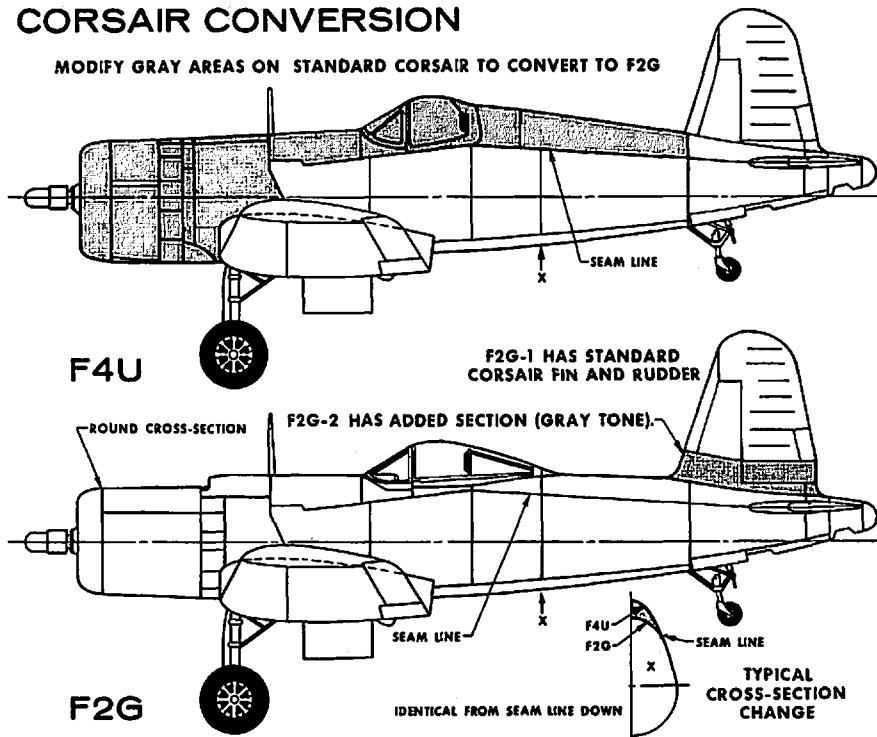
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catalog 50c

CORSAIR CONVERSION

MODIFY GRAY AREAS ON STANDARD CORSAIR TO CONVERT TO F2G



Brian Taylor — F4U-1, 61½" span, engine size not available but is obviously about .60 size. Plans, \$9.95, Cowl \$9.00, Canopy \$3.50. All of the above plans are available from Bob Holman Plans, P.O. Box 741-SM, San Bernardino, Calif. 92404.

All of the above designs have built-up balsa construction. There is also at least one Japanese kit of the Corsair. In addition, I hear rumors of a Top Flite kit to be available in the Fall and a 1/4 scale biggie in the works by another company.

For something out of the rut, why not convert a standard Corsair kit to an F2G? As can be seen from the accompanying sketch — there is a lot of Corsair left in the F2G. If the major seam lines (and there are some disagreements between 3-view artists about the seam lines) were not obviously used in design of the kit, you can add them and re-design the structure accordingly. The major job will be reshaping the turtle deck. Re-draw the cross sections on tracing paper, in a pile, one on top of the other so you can see the contours of the formers progressively. One of Sig's World War II bubble canopies should fit any of the kit sizes listed. The nose reshaping will not be hard, since I would recommend splicing in blocks of balsa and carving the new shape (and not just because this is easier than plotting formers — and it is). The fact that Corsair builders (be they F2G or F4U) must face is that the model is going to be tail heavy. Not maybe — will be! So go easy on tail parts and anything goes in the nose. One of the major reshaping necessary for the F2G is carving depressions in the sides just behind the cowl for exhaust stacks at a point where the F4U is clean

skinned. The blocks will give you wood to shape the fuselage into the new round cowl. Incidentally, Jane's All The Worlds Aircraft — 1947, says the F4U and the F2G are within an inch of being the same length.

In the DCRC newsletter, Steve Winzer relates the story of Stan Mack's Corsair which needed 3 pounds of lead in the nose. Designed for a .40, he used a .60 and the model flew well until the landing. This was at high speed because of the weight increase from the balancing lead and the Corsair nosed over into a bouncing cartwheel across the field, breaking the nose off first and then the tail. Steve commented that maybe Stan could lighten the tail in repairing the model. I'm all for having the C.G. correctly located and even a little forward on test flights, but 3 lbs. seems like a lot. A nose heavy tail dragger is going to want to go head over heels on touch-down and even try it on take-off. **Still** - - - don't fly tail heavy. I remember what happened to Bob Karlsson's Corsair at the Glenview Nats when his nose weight fell off in the air. The model immediately became unmanageable and splattered itself. But I digress — and I'm not trying to scare anyone out of a Corsair. Just be sure to build the tail light and fasten the nose weight in permanently. I've seen Corsairs — Jim Bonanno's Royal kit and Karlsson's next Corsair come to mind — that fly perfectly.

Here is a list of sources for material that will help in converting an F4U to an F2G or just provide interesting reading material for historical buffs and collectors:

MA Plan #25 — Goodyear F2G-1 and F2G-2 3-views. 1/48th scale. \$1.00

plus .40 cents postage. Miniature Aircraft, Box 26331, Indianapolis, Ind. 46226.

Model Airplane News — April 1958. 1 page 3-view. Shows conversions and color schemes of Cook Cleland's F2G's flown in the Thompson Trophy Race.

U.S. Navy and Marine Corps Fighters — by William Green and Gordon Swanborough. From the World War II Fact File Series. Published by Arco and available from most aviation book dealers. Photos and drawings showing the F2G-1 and F2G-2 development from the Corsair. \$4.95.

Goodyear Aircraft — by Hugh Allen. Published 1947. Out of print but available at times from used aviation book dealers. Photos and historical data on F2G's.

Chance Vought F4U Corsair — by Maloney and Feist. Part of the Aero Series — No. 11. Available from most aviation book dealers. Pictures of F2G's as well as many others of the standard Corsairs.

See a copy of aviation historical magazines like Air Power, Wings, Air Classics, etc. for ads of aviation book dealers.

The National Archives (GSA), Washington, D.C. 20408, has a number of photos of the F2G. Upon receiving your written request for information, they will send you photocopies of 10 photos in their files that answer your specifications. (Applies to any airplane, not just the F2G.) If you want more photos after selecting some from the first group of 10, they will supply another group of 10. This is a valuable service to the scale builder, particularly so in the case of rare subjects like the Goodyear. I can remember when the photos at the Archives only cost \$1.00 and the listing was not limited to 10 per request. But over the years the "user must bear the cost" philosophy has steadily escalated the prices and now an 8" x 10" glossy is \$4.65. But at least with the photocopy listing you can see approximately what you will get for the money and there is no extra charge for the search service and listing.

Here are some of their F2G photos:

72-AC-22G-46: 3/4 front closeup of closed canopy, F2G-1.

72-AC-22G-48: Cockpit interior, F2G.

80-G-275857: Aerial view from below.

80-G-275854: Aerial view, 3/4 front, F2G-2.

80G-275855: Front 45 degrees, F2G-2.

80G-275860: Aerial, 3/4 rear, 45 degrees, F2G-2.

80G-275858: Aerial, 45 degrees above, F2G-2. (The last two are good views of the exhaust stack depressions in the side behind the cowl and the shape of the top intake.)

80G-275859: 3/4 front, 45 degree, from below.

For other F2G photos, see the next

column item. The last information I have is that one of Cleland's F2G racers survives in a private aviation museum run by Walter Soplata in Ohio.

New Photo Service

Many times I have heard scale modelers say, "I wonder if Pete Bower's photos are available?" Model builder, home-built designer (Flybaby) and a respected aviation historian, Pete is one of those few dedicated enthusiasts who has been taking and latching on to photos of aircraft ever since they saw their first airplane. Pictures from his collection have been seen widely with his articles and books and have been used with many other author's efforts. In addition to his own work, he had many examples of other well-known photographers. Now prints from all of his 50,000 plus negatives are available from Castle Graphics (P.O. Box AD, Greenbank, Wash. 98253). The prices make the National Archives seem like a governmental rip-off. Castle asks .35 per 616 contact, .75 for 4 x 5 or 3 x 5, \$1.25 for 5 x 7 or 5 x 8, \$2.00 for an 8 x 10, and \$3.50 for 11 x 14. A sampler catalog of 2,000 photos and a sample photo can be had for \$1.75. The catalog lists the titles of 228 specialized catalogs for specific manufacturers, countries and categories. These are 10 cents each, refundable on the first order from them. These catalogs cover all of the photos available on the subject. Vic Seeley of Castle Graphics tells me that they have 800 pages of photo lists.

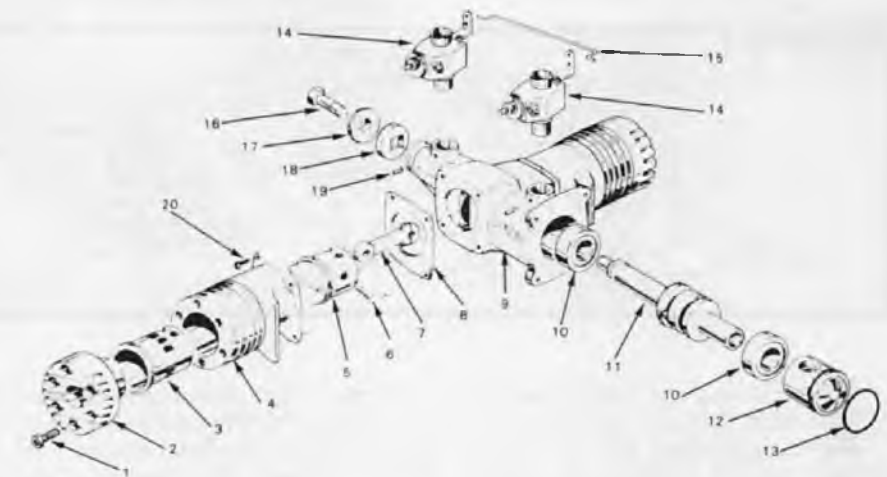
I was able to get several good F2G pictures and am currently pouring over several of the specialized lists, picking out some goodies. They also have 3-view drawings and aviation lithographs available.



The Kendel Twin - 1.2 cu. in.

Scale Powerplants The Kendel Twin

We recently had an opportunity to run a sample of the new Kendel Twin, a 1.2 cubic inch tailor-made for scale models. It will look fine sticking out of an early Aeronca or other exposed engine subject, but is also very cowlable. Most any size cowl that will conceal a .60 can cover up the Kendel, since it is essentially two .60's opposite each other, hooked to the same crank shaft. In fact, the analogy is actually carried out in the construction of the engine. Each



Equipped with two Semco mufflers and running rich for break-in, the Kendel indicates 10,100 rpm on a Royal Pro-Tach, 14/6 prop. The twin tanks are handy for the two carbs, cancel any chance of two feed lines becoming tangled in a single tank; are easier to fit into some airplanes.

cylinder has its own carburetor and the crankcases are separated from each other by the center bearing. This design avoids the problem of uneven fuel flow to the cylinders that has plagued designers of model twins. (Ross had another solution on his .60 twins. He made them as symmetrical as possible by careful bypass placement, locating the cylinders directly opposite each other and staggering the connecting rods. Fuel fed fairly evenly from the single carb.) About 10 years ago, Ben Shereshaw, designer of the famed pre-war Bantam .19, worked up a two carburetor .61 twin quite similar to the Kendel in layout. He gave me a sample to try out and I put it in the Fletcher FU-24 that I flew at the Bremen Internationals in 1969. It ran fine and had a good idle, but Ben later decided not to put it into production. Gene Dellisanti and Kenneth Turocy of Kendel carried this twin carburetor layout to the ultimate in that they recommend that the cylinders be started up individually and the idle set as though each were a single cylinder engine. This is accomplished by a neat little bit of trickery. The glow plug is removed from the opposite cylinder but the carburetor is left hooked up to it for lubrication. The now compressionless dead side is allowed to run free as the other cylinder is adjusted, both for high and low speed in the normal manner. Then the process is repeated on the

other side. When both glow plugs are in and the engine started up, the idle is in shape and the high is slightly richer coupled than when the cylinders were pre-set originally, but this is not a bad thing at all.

The Kendel starts easily by hand but it is too much for a standard starter. This will soon be remedied by the appearance of the 1/4 scale starters under development. It is a very loud engine, as would be expected from the displacement and you will need ear protection working near it when it is being run unmuffled. To find out how it liked mufflers, I fitted two Semcos to it. This turned out to be an easy job, for the Semco adapter No. 16-L, made for the OPS .60, was a perfect fit in the exhaust stacks of the Kendel. My testing time was limited but the engine is well adapted to mufflers, appearing to lose only about 250 rpm. It runs smoothly - - - the opposed cylinders cancel a lot of vibration. The company rates it at 11,000 rpm with a 14/6 prop and I'm sure the engine will reach this after the break-in period. They also recommend 15/5 and 16/4 props, plenty of bite for some pretty big airplanes or just for airplanes with large cowlings and a lot of drag. The Kendel measures 6.36" from fin to fin on the cylinder heads and is under 7" with the glow plugs in.

I would definitely recommend the use of hot plugs on any twin cylinder engine, to eliminate the chance of the fire going out in one cylinder during a prolonged idle period. Needless to say, this conks the engine immediately. The L & L On-Board Ignition System, described in this column in the August RCM, would be just the ticket.

The price of the Kendel is a reasonable (considering the complex engineering and tooling required) price of \$325.00. For further information, write to Kendel Model Engines, 43443 Telegraph Rd., Elyria, Ohio 44035.

Light Up

Vern Zundel of Classic Flying Machines Co., 4956 Tiemann Ave., St. Louis, Mo. 63123, is producing a new line of lights for scale models. The Super

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Hover



If I started off by saying that the 1978 NRCHA Nat's was the biggest, best, etc., helicopter contest to date it would just sound repetitious. But I've got to say it --- the NRCHA Nat's for 1978 really were the biggest, the best, the most entries, the most helicopters and also the wildest and the best overall flying I've ever seen.

This was the 5th NRCHA Nat's and if you go back and compare the first year with this latest, it becomes so evident of the progress the machines and the pilots have made. Just as recently as a year ago, a loop or a roll that was completed without a crash, and to any degree recognizable, was really something, but this year, just one year later, a standard loop or roll was very commonplace with practically everyone doing them and very high quality ones at that. To be competitive in the Hot Dog Class, double loops, double rolls, triple loops, triple rolls, Cuban Eights, split S, pilot walk around, stall turns with one or two 360 tail rotor spins and a 24" square pedestal landing, were some of the maneuvers that had to be done. But I'm getting ahead of myself, let's back up to Friday, July 21, 1978.

Friday morning dawned hot and humid. Seeing license plates from all over the country --- California, Texas, Florida, New England states, North Carolina, Midwest states, Canada, and on and on, it was evident this year was going to be the best NRCHA Nat's yet.

There were somewhere around 175 helicopters at the contest with 61 official entries and never a dull moment for the whole three days. There were helicopters in the air from sun-up till dark with the contest flying between 9:00 a.m. until about 4:30 or 5:00 p.m.

Without a doubt, the aerobatic helicopter is here. The majority of entries were flying the Heli-Boy or the flybarless Revolution II, and not just in Hot Dog --- these machines were entered in all the classes from Novice on up. The number one helicopter used was the Heli-Boy, with Revolution, then the Kavan Jet Ranger, Du-Bro Shark and Heli-Baby, following in that order. The radio compound area had just about every brand you could name with Futaba being the most popular followed by Kraft, Variant, Proline and on down the line. The contest this year was held in

Columbus, Ohio, at the beautiful Alum Creek State Park right below the breast of the dam. Dwyane Stephens, the C.D., did an excellent job of running a very smooth and professional contest. Each entry received a tri-colored pin shaped in the outline of Ohio engraved with a helicopter and 1978 NRCHA Nat's Contestant. Very nice.

The whole three days went off perfect with the weather being just perfect until after the whole show was over and everyone heading home --- then the rains came. I wish I could write on these pages all of the good fun and especially the fellowship that I get from a contest like this. I got to meet many of the fine people whom I know only from talking with them on the phone. Thanks to everyone for being such a great bunch of guys and especially to all those who made this contest possible.

Every year at these contests there are the things that stand out above others like, for instance, Lloyd Wheeler from S.C. Modeler dropping a parachute from his 222 from 700 to 800 feet. But this year if there is any one thing to remember it will be the demo flights that a young man from Indianapolis put on. His name is Bob Pinto. To describe his flying skills would sound like a giant B.S. story. But to watch him fly his Heli-Dog (his name for his Heli-Boy) is truly inspiring. He does all the normal (?) loops and rolls but Bob does them 10-15 feet off the deck along with vertical rolls, vertical Figure 8, square loops, stall turns with 10 and 12 tail rotor spins, vertical dives that are true 90° to Mother Earth, eye level hover loops, etc. You see, I said it would sound like so much B.S., but it's all true. You would have to see Bob fly to believe it. He's just a rare combination of super reflexes, good eyes and, also, he's absolutely fearless. As I said, to watch him fly is truly inspiring but --- but the only discouraging thing is the Bob has only been flying for 10 months. This was Bob's second contest and he came away with the award of the Best Overall Pilot which was determined by using the best combined score of Masters and Hot Dog class. Congratulations, Bob Pinto, you earned it.

Here's the rest of the winners of the 1978 NRCHA Nat's:

Novice

- 1st --- Bruce Buchanan, Minn., Jet Ranger, Futaba 2 stick.
- 2nd --- Dan Sweazen, Penn., Jet Ranger, Custom Variant 2 stick
- 3rd --- Rene' Dikkes, Canada, Heli-Boy, Variant.
- 4th --- Kerry Sterner.
- 5th --- Charles Elliott, Calif., Revolution II Futaba 2 stick.

Sportsman

- 1st --- Jim Platt, Okla., Heli-Boy, Cox Sanwa 2 stick.
- 2nd --- Bill Jensen, Conn., Shark, Kraft 2 stick.
- 3rd --- Al Decanio, Penn., Revolution, Futaba 2 stick.
- 4th --- Wendell Hostetler, Ohio, Jet Ranger, Proline single.
- 5th --- Lloyd Wheeler, Ill., Heli-Boy.

Masters

- 1st --- Ray Hostetler, Ohio, Jet Ranger, Proline single stick.
- 2nd --- Bill Youmans, Florida, Heli-Boy, Kraft 2 stick.
- 3rd --- Bob Pinto, Indiana, Heli-Boy, Futaba 2 stick.
- 4th --- Ralph Delusio, Conn., Heli-Boy, Variant 2 stick.
- 5th --- John Simone, Calif., Revolution II, Futaba 2 stick.

Hot Dog

- 1st --- Bob Pinto, Indiana, Heli-Boy.
- 2nd --- John Simone, Calif., Revolution II.
- 3rd --- Ralph Delusio, Conn., Heli-Boy.
- 4th --- Bill Youmans, Florida, Heli-Boy.
- 5th --- Mike Mas, Florida, Revolution II.

After all the awards and trophies were given out, Dwyane Stephens had a surprise for all the entrants. It seems that Westport International had donated a gift certificate for a complete Custom Variant and all the entrants names had been put in a hat and the lucky name drawn was Bruce Buchanan from Minnesota. That would sure make the long trip home easier I'm sure. Thanks, Westport. Also, thanks to JMD Fuel Labs for their contribution of JMD Fuel.

I hope next year everybody can make the NRCHA Nat's. It sure is great to see and talk to so many helicopter enthusiasts. There's so much to see and learn that I wouldn't miss it for anything. Until next month, keep the stick forward. □



The Best Overall Pilot of the Nats (O.C. - out of control) Bob Pinto from Indianapolis, Indiana.



John Simone Jr., of American RC Helicopters, was Second in Hot Dog and Fifth in Masters. Rev. II K & B .60 and Futaba 2 stick.



Ralph Dalusio from Conn., was Third in Hot Dog and Fourth in Masters flying a Heli-Boy - Variant 2 stick and Webra speed.



Bill Youmans from Florida was Fourth in Hot Dog, Second in Masters flying a Heli-Boy HP61 and Kraft 1 stick.



Jim Platt, from Oklahoma, finished First in Sportsman with Heli-Boy, Webra Speed and Cox Sanwa 2 stick.



Bill Jensen, from Conn., placed Second in Sportsman using his Shark .60 with a Kraft 2 stick.



Al Decanio, Penn., Third in Sportsman, Rev-olution.



Bruce Buchanan, Minn., First Novice, Jet Ranger and World 2 stick.



Dan Sweazen, Penn., Second Novice, Jet Ranger, Rossi .60 and Custom Variant 2 stick.



Beautiful Jet Ranger of Bob Hayden, from Penn. Bob took First Place at the Toledo Show with this piece of art. Yes, he flies it, too.



Ray Hostetler, Ohio, took a well deserved First in Masters with his Jet Ranger, Rossi .60 and ProLine single stick.



The fine people who made it possible with the beautiful flying site. LEFT TO RIGHT: Randy Smith, Ms. Golden, Bud Gluesencamp, and Maj. Dallas Moyer.



Mike Mas, from Florida, snatching the 3" hoop with his .60 powered Rev-olution.



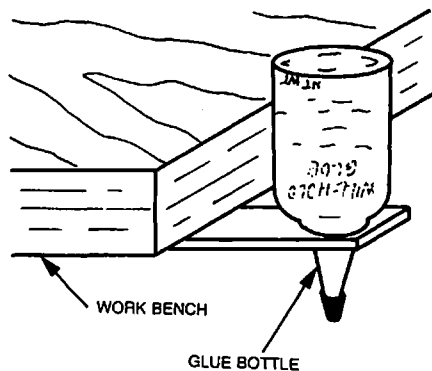
Ray Hostetler going through tunnel gates. Gates had 3" rotor clearance on each side.



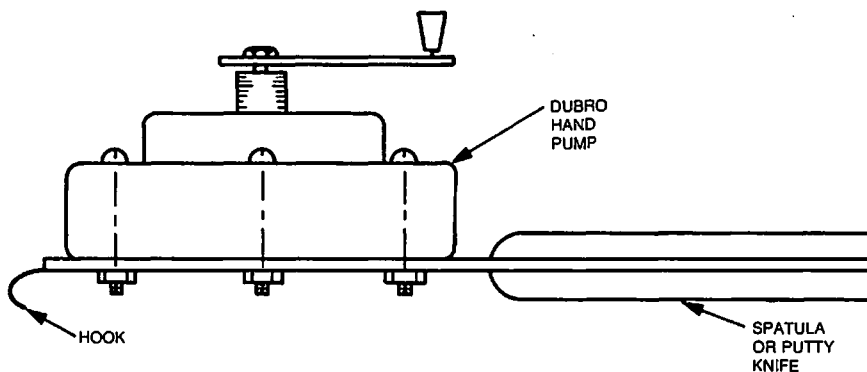
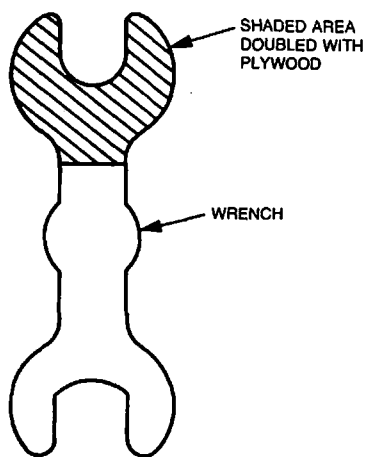
Close up of Bob Pinto's business only Heli-Dog.

FOR WHAT IT'S WORTH

Have you ever been frustrated waiting for the last of your glue to run down to the opening while you try to hold the pieces in place? Brian J. Mork of Calumet City, Illinois, suggests trying his idea of a holder and it will always be ready to use. Just drill the hole big enough to fit around the neck of your glue bottle, per the sketch, and then clamp, tape, or glue it to the bottom of your work bench. Be sure to cap the glue bottle before storing in the holder or you'll have glue on the floor.

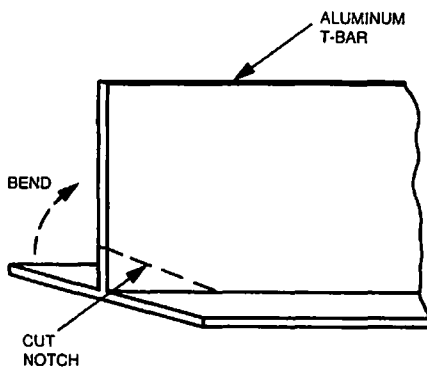


Some of the Dremel collet wrenches are thin and irritating to use due to having to keep them centered in the proper place. John P. Menerick of Elkview, W. Virginia, found a way to correct this by gluing a square of 1/16" or 3/32" plywood over the entire end of the wrench. Use your favorite cyanoacrylate glue. Clamp if possible. Then, using one of your stone grinders, contour the plywood to the shape of the wrench. Give the edges of the plywood a coat of glue to "plasticise" it. Use the wrench with the plywood down towards the body of the Dremel. The metal part of the wrench will stay where it should be. John used wood on only one side but it could be used on both. See sketch.



Modelers who like to hold their hand pump similar to the I.M. or Royal type, but have the Du-Bro pump, can do so as indicated by the accompanying sketch. This method, which was sent to us by Richard L. Shirey of Sewickley, Penn., allows the pump to be easily disconnected and used on various fuel containers if desired. The hook can be used to hang the pump on your field box or fuel can.

This suggestion from Frank Cross of Waco, Texas, tells how he improved his T-bar sanding block. Before applying the sandpaper, cut notches in the handle just above the sanding surface on each end as shown in the sketch. Evenly form the end of the sanding surface up into the notch. This will prevent the end from digging in and grooving the wood or foam on curved or uneven surfaces. This raised edge will work on all of your sanding blocks. The spray adhesive used on your foam wings works great for attaching the paper to the sanding block too.



For model boaters, one of the most persistent problems can be sealing the radio box lid to prevent entry of water. The foam tape usually used has some shortcomings. Four joints admit H₂O and most of the tape soon flattens out permanently under the pressure of the lid screws. The ideal means of sealing is an "O"-ring. The problem here is finding

the proper size and the proper material — the "O"-ring must be soft enough to compress under the plexiglas lid without excessive pressure that could crack the lid. Larry E. Fry of San Diego, California, believes he has the answer: Make your own "O"-rings out of 1/2A size surgical rubber fuel line. Here's how:

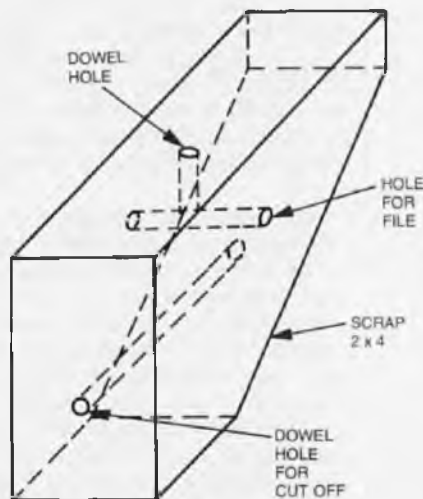
Carefully clean all the adhesive residue off the box edge or, if it's a new box, wipe the resin finish coat with acetone. Carefully measure around the box flange using the tubing itself (this way the radii measurements will take care of themselves). Cut the tubing **squarely** with a **clean razor blade** (not an X-Acto blade). Only a razor blade is absolutely sharp enough to cut surgical rubber cleanly (and get all the oil off that new razor blade before you cut). Put the two ends of the tubing together with your favorite cyanoacrylate adhesive (being careful of your fingers!). Then stick the "O"-ring down with the same super-glue. Make sure it's aligned properly before touching the tubing to the box. Doing it one side at a time makes it much easier. Not only does this method of waterproofing really work, but it has a neat, professional appearance. And it won't deteriorate like our old favorite weather stripping does. The salt water model boat pond in San Diego **demand**s complete waterproofing and this is the only thing that has worked for Larry.

There is a kit of magic markers sold by the brand name of Mr. Sketch Instant Water Colors which includes 12 colors. The Charleston Radio Control Society uses this kit to enter the contestants name on contest score boards in the color of their frequency. Instant frequency recognition! It makes it a lot easier to spread out the crowded frequencies and makes frequency control more visible to the contest director. This idea was submitted by Kenneth A. Gulliford of Summerville, South Carolina.

FOR WHAT IT'S WORTH

According to Joseph Kiracofe of Oxnard, California, if you would like to create a more authentic appearance to your model, try building the fuselage of wood doweling as a substitute for the steel tubing in the real plane. You can use a size smaller dowel than you would if you were using balsa; i.e., 3/16" dowel instead of 1/4" square balsa. The dowel is usually made of birch and is quite tough. By using a smaller, round piece of dowel in place of a larger, square piece of balsa, the weight, believe it or not, is about the same. It is stronger and about one half the cost. If your model shop doesn't carry doweling, a lumber yard or hardware store usually does. You will need to make a simple tool from a scrap piece of wood to make a "fish mouth" end to your joining pieces (see sketch).

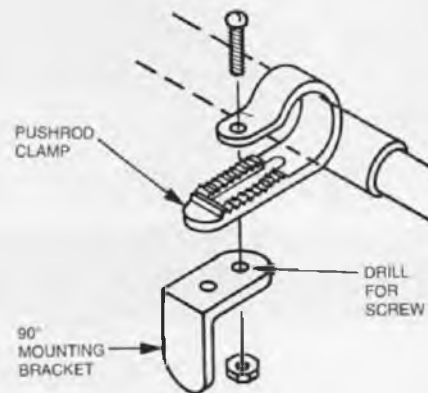
Use a piece of 2 x 4 approximately 4" long. You will also need a small "rat tailed" file approximately the same diameter as your dowel. Drill a hole in one side near the middle of the 2 x 4 just large enough so the dowel will slide in easily. Drill another hole in the center of the face of the 2 x 4 and intersecting the first hole, and large enough for the file to slide through. By inserting the dowel in its hole and sliding the file back and forth, the end of the dowel will be curved to fit the round surface of a mating dowel. The dowel may be held at an angle and filed some more if the mating piece doesn't join at 90°. Another dowel hole may be drilled in the tool for holding the dowel while you saw it to length. This works for the tail feathers, too.



The day's flying is done and everything has been cleaned up and stowed in the car - - - well almost. What about those dirty, oily hands? Forrest L. Pretzer of Dayton, Ohio, doesn't like to drive with oily hands so he has been

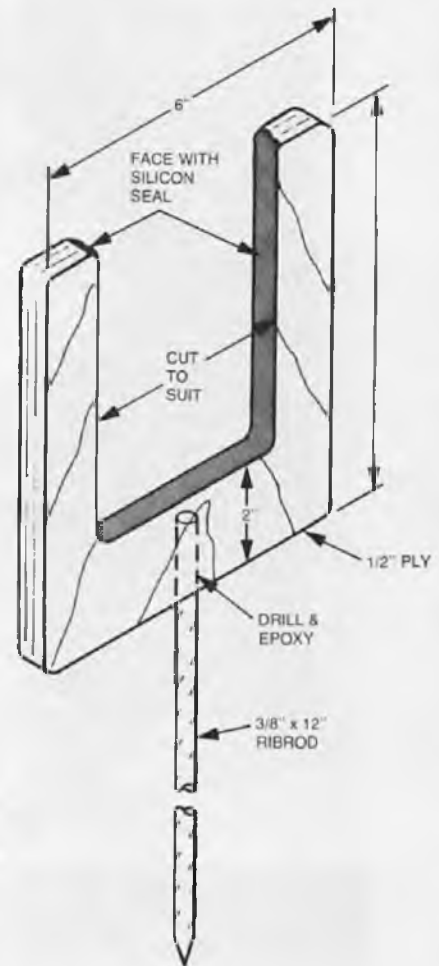
making a pack of "Wet Ones"™ part of his field equipment. These are towelettes moistened with a cleaner and one will do for a clean up job on the hands. They are superior to the standard shop rag or paper towels and can be found in most super markets and drug stores. A convenient flat package holds 30 towelettes and costs a little over a dollar. There are most likely several others available under different brand names. Some restaurants even furnish them when you order certain types of meals.

John F. Riba of Westlake, Ohio, sent in this suggestion for a handy way of attaching a Sig pushrod clamp (SH-183) when a bulkhead is not in a convenient location. Use a Goldberg 90° mounting bracket, adjusting its length to suit. See sketch for details.



From LeRoy Humphries of Jefferson Oregon, comes a good suggestion for spreading various glues. By using low cost plastic fork and knife, the fork will hold a large amount of glue and you can work it to the level you desire. Then take a plastic knife to finish it up. On larger models where larger areas are to be worked, use a rubber kitchen spatula. When the glue sets up on the spatula - - - just flex it back and forth. The glue will peel right off.

Bill Griggs of Utica, New York, has been using the small plastic bubble packing, found in candy boxes and many small appliances, for his R/C equipment. Bill wraps the receiver and battery pack with this bubble pack and tapes in place. This gives you an almost unbeatable cushion of air around your receiver and battery. The bubbles are very difficult to break. With some scouting around at various stores, one should be able to find all you need.



Are you tired of always having oil and dirt in your flight box? Frank D. Blow, Jr., of Fredericksburg, Virginia, solved this problem with the plane stand. The accompanying sketch is self explanatory, however, be sure to make two. They just have to be pushed into the ground and are great for pipes and inverted engine aircraft.

We all like to have that show room finish on our models. Now you can have it by using this hint from Dick Lally of Bend, Oregon. When MonoKoting, use a 6" x 8" piece of 3/4 oz. fiberglass cloth, putting this on top of the area to be ironed. The fiberglass holds the heat and makes a smooth, scratchless finish. Beautiful, try it you'll be amazed.

Send your hints & kinks to R/C Modeler, P.O. Box 487, Sierra Madre, Ca. 91024 & win a free 1 year subscription to RCM.



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ONE MORE TIME AROUND

Reprinted From
"The Bee Line"
Club Newsletter

Once again the rumors on prop balancing are creeping around. This is the only way to properly balance a commercial wooden propeller!

(1) Find out which side is heavy by using a good prop balancing tool (Du-Bro or Prather).

(2) Sand the face only (the airfoil shaped side, the part forward of the airplane) of the heavy side maintaining an approximate airfoil shape similar to a "Clark Y" airfoil. Sand until it is slightly lighter than the other side, then dope or lacquer the sanded portion and rebalance after dry by additional coats on the light side until perfect.

If you don't plan on properly sealing the prop — then don't bother to balance it at all. Fuel will soak into the bare wood and the prop will be out of balance more than before.

The most important thing to remember is to sand the face only and do not remove any material from the prop tip. Obviously, when you think about it, any change in the airfoil on the front of the prop is going to cause a negligible change in the amount of pull the prop exerts.

But a very small change in the pitch (pitch is entirely determined by the angle the **back** of the prop attacks the air) has a giant change in the props pull.

We've found that most commercial props don't have the same pitch on each side, thus balancing has little effect. I usually try to get props which are close and then never bother to balance them. With proper radio installation and by closely watching and feeling the vibration, I have **never** had any vibration problems.

If you fly from grass, bumpy, or rough fields, you will need to change props more often even though you have gone to all that balancing trouble. In the long run, it's better to junk that prop that is nicked up or frayed than to build a new plane or have your engine or radio repaired. □

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Cox 8022	139.95	93.	2 no
Logicrol Nimbus	135.00	98.	2 no
2 Channel Dual stick			
Cox 8020	99.95	70.	2 no
Futaba FP-2GA	109.95	75.	2 no
Futaba FP-2E	139.95	93.	2 no
MRC 772	119.95	84.	2 no
2 Channel Wheel			
Cox 8021	139.95	93.	2 no
Futaba FP-2F	139.95	93.	2 no
3 Channel Single stick			
Cox 8031	159.95	104.	2 no
Logicrol LRB-3	159.00	100.	2 no
Logicrol Ranger	179.00	113.	2 no
3 Channel Dual stick			
Cox 8033	229.95	148.	3 yes
Futaba FP-3F	179.95	118.	2 no
Futaba FP-3FN	199.95	131.	2 yes
4 Channel			
Cox 8040	299.95	189.	4 yes
Cox 8043	279.95	178.	4 yes
Cox 8048	449.95	285.	4 yes
Futaba FP-4N	299.95	190.	4 yes
Futaba FP-4FN 517	269.95	175.	4 yes
Logicrol Nimbus	309.00	187.	4 yes
MRC 774	279.95	189.	4 yes
5 Channel Dual stick			
Cox 8054	299.95	190.	4 yes
Futaba FP-5FN	349.95	217.	4 yes
Logicrol LRB 2-5	285.00	179.	4 Rxonly
Logicrol Champion	369.95	225.	4 yes
MRC 775	379.95	251.	4 yes
5 Channel Single stick			
Logicrol LRB 1-5	330.00	197.	4 Rxonly
6 Channel			
Cox 8060	369.95	230.	4 yes
Cox 8068	479.95	305.	4 yes
Futaba FP-6FN	359.95	227.	4 yes
Futaba FP-6FN 517	319.95	202.	4 yes
7 Channel Dual stick			
Futaba FP-7G	579.95	392.	4 yes
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.19 VI TV	45.50	27.30
.29-B IV TV	50.50	30.30
.35-B III	45.50	27.30
.40 TV	89.98	53.99
.40 XTV	115.98	69.59
.45 II TV	89.98	53.99
.60 B III BB TV G8	124.98	74.99
.60 XF TV Schneurle	199.98	119.99

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NO. AMERICAN AT-6 "TEXAN"

Jemco, 1305 Foothill Dr., Vista, Calif. 92083, introduces their sport scale R/C kit, the No. American AT-6 "Texan" for .35-.46 engines. Span 54", 475 sq. in. area, 4 1/2-5 lbs, 4-6 channels. Balsa and lite ply materials are utilized for fast fuselage construction. Jemloc engineering of the fuselage assembly allows construction in less than 8 hours and results in a very scale appearing subject. The three piece wing construction is simplified by the use of foam core and balsa materials. Normally difficult scale parts are provided pre-shaped. Three views and color documentation for seven variants along with an excellent decal sheet for "Gotcha" and the number "10" racers is included. Exact scale military decal markings are available for this model from Jemco. The AT-6 is a well behaved tail-dragger and an excellent flyer. Available from your hobby dealer or direct from Jemco, the price is \$58.50.



AIRBRUSHES AND ACCESSORIES

Graphic Arts Center, 437 Main St., Ventura, Calif. 93001, announced the inauguration of a new division which manufactures and distributes a full line of airbrushes, airbrush accessories and

airbrush materials to the various industries in the United States and overseas. The firm's manufacturing facility now produces other graphic aids for many markets throughout the world. The new airbrush products division will supply airbrushes and associated materials and equipment for ceramic art, model building, industrial art, sign making, crafts, hobbies, aviation, boating and any area where airbrushes are utilized. New airbrush usages are constantly being developed by the center which will make available detailed instructions for the use of airbrushes and retouching techniques to their customers. In addition to manufacturing their own airbrush aids, the firm also carries full stocks of airbrushes, compressors, accessories, retouching materials, kits, books. For further information, and descriptive catalogs, write to Graphic Arts Center.



WING SOX CUSTOM TRANSPORT BAGS

Due to popular demand GBS Enterprises has now added eleven more top selling RC glider planes to the list of custom transport bags available. Now including the new ones, Aquila, Olympic II, ASW 15, ASW 17, Monterey, Super Monterey, Californian, Cirrus, Centurion II, Libelle, Midwest Hawk 8', Hobie Hawk 10', Paragon, 970, Windfree, Wanderer 72, Wanderer 99, Windrifter, Windrifter SD-100, Sallaire, Butterfly II, Viking Mark I & II, SB-10, Javalin II, Albatross, and The Anser. For the serious minded RC glider pilot this is the ultimate in protecting your wings during transport and storage. With fit and stress in mind, both wings and removable stabilizers fit neatly into cleverly designed pockets so that the MonoKote does not rub together. The handle placed at balance point fits over the shoulder leaving hands free. Made of absorbent washable polyester. Wing Sox pictured from top to bottom are for Windrifter SD-100, Cirrus, and ASW 15. As you can see, they are individually patterned to each model sailplane. First shown at the 1978 MACS Show, they were endorsed and are now being used by Mark Smith, Tom Williams, Bob Boucher, Ed Slobod, Craig and Maury

Foxgord leading designers and manufacturers in the RC glider field. GBS Enterprises is proud of the fine quality which has made Wing Sox custom transport bags popular in such a short time. Five bright colors to choose from: red, yellow, orange, royal blue and black. Wing Sox sell for \$19.95 and can be ordered direct from GBS Enterprises P.O. Box 1701, Burbank, Calif. 91507. Checks, B of A. and Mastercharge accepted.



PFC FROM HOBBYPOXY PRODUCTS

HobbyPoxy Products, 36 Pine St., Rockaway, N.J. 07866, introduces PFC (Polyester Filler Compound). PFC is a brilliant white polyester resin in putty form, made for leveling dents, dips, ripples, chips, and other imperfections in fiberglass parts. PFC is non-sagging, fast setting, and feathers out to zero thickness without peeling or flaking. It can be filled, drilled and sanded, and it's completely fuel proof. Use PFC for filling, repairing, reinforcing, bonding, shaping and making filets. An absolute necessity for builders of fiberglass boats. PFC is packaged in a half-pint (3/4 lb.) can with mixing cap and catalyst. At your hobby shop for \$2.75.

aj's WHITE DOTS

aj's Division of Twinn-K, Inc., in Indianapolis, has released a complete line of replacement 1/8 and 1/12 R/C Tires — aj's White Dots. aj's White Dots can be had pre-trued (completely round) with .094 radius on outside edges. The tires are ready to race. They need only to be glued onto the hubs. In addition to the pre-trued feature, Twinn-K also offers all tires in five different rubber compounds ranging from soft to very firm closed cell sponge rubbers. Twinn-K is the world's largest manufacturer of racing slicks for model cars and are currently producing over 65,000 tires per day. They offer a complete line of tires for all scales from HO through 1/8 scale. aj's products are

available in fine hobby shops everywhere in the world. Racing enthusiasts can get a complete catalog and price list by sending 25¢ to Twinn-K, Inc., P.O. Box 31228, Indianapolis, Indiana 46231.



UNI-MASK

Karoden Hobby Products introduces another innovative new product with its Uni-Mask. Uni-Mask is a one piece filter face mask for general use around the shop. It is very effective in filtering out hazardous airborne dusts such as balsa, fiberglass, hardwood, glue, paint, etc. It is so light, cool and comfortable that it can be worn without even realizing it is on. Most modelers do not realize the hazards they are exposed to in the shop and, Uni-Mask will go a long way in protecting against some of them. Economically priced at \$1.49 for a package of six. Available at hobby shops or direct. Karoden Hobby Products, P.O. Box 434, Bergenfield, N.J. 07621.



CONCEPT MODELS QUARTER SCALE FLEET BIPLANE

Leading the R/C Aircraft industry, in the latest state of the art, Concept Models, P.O. Box 7335, Madison, Wisconsin 53707, has created a quarter scale model of the 1930 Fleet. Designed specifically for the 2 cu. in. Quadra engine, this airplane is constructed very close to scale in every respect. Overall dimensions and moments are scale, rib spacing, fuselage and tail structures, all are scaled down from the full size plans. The semi-symmetrical airfoil and lifting stabilizer enhance its graceful, slow, fully aerobatic performance. 2100 sq. in. wing area, and the planes's overall large size contribute to a most fantastic and realistic flight. Take-offs and landings are a sheer thrill. Building and flying a model this size is a whole new experience in R/C. You will find that you will relate to the aircraft more as a miniature full size airplane than as a

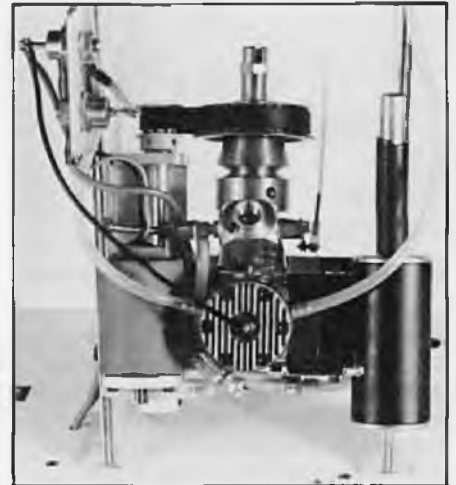
large model. The well engineered Fleet kit features four easily removable wing panels as well as removable tail surfaces for easy transport in today's compact cars. Quality typical of Concept Models will be found in the kit containing over three hundred fifty precision cut balsa, ply, and spruce parts, preformed landing gear and cabane wires, full size plans (36 sq. ft.), complete hardware pack, 16 page book filled with 3 views, photos, and historical data pertaining to the full size Fleet, along with detailed assembly instructions and photos, and plans for the Dummy cylinders. Though the Fleet was designed for the Quadra engines, it will also perform well with the .60 Drive units, the Webra .90 or any engine that can swing a 16" or larger prop. This kit is a limited production item available only through your Hobby Dealer or order direct from Concept Models. Wing Span, 7'2"; Wing Area, 2100 sq. in.; Length, 64"; Weight, 18-20 lb.; Radio, 4 channels; Engine Quadra or .60 Drive Unit.



SPIN A PROP

The Pipeline introduces a new evolution in prop balancers; Spin A Prop, the ultimate in simplicity and accuracy. This balancer requires no leveling and may be used anywhere, with more accuracy than the conventional style. No more worrying about the proper fit of your prop on a hopefully straight shaft supported by two pre-leveled knife edges. Now a precision ground shaft with conical ground ends mounts two tapered stainless steel cones which holds your prop centered on its rotating axis. This assembly is then placed in the detents between the two spring steel uprights and allowed to spin freely. An unbalanced prop is a boater's worst enemy! Not only can it cost you those precious RPM's, but it can also destroy your strut assembly and bearings as well. With Spin A Prop you can now get all your props in perfect balance and get that extra edge. For any prop to be in perfect static balance, its Center of Gravity must coincide with its axis of rotation. If this is true the prop will rest in

any position about its rotation axis. If the Center of Gravity does not coincide with the center axis, the prop will rotate until its Center of Gravity comes directly under the center of the shaft, before attempting to balance the prop blow heavily on it causing it to spin. By placing something white behind the assembly, check the hub for run-out. Many props are drilled off center, so if this is the case, correct the hub first. The prop is then brought into balance by adding or taking away weight at the proper points starting at the greatest diameter on the leading or concave face. The Spin A Prop sells for \$22.50 and can be ordered from The Pipeline, P.O. Box 1868, Fremont, Calif. 94538.



BOATERS R/C

"ON-BOARD" STARTING SYSTEMS

Yesterday's daydreams have become today's reality with Lectra- Starter. Now at last you can start any engine from the transmitter with the revolutionary Lectra- Starter (patent pending). After 3 years of development and testing we are happy to announce the most versatile, powerful, and practical model engine starting system in the world. All Lectra- Starter systems are equipped with a patented clutch assembly which disengages when the engine starts, allowing your engine to run up to full speed with no power loss. Complete system package includes all hardware, mechanical, battery, and all electrical components. The system requires no extra parts, and is easy to install, can be done in one evening. The unit features bolt on installation, and fits entirely into the model. The system is completely water proof and is activated by simple servo operation, no extra channel is needed. One battery does it all. No additional glow plug circuit is needed. 25 to 50 starts per charge can be expected. Can be used to restart a stalled engine. Light enough for a .20 size engine and model, yet powerful enough to start the largest high compression engines.

Versatile and compact, can be transferred from one model to another easily. Eastcraft offers the modeler 6 systems to choose from depending upon their needs. For more information and literature contact, Eastcraft Specialty Products, Marine Division, 709 Longboat Ave., Beachwood, N.J. 08722 (201) 240-3882.



GLASKOTE

The Coverite people have developed a new clear liquid that goes over any painted surface and produces a high gloss, fuel resistant finish. They call it Glaskote. It is so easy to use that most modelers brush it on right out of the can. It flows like butter, leaving no brush marks at all. No mixing is required, no Part A & B, no short pot life. The special resins used in Glaskote's formula employ a much greater percentage of solids than ever before. This enables Glaskote to achieve, in only one coat, the kind of glossy finish that was previously possible only with many coats of dope or with two-part systems. Glaskote is thoroughly compatible with all paints (epoxies, urethanes, butyrates, nitrates, enamels, lacquers, etc.). Once you have achieved the color you want with your favorite brand of paint, just add one final coat of Glaskote and the finish will be transformed from flat or semi-gloss to high gloss. Also, one coat of Glaskote over Coverite and you have achieved the gloss of Mylars, while retaining the authentic fabric look and inherent strength of Coverite's unique 100% polyester fibres. You don't have to be an expert to achieve excellent results with Glaskote. Although it dries rapidly, it has perfect smooth leveling. It is also sandable without taking away the Glaskote shine. Available in half pint cans wherever quality model airplane products are sold. For further information, contact Coverite, 2779 Philmont Ave., Huntingdon Valley, Pa. 19006.



CHALLENGER KIT

Model Racing Products, manufacturer of many national winning gas and electric cars, releases its new economy Challenger kit, a 30 mph competitive ROAR Legal electric R/C car complete (less radio) with: 05 ROAR Legal race motor, 6 GE fast charge nicad batteries, assemble controlled flex chassis with independent front suspension, molded body and decals — no painting required, mag type wheels and foam rear tires, exclusive one piece "shaker plate", radio, resistor battery, mounting plate — fits 95% of their radios available, charger for nicads and, ribbon wound high current resistor. All Jerobee/MRP racing bodies and accessories will fit. Available for under \$90.00. For further information, contact Jomac Products Inc., 12702 NE 124th St., Kirkland, Wash. 98033.

R/C DIESEL CONVERTER FOR .049/.051 ENGINES

Due to the extensive use of the diesel converted .049/.051 in RC, Davis Diesel Development, Inc., Box 141, Milford, Connecticut 06460, announces the availability of the RC Throttle version. Shock mounted with positioning adjustment and advanced timing washers. The throttle may be set independent of compression (timing) while the washers raise the cylinder to eliminate sub-piston induction. Range of this system is 13,000 rpm down to 5000 rpm on 7/3 1/2 prop. Due to the low speed power range, power absorbing mufflers are not required. Priced at \$12.95 plus \$1.00 postage and handling. To convert standard diesel converter C-5, throttle arm in available for \$3.00 plus 50¢ postage and handling, or see your dealer.



MRC READY TO FLY FOAM PLANES

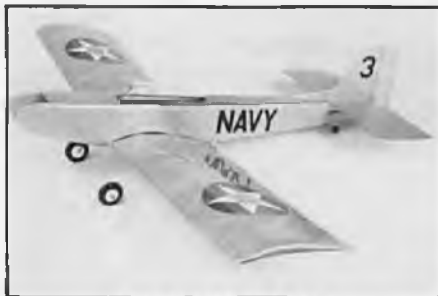
Popular priced ready to fly has arrived. They are big, powerful responsive craft with 48" wingspan, and 32" fuselage. They are available either with an MRC-Enya 15 engine installed or the new MRC-Mabuchi electric power system in place. What makes these good looking aircraft an excellent buy with broad appeal is that they come truly ready to fly and need little more than an hour's assembly. And these are not toy type craft, but quality hobby engineered craft. Here's a brief description of the two: Trainer Hawk — price \$98.00. The MRC-Enya .15 TV engine is installed at the factory, as is the fuel tank, control rods and horns. The muffler, spinner, glo plug and propeller are included in the kit. The plane itself is a brightly colored foam instead of the usual white. A two channel radio is sufficient (not included) to control nose wheel steering, rudder and elevator. Third channel, if desired, can be used for control of the throttle valve engine. The MRC Electra-Fli Trainer — price \$189.95. MRC-Mabuchi electric power system is already installed in this baby. It, too, has been designed for two channel operation. Control horns and rods are in place. The electric system consists of powerful motor, CVR (Cutoff Voltage Regulator), 600 mah battery, and fast charger which will operate from an auto cigarette lighter and, when used with the system, fast charges the battery in only 25 minutes. While two channels are sufficient, a third channel can be used to control CVR's micro switch which turns the motor on and off in flight for conserving power and gliding between periods of powered flight. The CVR unit also prevents overcharging, allows one battery to operate radio, servo and motor. It also has an automatic cut-off that prevents deep discharge. The CVR monitors battery voltage and cuts power to the motor long before voltage drops too low; the flyer always has enough power to glide with control back to a landing. Both these big handsome craft are excellent trainers and will perform right out of the box.

MRC - - the pioneers in "ready to go" products. See your hobby dealer or write to Model Rectifier Corp., 2500 Woodbridge Avenue, Edison, N.J. 08817.



STERN DRIVE ASSEMBLY FOR LIL DOLPHIN KIT

A new stern drive hardware kit has been released by Steve Muck's R/C Boats. This stern drive hardware set converts the Lil Dolphin kit #55 to an inboard installation. Kit includes motor mount plate, engine bearers, stainless steel drive and rudder brackets, strut with Oillite bearings, stuffing box, Teflon tubing, rudder, water pick-up, engine cable collet, flex-cable assembly with drive dog, thrust washer and propeller nut. Propeller not included. Kit #63 is manufactured by Steve Muck's R/C Boats, 6003 Daven Oaks Dr., Dallas, Texas 75248



MINIMOUSETANG

The Minimousetang is a new sport airplane from a design by Ken Willard. The airplane is quick building, approximately 7-14 hours, which provides a fun flying plane to put you at ease both on the ground and in the air. Minimousetang's 35" wing span combined with approximately 15 ounce flying weight gives a light wing loading of 9.2 ounces per square foot. Model Engineering of Norwalk's kit engineering features "thru cut" die cutting combined with "tri square loc" assembly in lite plywood and balsa for ease of construction. Quality building materials, rolled plans, building instructions, complete hardware package, canopy, and pre-shaped landing gear are included. The Minimousetang's list price is \$24.95, available from M.E.N., 54 Chestnut Hill, Norwalk, Conn. 06851.



NEW SCALE MODEL FROM DUMAS

Dumas Products, Inc., 901 East 17th Street, Tucson, Arizona 85719, "The Model Boat People" have announced a new scale model, "Dauntless." Dauntless is a 3/4"-1" scale model of a well-known commuter boat, active since 1946 on the U.S. East Coast. The kit is wood construction and includes complete deck hardware. A big boat, the Dauntless is 49 1/2" length with a 14" beam providing plenty of room for virtually any kind of gear. The boat is well suited to twin gas or electric power as the hull is a high speed design with good rough water capabilities. The real "Dauntless" was designed by Sparkman and Stephens, built of aluminum and powered by high performance Packard gas engines. Her top speed exceeded 50 knots. In her role as a "Commuter" boat, Dauntless faithfully took her owner 20 miles to work and 20 miles home mostly every working day each summer for 30 years. On weekends and winters "Dauntless" was used for vacation time cruising in the northeast and south. Later converted to GM diesel engines, she still cruised at 25 knots as she does today with her new owner who cruises extensively. There aren't many of the great commuter boats left today, but Dumas has immortalized the "Dauntless." She's available at hobby shops.



1/4-20 WING HOLD-DOWN BOLTS

Re-designed 2" long 1/4-20 wing hold-down bolts from Rocket City R/C Specialties have several exciting new features. The #22 bolt is threaded all the way to the head and has a new head design which will allow it to be tightened three ways; with the fingers, prop wrench, or screwdriver. The #35 bolt still has the same oval head with a captured screwdriver slot but is now 2" long and is also threaded all the way to

the head. You will find no flash on the threads as these bolts are made the hard way, they are shot into a solid mold and then unscrewed from the mold. Rocket City is the only company that takes this time to make a better bolt. These superior bolts are priced at 79¢ per pair and are available from hobby shops or from Rocket City R/C Specialties, 103 Wholesale Ave., N.E., Huntsville, Ala. 35811.



AFTER RUN ENGINE OIL

Prather Products, 1660 Ravenna Ave., Wilmington, Ca. 90744, introduces their new oil — designed to be used between flying sessions or when you store your engine. The oil prevents gumming and rust which results in easier starting engines and extended engine life. The convenient squirt bottle also makes a great prime bottle when the oil is gone.

3/8" SCALE MODEL WORKBOATS

Norseman Model Marine, 8287 Oak Ave., Niles, Ill. 60648, has announced the release of their first workboat kit, the 117' River Towboat Kelly Ann. This is a big scale kit with a hull length of 43 3/4" and a beam of 11 1/4". The kit features a molded, one piece hull, deckhouses and pilothouse and tempered, one-piece decks. All fittings and running hardware is included along with a full detailed set of blueprints. Available now for \$139.95 complete. □

RCM PRODUCT TEST

Carrera KESTREL



The Carrera Kestrel is a 12½' Sport Scale Glider. It is a very modern approach to kitting such a model — rotational molded polypropylene fuselage, foam wings covered with obeechi and balsa wood, foam and balsa tail surfaces. All that is required to kit the wing is gluing on leading edges and tip blocks then planing to shape and a lot of sanding. After this is done, the ailerons are cut out and faced with balsa. Then one must make the choice, servo in each wing or pushrods and bellcranks in the wing with one servo in the fuselage to operate the ailerons. All the necessary things are in the wing so you can take either route. The ailerons are covered before hinging. With clear heat film on top and the cloth tape (furnished in kit) on the bottom in the V joint made between wing and aileron, you end up making a good sealed hinge.

Next you must cut slots in the top of the wing to place the vertical spoilers flush with the top of the wing. This was the toughest job I found in putting this kit together. The tail only requires gluing on leading edges and tip blocks, then carving to shape and sanding. The tail is fastened to the hinge on the top of the rudder ("T" Tail) with a clever molded plastic quick attaching device. This is glued to the tail after covering. The rudder requires sanding and covering and it is pre-hinged so it fits perfect. Because most German servos have the hold-down lugs on the bottom, it was necessary to build a servo tray that could be screwed to the ABS floor which was used in the kit. I used a Cox Sanwa 4 channel radio, 3 ball bearing servos in the fuselage and 2 mini servos, one in each wing with a "Y" Connector to operate them simultaneously.

Rudder and elevator pushrods are balsa, but I chose to use Carbon Arrow shafts. The pushrods are hinged in the middle of the fuselage with a walking beam. This is to compensate for the fuselage expansion and contraction and seems to do the job holding trim changes to a minimum. The canopy comes fitted with a hold-down and ready to fly. Also furnished is an ABS tray molded to look like a pilot which can be painted and used under the canopy for scale appearance. The head has to be glued to the tray. All hardware (and there is a lot) is furnished to size, pre-bent and the right length.

The first flight was made with a 6 volt winch which worked but a 12 volt would have been better. The tow hook is a little far forward and I'm planning to put on an adjustable tow hook.

to page 98

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

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

SPECIFICATIONS

Name	KESTREL
Aircraft Type	Glider
Manufactured By	Carrera P.O. Box 566 Westmont, Illinois 60559
Mfg. Suggested Retail Price	\$286.95
Available From	Both Mfg. & Retail
Mfg. Recommended Usage	Sport & Competition
Wing Span	150 Inches
Wing Chord	6" (Avg.)
Total Wing Area	900 Square Inches
Fuselage Length	50 Inches
Radio Compartment Dimensions	(L) 13" x (W) 4" x (H) 3"
Wing Location	Mid-Wing
Airfoil	Undercamber, Semi-Symmetrical
Wing Planform	Double Taper
Stabilizer Span	25¼ Inches
Stabilizer Chord (incl. elev.)	4½ Inches
Total Stab Area	113 Sq. In.
Stab Airfoil Section	Symmetrical
Stabilizer Location	T-Tail
Vertical Fin Height	10 Inches
Vertical Fin Width (incl. rud.)	8 Inches
Mfg. Rec. Engine Range	NA
Recommended Fuel Tank Size	NA
Landing Gear	NA
Recommended No. Of Channels	4
Recommended Control Functions	Rud., Elev., All., Landing Spoilers
Basic Materials Used In Construction:	
Fuselage	Polypropylene
Wing	Foam, Balsa, Spruce, Ply, Obeechi
Tail Surfaces	Balsa & Foam
Hardware Included In Kit	See Text
Plan Size	43" x 58¼" (1 sheet)
Building Instructions on Plan Sheets	Yes
Instruction Manual	Yes (29 pages)
Construction Photos	Yes
Kit Includes	Shaped Parts
Mfg. Rec. Flying Weight	110 Oz.
Wing loading based on rec. flying wt.	18 Oz.

RCM PROTOTYPE

Weight, Ready To Fly	110 Ounces
Wing Loading	18 oz./sq. ft.
Covering & finishing materials used	See Text
Engine Make & Disp.	NA
Muffler Used	NA
Radio Used	NA
Tank Size Used	NA



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After more than a year in development, Casburn Kits is introducing the new Funette trainer this month. The flying base of this new bird is unbelievable, and is matched by the ease of assembly. An excellent "first bird", the Funette will allow most new RC'ers to solo in half the time it took before. The Funette is destined to become the all-time classic trainer.

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Shuttle 100	39.95
Shuttle 132	49.95
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Kraft 5C	PRICE ON \$?
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OS 25 Reg. RC	\$ 36.95 29.95
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NEW QUADRA ENGINE - 2 cycle, 2 cubic inches, 2 HP, comes complete with Prop. Adapter, engine mount, muff. Pump type carb... **\$121.50**
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WORLD ENGINES

EXPERT

SYSTEMS



'78
NATS
1ST
3RD
7TH



Dave Brown - World's Mr. Feedback

One thing that our Expert Systems have been exposed to is competition. Pattern flying is popular in the Midwest and a lot of Expert Systems are used in pattern in this area, as well as in national and world competition.

It is the feedback from Dave Brown and other pattern competitors that Jim Lanterman's design decisions are based on. Jim is our electronic designer. He is well known in the trade and has worked with Signetic and Exar on the design of the IC that is used in many servos today. Pictured in the above photo - Dave Brown, left; Jim Lanterman, right.

Interesting - but, so what! Ever think about what World War I and II did to develop full scale aviation?

They started WW I with a Curtiss Pusher and came out with the Fokker D-8. We started WW II with the P-40 - the Germans were flying jets in 1945.

Frankly, we think our product is better because of its competition usage (war). Many other R/C systems cannot make this claim.

His design decisions reflect the design of our open gimbal sticks and the RF and encoding systems in the transmitter. Also, our receiver and decoder technology, and amplifier design.

At the lower right is pictured the OS 60 FSR, used to power Dave's plane in his '77 and '78 National's win.

Congratulations to Mark Radcliff, who placed third, and Tony Frackowiak (seventh) in this year's National's held

at Lake Charles, Louisiana. Tony is now in World Engines' tool room.

We are listing various radio systems that we manufacture. Also, some customizing features such as dual rate, roll button, and channel switcher.

On Dave's Curare he is using the channel switcher to couple or uncouple the flaps. He uses flaps simultaneously with the elevator for take off, spin, snap rolls and landing.

The R/C system population is somewhat patterned. Some are popular in one area and others in another.

We would like to work with some senior R/C fliers in areas where our Expert System population could be perked up. If interested, please write.

We have a special for service men serving outside the country.

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5 Ch. Expert DS (4 servos)	399.95
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7 Ch. Expert SS (5 servos)	484.95
3 Ch. Expert Nicad (3 servos)	239.95
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Belleville, IL. 62221

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Seymour, IN. 47274

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Concordia, KA. 66901

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Worcester, MA. 01610

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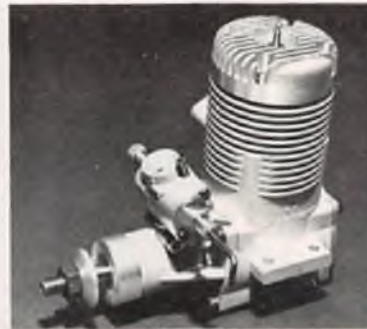
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KESTREL

from page 94

.... Flying was straightforward. It flew fast, but true, and turns were very flat with no skidding, but top rudder was very necessary. The L/D seems to be very good and it thermals well but fast, six minutes on the first flight with all trims neutral. It is not for the novice but with a good pilot it should be a winner for Stand-Off or Sport Scale.

Covering was Econokote on wings and tail surfaces. Because of the thick undercamber airfoil, the bottom of the wing was a long slow process with a Sealrite iron and cotton baby sock over it. The fuselage is white, so white Econokote was used. Plenty of decals are furnished for trim.

Despite the fact that the plans, parts and instructions are written in German, the complete kit is done so well that it goes together with very little trouble. □

SCALE VIEWS

from page 83/79



Super Flashing Strobe, caught in mid blink.



Zundel's Navigation light system.

Flashing Strobe can be seen for 1/4 mile at night and gives a nice touch to a scale model in the daytime at a contest. The "works" are on a small printed circuit measuring 1" x 3/4", equipped with a switch and plenty of extension cord for the strobe light. Price without battery is \$9.95.

For a complete navigation light installation, he has a more elaborate outfit, also with long extension cords on each light and having flashing capability as is used on many modern aircraft.

to page 100



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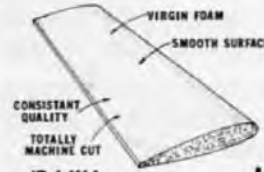
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SCALE VIEWS

from page 98/79

Offered as shown in the accompanying photo, the price is \$15.00. The light system will work on anything from 5-15 volts and can even be hooked to the flight pack.

The last little gem is something your columnist could use, being one-track

Warning Light by Zundel.



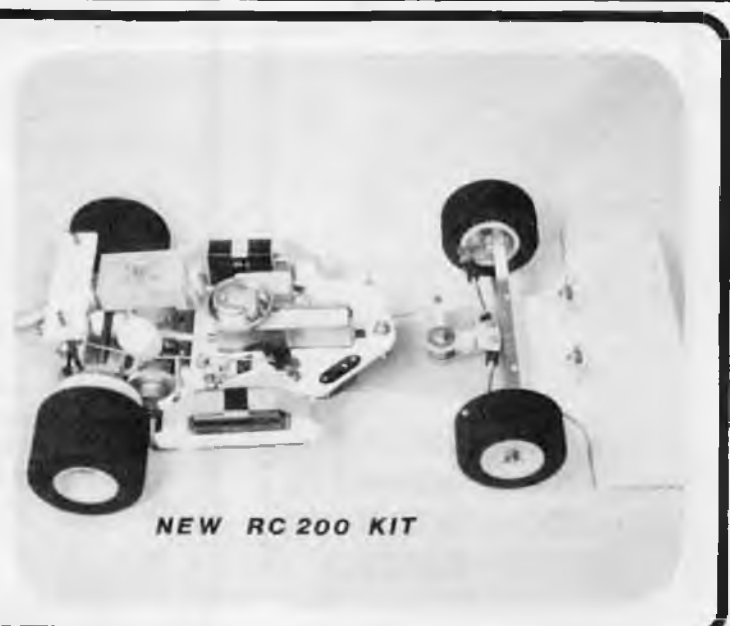
mindred. Smaller than a postage stamp, it requires only a two wire hook-up into a transmitter or receiver and delivers a pulsing red warning light that can be seen at a distance when the equipment is turned on. It should save a lot of dead batteries and maybe a contest win! Sells for \$5.00. Vern handcrafts these items and is selling them direct at the moment, but hopes to have dealer distribution later.

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RADIO SPECTRUM

from page 78/76

repeaters, but if they are good guys like most hams, they won't. Having "standard" frequencies also simplifies frequency control at the field and at contests. You don't have to go through a lot of calculations and/or tests to see who is compatible. No doubt you could sandwich some more frequencies in, but as far as I'm concerned, five airplanes in the air at once is too many anyway, so I can see no reason to be greedy. Finally, the cost of equipment would go up if the manufacturer couldn't stock standard crystals. The six meter band has worked out exceptionally well and I heartily recommend it to anyone with an Amateur license who is interested in getting into RC.

RC Equipment Poll

In the August issue we asked readers

to comment on how they rated their RC equipment. We asked that you score your systems, by brand, with a zero to ten point rating for performance, reliability, maintainability, and cost to own.

So far the response has not been very good. Maybe everyone is satisfied or have figured out for themselves what is good and bad and have decided to let everyone else find out for themselves. I was a little surprised that most of the letters were positive, that is the guys were happy with what they had. Maybe that is why there have been so few letters? Most people are unhappy but don't want to bad mouth anyone.

We don't have a good statistical sample on any brand yet, but Kraft and Futaba owners seem the most satisfied.

If you want to be heard, pro or con, drop us a line. Til next month — happy flying ☐

SUPER SCALE

from page 75/74

Electronics, P.O. Box 2102, Lake Havasu City, Arizona 86403) is a great boon to the Super Scale flier. It permits flying all day on the same RX battery pack, charging after each flight for about ten minutes, and ending the day with a battery that is as fresh as when it started the day. As this is written, they have released the TX version which permits the same performance from your TX battery. It will operate from any 12 volt battery and removes the worry the large model flier feels after the second flight on a fresh charge.

As to the servos themselves, the standard ones seem to be adequate for the job, but I, too, have felt concern to page 112

THE BIG THREE — Chuck Cunningham's Original Line-up! The quarter size planes that do it all on .61 power



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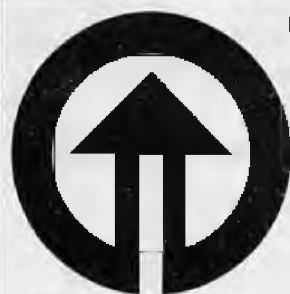
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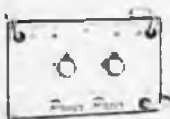


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SUPER SCALE

from page 102/74

(along with many others) that we might be treading on the thin edge of the line in putting them to the use we do in the larger models.

Recently introduced is the new servo being manufactured by E.W.H. Products of Arlington, Texas, who have been marketing items for the Quadra engine and for the larger models. They are reputed to deliver 7 pounds static thrust and 10 pounds once they get moving. They are also reported to have adequate transit time for the larger model which

some of the huskier servos intended for retracting landing gear do not. More on these after I have had the chance to use them. They'll still devour battery capacity at a higher rate than we are used to, so you'll still need extra mah.

An additional method of reducing the work required from a servo is to both mass and dynamic balance the control surfaces, where this is possible. Many full scale aircraft use mass balance weights to help overcome the resistance of a control surface to being moved in the air flowing over it, and many others have a section of the surface ahead of the hinge line to help relieve some of the pressure. In those which do not, heavier servos may well be required in order to

raise the reliability to a better level.

In the larger models, it is also possible, through the additional space available, to mount the servos right in the tail of the model thus reducing the length of pushrod required and, therefore, reducing the possibility of control pushrod flex which can reduce the control throw produced at the control surface. In so mounting the servos, the pushrod length can be reduced to a few inches and the servos can be connected to the receiver through the use of long servo extension cords, much as we now connect aileron servos to the receiver. The usual cautions still apply - - - keep the antenna away from the servo to page 114

Instead Of Giving Up Your Dream To Fly Radio Control Perhaps You Should Give Up The Expensive Radio!



There are many people who would like to get into radio control, but one thing more than any other stops them — Price! Also, as a modeler gains in experience and has built many models to fly, he finds that being the owner of several radio systems is desirable. The dream of getting into radio control, or of adding extra systems, may be forgotten by many who feel that purchasing an expensive national brand radio system doesn't make any sense. Now, the Hobby Shack Aero Sport Systems offer thousands of people exactly what they are looking for. Aero Sport has all of the reliability, performance, electronic technology and all of the other advantages of the higher priced systems, but at a realistic price! Instead of offering a radio system and having the manufacturer make a profit, the wholesaler make a profit, and the dealer make a profit, we offer the Aero Sport system to you and eliminate the "middle man". Instead of trying to make a large profit on a few hundred systems, we reduce the prices and make a smaller profit on thousands of Aero Sport Systems. Aero Sport is the kind of radio system which is inexpensive, good looking, and will give you outstanding performance — Aero Sport can make your dreams come true!

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SUPER SCALE

from page 112/74

leads, but to date I know of no one who has yet had to shield the extension cords in order to eliminate interference.

• •

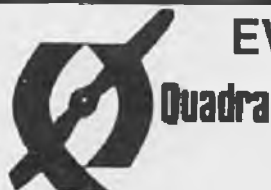
Those of you who follow the model press (and Super Scale) will be aware of the activities of the Southern Tier Aero Radio Society (STARS) who operate out of Olean, New York. Their squadron

concept of modeling has been seen by many where they have flown their squadron of Bristol Scouts. The STARS continue to produce Super Scale models and are currently working on a decision as to what their next joint project will be. The F4B-2 seems to be in the lead position for the coming building season, although as will be seen by the accompanying pictures, they have not restricted themselves to everyone building the same thing.



Woody Clapp's Stinson Reliant with welded steel tube fuselage - modified from Barron's plans.

to page 120



E.W.H. is Your Miniature Aircraft Headquarters

The **Quadra** is a two cubic inch, two horsepower (@ 10,000 R.P.M.) two cycle engine. It uses regular gas and oil. It costs less to operate than a .15 size glow engine. Now you've got power to spare for those 1/2 size and 3/4 size models. **Quadra** burns fuel clean and the model stays clean (no need to fuel proof the model). **Quadra** comes complete with the accessories shown in the photo.

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DOES COVERITE WORK ON SAILPLANES?

Sam Crawford of San Rafael, California says "Sailplanes with Coverite stay in the air longer than those built with films. Also, the glow effect of white Super Coverite, when the sun shines through, makes an extremely visible high flying sailplane."

We think Sam is right. Many modelers report that Coverite's woven fabric, which is not overly smooth like the plastic films, offers a greater degree of turbulence, increasing the "hang-time".

Vernon Olson of Kane, Pennsylvania reports that he "flew his Windrifter covered with Monokote and got an average of 7 minutes per flight. The Windrifter recovered with Coverite now gets 11 to 14 minutes."

Dr. John Mountjoy of Winston-Salem, North Carolina states, "I have many flights on my Olympic II covered with Silkspun (wings and tail surfaces). . . it flies slower - believe due to drag at surface from cloth weave. It is strong, can land in corn field without punctures."

Later on in his letter, Dr. Mountjoy discusses flutter, which sometimes plagues sailplanes. "On steep toe winch," he writes, "wing flutter eliminated by slight downtrim or change to high start. Winch puts out 12-13 lbs. Since using Coverite, don't have any desire to return to plastic coverings."

Ed Slobod, President of Pierce Aero wrote about his friend Ed Eggert who has several Hobie Hawks one of which he covered with Coverite and claims that "it seemed to tame his Hobie. The improvement in handling was quite noticeable."



This is the Ihex, a Stan Hall design, built by Gordon Pearson, President of the LSF. The Ihex was photographed at the SOAR Nats. It was covered by Gordon in Super Coverite, painted with K&B Superpoxy. Span 147".



Here is Johnny Litchenburg of Historical Aircraft Research & Development Co. in Kansas, with his replica of the #3 version of the Chanute Glider of 1886 - but with a power pod & wheels added. Johnny builds many replicas for museums around the country - and covers them with good old Coverite.

And George Dartt of Huntington, New York said "A long glider wing with Permagloss Coverite flew with less flexing, climbed faster in thermals and survived better several non scheduled landings than with the previous 'material' used, also an iron on product. After stripping the wing (very easy) to recover with a long roll to eliminate seams a series of cracks were found. Only Permagloss held the wing together! A little Zap and the wing is as good as ever. By the way, tree, leaf and grass stains wash right off. Congratulations on a great product."

We at Coverite are prejudiced of course. But we have held back recommending our Coverings on sailplanes until we were sure that modelers were getting the kind of results we expect of our products. We're convinced now that sailplanes built with Coverite, will outlast any film by a long shot - will resist scuffing on landings - and will probably deliver longer flights.

There is one question that we can't answer at this time. Which of our 3 coverings is best for sailplanes? We hope that modelers will continue to write us, so we can pass along their experiences. In the meantime, cover your next glider with Coverite - the difference will be obvious.

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SUPER SCALE

from page 114/74

I have mentioned Woody Clapp's Stinson Reliant here before and am pleased to be able to show you a picture of it. Woody welded the fuselage up from 1/4" aircraft grade tubing, and as is obvious from the pictures, has done a super job. The plan is originally Dick Barron's SR-9 and Woody has adapted it to his own use of the metal tubing, rather than conventional wooden construction. I suspect this is going to be a most impressive bird in the air. Woody and the STARS are currently on the scrounge to see if there is some way they can fly themselves and their models to Vegas this fall for either the Tournament of Champions or the QSAA fun fly. (Anybody out there got a DC-3 they can spare for a couple of weekends this fall?) Woody is a full scale pilot, home-builder and a restorer of full scale aircraft, fire engines, and steam rollers; obviously quite a guy.



L to R: Chuck Nellis, Woody Clapp, Bob Dunn. L to R: Nieuport 28, Pfalz A-2, Boeing P-26, Sopwith Triplane Nieuport by Dunn, Pfalz by Nellis, P-26 by Dunn, Sopwith by Clapp.

All of the models shown with Chuck Nellis, Woody Clapp and Bob Dunn, have been flown and live up to what we have come to expect of Super Scale models. The Tripe was designed by Woody from a much smaller kit and then embellished with detailed information he received from the original Sopwith drawings sent to him from England, by another enthusiast. Bearing out once again, what a great group modelers are.



Don Godfrey's Super Scale Super Stearman. Don's first venture into true scratch building. 80" span and flies as well as aerobatically as an Aeromaster Too, according to Don. Quadra power swings 20/6 and 20/8 props.

New York State seems to be a hot-bed of Super Scale activity. Don Godfrey of to page 122

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Spoiler assemblies: 9"-17" \$28.50-\$31.50

Other Scale Accessories Available

SUPER SCALE

from page 120/74



Binghamton, whose Super Stearman plan I mentioned in a previous column, has built up some time on his along with another one built in his area by Shep Brokaw. Their claim is that the Super Stearman in Super Scale (Super Super Stearman)? flies right along with a conventional sized Aeromaster Too.

I have just had some information about another manufacturer who is getting into the Super Scale field and will

be reporting on their plans and kits as soon as full information is available. The first of these will probably be a sort of Stand-Off Fokker E III and will apparently be available as a semi kit, plan or full kit. They have a couple more up their collective sleeves and I'll keep you up to date as the information comes available to me.

'Til next month, that's about it for now, hang in there, Big Is Beautiful.

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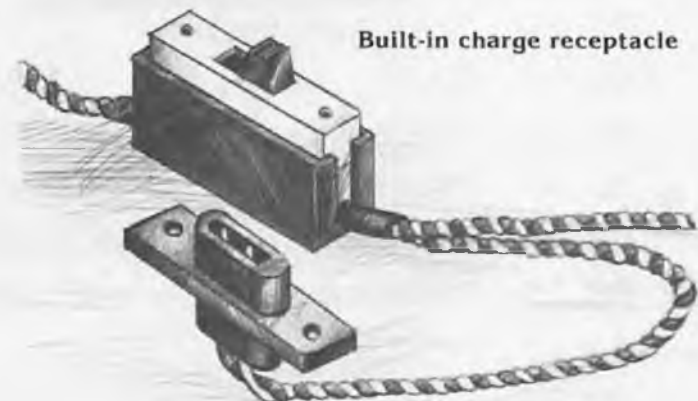


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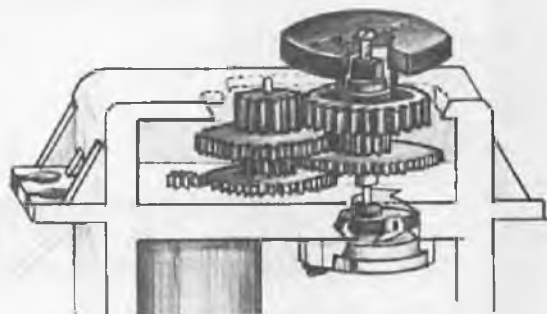
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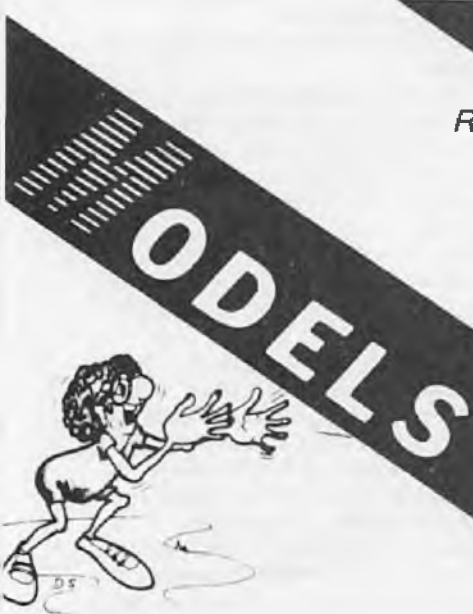
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SCALE DETAILING

from page 73

microweld. Complex shapes can be formed by molding using a heat gun, household oven or even a match.

The instrument panel is made by gluing pictures of instruments to thin styrene and then cutting them out. These individual units are glued to a contrasting colored panel and aluminum wire is cut and added for knobs, levers, etc. I use aluminum wire because it can be cut easily with a knife and adds very little weight.

All interior details, i.e., cockpit, opening canopy, radio installation, etc., are finished before I start sanding the first coat of primer. I find this technique of building from the inside out saves me from repairing and refinishing exterior surface from the inevitable damage, engineering changes, etc., that come about when these details are added.

After sanding the first coat of primer, I mist on a second coat of primer, sand, and then spray a light coat of all the colors to be used on the aircraft in the appropriate pattern that they will appear on the final coat. I use a Devilbiss touch-up gun #EGA-502 for painting larger areas and a Paashe air brush #VL5S for detail work.

This color coat is then wet sanded with 400 paper.

At this stage I add panel separations (panel lines) by placing 1/64" wide drafting tape where these separations occur. After the model is painted, pull up the tape and you have two edges 1/64" apart that visually simulate the skin joints on a real aircraft. The first color coat shows through where the tape lines were and gives an interesting and realistic visual effect.

After the tape lines have been added, I paint areas where "paint chips" are to occur with a 50/50 mixture of Hobby Pox silver and K & B gloss catalyst. After these areas are dry, I rub them with fine steel wool to get the grain and texture of weathered aluminum.

Liquid masking film is then applied over the silver in irregular patterns to simulate paint chips, scratches and worn areas.

Look at full size aircraft to determine where these areas occur. Access hatches, leading edges, steps, etc., are all areas that show wear. I use a variety of devices to apply the liquid mask: paint brushes, toothpicks, toothbrushes, etc.

The final color coat is now sprayed on the model. The A-4 has 8 colors on it so follow your plan and allow 24 hours for any one color to dry. The camouflage is painted by applying the light blue underside first and allowing it to dry. Next the tan is applied.

to page 128

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SCALE DETAILING

from page 126/73

Where the tan blends to the white, allow 3 hours for the tan to set up and then wipe off tan overspray on the white with a slow lacquer thinner. You can wipe right up to the desired blend line with lacquer thinner and achieve a narrow scale-like color blend. Most models suffer when overspray from one color makes a larger blend area than is scale. The brown and green are then sprayed in sequence and each cleaned in turn with lacquer thinner.

Next, paint on insignias, aircraft numbers (no decals please) using liquid masking film to mask the paint. I use a lot of new #11 X-Acto blades to cut out the areas to be painted. The weight of the knife and a sharp blade gives you control without cutting into the surface of the model.

Now pull up the panel line tapes and pick off the liquid mask film. Make sure to leave the rough edges around the paint chips. You might take time and look at real chips before you start this finishing project. Don't rely on what you think they look like. Go out and see what they really are.

The next step in the finishing process is to add wear that occurs during use, like oil stains, gun gas stains and dirt, as well as areas that are defined by shadows, i.e., slats.

For oil stains, I spray a mixture of flat black and gloss clear lacquer on the area to be stained. Then hold the fuselage vertically and overspray this mixture with medium lacquer thinner. Chase the drops of thinner and dissolved paint with the air brush adding more thinner as you move these drops in a pattern to simulate air flow. You can also vary the path of the oil stain by tilting the model. Wipe off any mistakes with thinner on a clean rag.

Separate control surfaces like slats, air brakes and spoilers are painted on. From 10' away they look real and you don't have to pay the weight and time penalty of trying to carve them out.

Mud is applied by spraying a mud colored lacquer with a toothbrush in logical areas: wheels, wheel wells, flaps, etc., and then "chasing" it with lacquer thinner.

Gun gas stains are sprayed on with a mixture of flat black and gloss clear lacquer and wiped with denatured alcohol.

I clean my A-4 with a glass cleaner or rubbing alcohol. So far the finish is fuel proof.

When you finish your model, mix several ounces of extra paint for repairs. When you re-paint an area you need only to go to the nearest panel separation. Each time you paint, the

to page 130

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1/12 SCALE PORSCHE 935 TURBO

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1/16 SCALE BMW 3.5 CSL AND MASERATI BORA

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1/16 SCALE

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POWERSTREAKER RACING SET

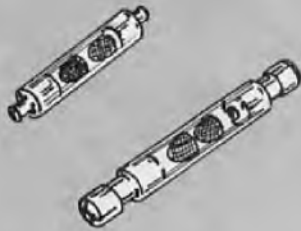
This racing set includes a 1/24 Super Corvette and a 1/24 Lancia Stratos...along with two push-button transmitters and six racing pylons. Cars have two forward speeds. Cars are also available separately.





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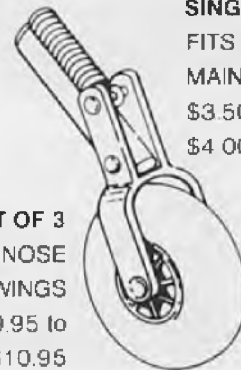
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SCALE DETAILING

from page 128/73

color or texture is slightly different so the repaired area shows up exactly like repaired areas on a real airplane.

In summary, when you are planning a finish, examine it for what it is, not what you think it is, or what finishing has come to be through conventional modeling techniques. A panel line is not ink; it is

the edges of two pieces of aluminum that may or may not fit exactly. A paint chip is the removal of one or more layers of paint or primer from a metal surface. I suggest you go to an art supply store and buy a book on air brush technique and then examine your model for areas where these graphic art techniques can be used. Use your eyes and think about what you see and then dream up some way to duplicate it. □

1/2A HORNET

from page 71

Our finished product proved to be one of those designs that "flew right off the board." We found that no weights were necessary to balance the plane . . . and that's always a nice situation. Fly? How could a good looking airplane with a name like Hornet do anything but fly, and do it well! With the wing placed at the

to page 132



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Fox Combat Special 1978 Nationals Wins

Slow Combat Open

- 1-Dick Stubblefield - Fox
- 2-Larry Driscoll - Fox
- 3-Geo. Cleveland - Fox

Fast Combat Jr.

- 1-Tom Fluker - Fox
- 2-Mathis - Fox
- 3-White - Fox

Fast Combat Sr.

- 2-Bill Maywald - Fox
- 3-Russell Crawford - Fox

Fast Combat Open

- 1-Phil Granderson - Fox
- 2-Mike Tallman - Fox
- 3-Bob Mears - Fox
- 4-Karns - Fox

Congratulations! And Thanks.



MANUFACTURING CO.
5305 TOWSON AVE. FORT SMITH, ARK. 72901
PHONE 501-546-1858

In the scramble for the R.C. dollar many manufacturers have bypassed the control line flyers needs. Not so at Fox. In the last couple years we have upgraded our control line motors and added many new control line products. We invite your inspection of our tanks, control lines, bell cranks, control handles, fuel bulbs, fuel line, wheels, wheel collars, and other products. Our catalog is free for the asking.

For the beginner we have assembled starter sets consisting of a motor, mounting bolts, fuel line, tank, bell crank, elevator horn, wheels, wheel collar, fuel filter, extra plus, control lines, handle, and cups! All matched and at a considerable price savings over buying them separately. We suggest you consider

#81015 Fox 15 Baffle Starter Set For Profile Models — \$37.95 or #81016 Fox 15 Schneurle Starter Set For Profile Models — \$43.95

While most of our motors are pleasure oriented we thought you might like to see how one of our competition oriented motors fared at this summer's Nationals.

SEND FOR OUR FREE CATALOG.

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1/2A HORNET

from page 130/71

shoulder position, it was easy to hold the transmitter with one hand, and hand launch with the other. No landing gear necessitates this method of getting airborne, and it proved to be no problem at all. Before the first flight, we set up the ailerons for a 3/16" maximum travel, with the elevators set for 1/4". These small movements of the control surfaces proved to be right on the money. Turns were quick and true, with elevator response under power crisp, and remaining effective during the glide. Roll rate was fast, and tracking was right down the line with no fish tail or ducking under. All in all, we found it to be a smooth flier, with a nice easy, long flat glide. About the only thing we can think of that would improve this rascal would be the installation of a 2 ounce fuel tank for increased flight time.

We said at the start of our review that the Hornet proved to be a good looking, easy to build, easy to fly airplane, at a price that brightened our day, and we think that's a good thought to leave you with. □

MAGNUM 40

from page 70/64

the 6/32" wing screw so do not omit. Insert the tube over the hole in W-8 and glue in place. The rubber grommet is to keep the Allen head screw from falling out when the wing is removed and the hole in the grommet allows access to it with an Allen wrench. Cut notch as shown on the plans in the trailing edge behind the cockpit. This will give clearance for wing removal. Add any cockpit detail at this time.

Covering: Sand down the entire model and finish as you desire. I have found it very difficult to achieve a lighter, prettier airplane than I can get with Solarfilm. It also will get you into the air faster! I prefer Solarfilm over other brands for 3 reasons: (1) cost, (2) it is easier to work with and to stretch around the wing tips, and (3) it is less brittle. I have seen the "High Price Spread" shatter like glass but never Solarfilm.

Remember that the more you sand it, the better it will look. I start with 200 grit and end up actually polishing the wood with 800 grit. I then vacuum off all the balsa dust just before covering. On a multiple color scheme such as I have done, cut your pieces to shape first. When joining these pieces on the airplane, overlap the joint about 1/4" and seal this seam completely. When you

to page 136

BIG SAVINGS AT ORANGE COAST HOBBIES



LEISURE ELECTRONICS

Reg. \$99.95

SALE

\$79.98

RESISTOR CAR WITHOUT RADIO - 6 CELL

Choose from Alfa, Vette or Porsche Body Style

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GALLONS

PRICE

#1-10% NITRO	\$ 9.90
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Formulated expressly for R/C car use. Consistent formulation and cool running are the reasons the car racing champions use this fuel!

NEW ASSOCIATED

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1/12 SCALE ELECTRIC R/C RACE CAR

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ASSOCIATED

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- Less Radio

6 CELL -
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RC100...\$99.98

RC200...\$149.95

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TITAN CHASSIS...

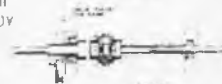
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DIFFERENTIAL

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AUTOMATIC TRANSMISSION



TECHNI MODELS

049/051 GLOW PLUG CONVERSION



\$1.99

011 BLADES /5 Pk

List 65c

39c

(Fit X-Acto, PD, Dixon, small handles)



R/C GLIDER KIT SPECIALS

WANDERER 72"	\$14.96
WANDERER 99"	\$22.88
BRIDI SOAR BIRD	\$14.88
PIERCE PARAGON	\$39.88
CASS STEIN SKYBOLT (glass)	\$79.88

BANTAM MIDGET



Outputs: Rotary wheel, arm, adjustable arm. Compatible with ALL digital radio systems, except Pro Line. Specify radio **\$29.95**

12V 5A WET CELL BATTERY and CHARGER

\$13.65



WISCO



HB 12 R/C-muffler	\$29.88
HB 15 R/C-muffler	34.88
HB 20 R/C-muffler	39.88
HB 25 R/C-muffler	39.88
HB 40 PDP	59.88
HB 61 PDP	79.88

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50000 THRU 79999 2.00
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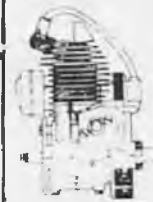
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2 cu. in. for those big birds!
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SIG SALUTES THE "HUMMINGBIRDS" AMA SHOW TEAM



The "Hummingbirds", AMA Show Team number 106 from Dayton, Ohio, feature the Sig Kougars in their performances. Shown in the photo are the pilots, (left to right) Robert Bremer, Dick Wetzel and Jim Masters. They have been flying the Kougars in formation for three years and now have them equipped with smoke cartridges, which can be seen mounted under the wings. This adds a professional touch to their act and keeps them abreast of the full-size aerobatic stars that they frequently appear with in air shows. Recently they flew at the Dayton Air Fair in front of 125,000 spectators, along with the Canadian "Snow Birds" jet demonstration team.

Dick Wetzel commented in a letter that they like the Kougars because of the easy construction and fine performance. Other AMA Air Show teams have also praised the Kougars for its adaptability to the demanding task of flying in formation. The low speed stability provided by the built-in washout of the foam wing core, helping to prevent tip stall, along with a fast high speed capability allows members of a formation to perform the necessary catch-up and slow-down maneuvers safely.

But you needn't be a crack Air Show team pilot to fly a Kougars. It is just as popular with sport fliers as it is with the experts because of the docile handling characteristics. See your Sig dealer and build your own version of this responsive and forgiving model.

KOUGAR RC-35 \$44.95

".....THE ONLY MODEL I COULD RECOMMEND TO A BEGINNER"

Sig Manufacturing Co., Inc.
401 S. Front St.
Montezuma, IA 50171

Gentlemen:

I've been a modeler for over forty years and it was just last winter I decided to get into R/C. I started out by purchasing your Kadet, the — — — — —, the — — — — —, plus a couple of radios, engines, etc. It was a real quandry trying to decide which should be first on the board after reading all the claims of each. But I liked the idea of a model with good hands off stability and a high lift wing figuring it could be slowed down to give some reaction time. So I started with the Kadet — and I've never regretted it. Having a Commercial Pilots license has helped in a lot of ways but does nothing for orientation and the Kadet gives you a little time. Within two weeks I was completely solo and shooting landings. I've had an occasional cart wheel and other assorted mishaps but the model has survived all so far with only minor repairs. It's not only very rugged but just about as forgiving as any plane could be. It even survived a radio failure crash right after take off when it rolled to the right and hit a freshly cultivated corn field. The engine and cowl were full of dirt but it didn't even bend the nose gear back. I can only say the Kadet has gotten to be just like an old friend to me. If it survives my training period I doubt if I could sell it for sentimental reasons. It's powered by a very dependable Max 30 and started with a Kraft KP-4A. Since the failure I'm using a KP-5C.

Now for the — — — — —. It came off the boards about three weeks ago with a Max 35 and Futaba FP-4FN. There's no way in hell that model is a beginner's trainer. With experienced flyers it's super and they love it. With me it's very quick and responsive to the point I'm darned uncomfortable when I fly it. My first landing attempt I tore the wing off and did some damage to the fuselage. Since then I only fly it while it's up and let a helper take off and land it. After that landing, I said it's back to the Kadet for at least another month. The — — — — — doesn't have the rugged construction the Kadet has either. I befeet it up somewhat like sheet covering the wing from leading edge to spar and that probably saved the wing on the bad landing. But your Kadet already had that in the plans. There's just no comparison between the two as a trainer. Much of the article on the — — — — — in M.A.N. could have been written by me after flying both. He states you should begin on a cabin type trainer with a high flat bottomed wing. And I'm sure he meant the Kadet. It's truly everything your advertising claims it is. Our club members like it and at least three other beginners are starting on the Kadet after asking my opinion. In just the little experience I've had it's the only model I could recommend to a beginner. Mine's had over one hundred flights by now and I plan to continue with it until control response is automatic. . . . Congratulations on doing such an excellent job in designing and kitting a remarkable trainer. . . .

Very truly yours,

James H. Johnson

2504 Elkhart Road
Goshen IN 46526
24 July 1978

We receive letters about the Kadet in just about every bag of mail arriving at the Sig plant. The letter at left from Jim Johnson was particularly interesting. We'll let it speak for itself because he makes some points about the Kadet much more effectively than we could with the usual advertising slogans. Thanks, Jim!

LENGTH: 42"
WING SPAN: 57"
WEIGHT: 4 lbs.
ENGINES: 19-35



SIG

KIT INCLUDES SPECIAL BOOKLET FOR BEGINNERS ON LEARNING TO FLY RC



**KADET
KIT RC-31
\$34.95**

Below: Some junior age modelers who learned to fly RC with Kadets. From left, Rick Holmes (Council Bluffs, IA), Jerry Cleaver (Omaha, NE) and Dave Howlette (Red Oak, IA).



(KIT NAMES DELETED)

KAVALIER-----SO REALISTIC IT GETS SCALE DETAILING!

When a trainer kit is designed, one of the main requirements is that it be easy to build. This calls for simple lines and box structures that ordinarily wouldn't win any beauty prizes. But Kavalier designer Claude McCullough spent a long time getting the "look" of this newest member of the "Learn To Fly RC The Sig Way" series just right. In fact, the model went through three major and several minor changes in configuration over the course of 3 years of development before he was satisfied. We are pleased to note that builders of the kit appreciate the sleek layout of the Kavalier and are putting on "scale" details and features to complement the appearance.

Cliff Gullett and son Mark of Newton, Iowa are the first to put wheel pants on a Kavalier and you can see the racy effect this modification has in the accompanying photos. The aluminum landing gear supplied in the kit already has holes punched in it for pant installation since Claude planned to try this idea later on for a possible accessory kit. Cliff fitted standard Sig Skybolt wheel pants on the main gear. For the nosewheel installation he replaced the nose gear that is supplied in the kit with the one made for the Sig Cessna 150 and used the Cessna pant on it.

The spectacular white, red and black color scheme has been coupled with a pilot, headrest and wing walk for a very sharp example. The canopy has been attached to the wing with a streamlined fillet of Sig Epoxolite putty. Cliff and Mark learned to fly on the Sig Kadet and Komander and now have many flights on the Kavalier. They expect to move on to the next step of the Sig training program with their Kougur.

For those interested in trying the pant modification, here are the parts required: RP-BN-104 Cessna 150 Nose Gear - \$1.00. SH-383 Cessna 150 Nose Wheel Pant - \$1.65. SH-533 Pair of Skybolt Wheel Pants - \$3.25. Have your Sig dealer order these for you or add \$1.00 postage and handling (if your order totals less than \$10.00) for direct shipment from Sig. Ask for a free pant installation sheet.



SIG
KAVALIER
KIT RC-39
\$39.95



Bob Winski, of La Grange Park, IL learned to fly RC on a Sig Kadet and built the distinctive looking Kavalier shown here as the next step in his training program. He installed a fully detailed cockpit and pilot along with a set of operating navigation lights. Not content with all of these "scale" features, Bob added the final touch to the military color scheme with a bomb dropping mechanism. Bob said in a letter:

"I hope the response by the modeling world is as terrific as my reaction for your new kit. I think that it is a good looking sport plane that could be anything that the modeler wanted to make it with personalization of the finishing and detailing. . . . I have about fifteen flights on my ship now and am doing stunts and learning some pattern maneuvers that I used to only watch the "other guys" do before! I have learned a lot with the Kavalier and am enjoying the confidence that it instills."

PLACE YOUR ORDER NOW FOR SIG'S LATEST COMPLETE CATALOG - NO. 39 - \$2.00 POSTPAID
SIG MANUFACTURING CO., INC. . . . Montezuma, IA 50171

Looking for that perfect Christmas present?

HERE IT IS!!!

"FLYIN' BOX"

Many are in use by beginners and experts alike. This molded fiberglass unit is extremely attractive and professional looking, and stays that way year after year. Noted for outstanding utility and durability. Features: 4PVC plastic folding legs, folding and locking PVC plastic plane supports, filed work surface, light weight, large capacity (21L x 12H x 10W), and much more.

- Assembled..... \$89.95
- Optional Alum. Legs..... 7.95
- Alum. Plane Supps..... 9.95

"LECTRIC FLITE CADDY"

The "Caddy" has all of the above PLUS it comes complete with mounted standard power panel, built-in battery charger and 12V H.D. (Wet Cell) battery, fuse protected. Features: Aluminum legs and plane supports, rear-mounted removable power cord to plug into your 110V line, bright indicating light shows charging cycle in operation. The power unit also offers fast charging at the field for your receiver and transmitter batteries. Can be purchased direct for \$149.95. Options: - a gel cell battery and matching charger - \$19.95 add'l. Choice of power panel: Sonic-Tronics Solid State or D.A.E. Dual Range - \$5.00 add'l, or D.A.E. Series IV - \$10.00 add'l. Any model in The Flyin' Box line can be obtained in Red, Orange, Blue and now in White.

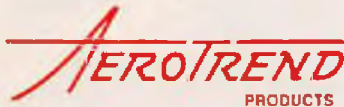
Equipment not included

Shown →



HOW TO ORDER:

Call now or send check or m.o. God's (\$2.00 extra) **PLEASE SPECIFY 1st and 2nd color choice**, and special "Ship To" address if any. Full payment with order guarantees **Aerotrend** pays the shipping charges!



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(203) 397-3755

Flyin' Box

MAGNUM 40

from page 132/64

shrink it out with your heat gun, be careful not to concentrate the heat on a seam. When you have it all shrunk out, finish it off with striping tape. Cut out the butyrate windscreen and glue it in place with Hot Stuff or Jet. Mount your wheels, tank, radio, etc., and you are ready for a flying experience you will not soon forget.

Flying: Check your C.G. location, proper control direction, and set your throttle. Control travel is a matter of personal preference but for "hot

dogging" you will want more than the norm. You will quickly learn that this airplane is capable of the wildest maneuvers imaginable, but it is also honest and predictable. I hope you enjoy it. □

DODGE CHALLENGER

from page 62

... cross check with the wiring diagram and look at the pictures it is impossible to go wrong. But we did! We made our only mistake by not completely observing the first point. We had already soldered all wires to the

Deans connector and shrunk the tubing over the connections when we realized that one of the taps for the radio power should have been on the Deans, too. Instead of trying to re-do the thing, we cheated a bit and took our tap off the speed-controller connection instead and got the same circuitry result. Just goes to show that we are only human (though Dewey has been known to voice his doubts about that on frequent occasions).

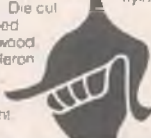
Assembly and wiring is done in stages by sectional instructions and the components required are in separate packages to match each step. There are

to page 138



Wing span: 67"
Wing chord: 14"
Total wing area: 795 sq."
Fuselage length: 54"
Stabilizer span: 27"
Verticle lin: 10 1/2"
Rec engine: 23-40
Gear: Fixed or retract
Channels: 4 (5 w/ret.)
Control functions:
Ailerons, Elevator,
Throttle, Rudder.
Construction: Balsa
Plan sizes: 35"x67"
Instruction manual
and construction
photos included.
Kit includes: Die cut
balsa, shaped
parts, hardwood,
plywood, aileron
torque rods,
hardware.
Flying weight:
6-8 lbs.

The Dwellist 2/40 has been designed as an easy-to-fly and safe handling twin engine 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.



2657 N.E. 188 St.
Miami, Florida
33180

THE 1:20TH CENTURY IS HERE!

Peerless announces the beginning of indoor-outdoor R/C electric competition!

PORSCHE 935 TURBO
ARR (almost ready to run)

1:20TH
SCALE.

4 FT.
TURNING
CIRCLE

Detail A



WHEEL BASE 4-1/3"
OVERALL 9-11/16"

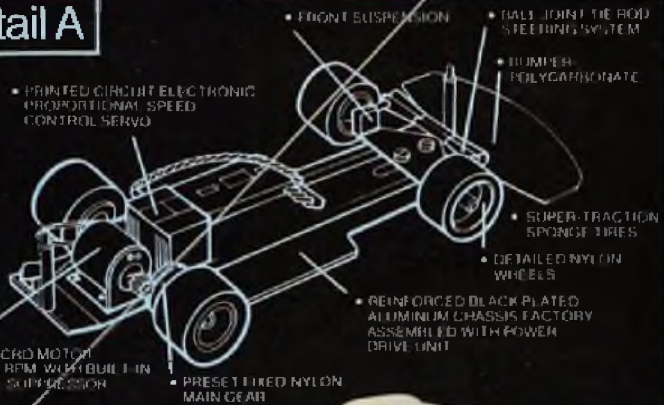
- BODY, POLY CARBONATE PRE-CUT PRE-PAINTED AND DECAL ASSORTMENT
- INSIDE PRE-PAINTED, HIGH LUSTRE FINISH CHIP PROOF.

Detail A



HEIGHT 2-7/16"

TREAD FRONT: 3"
TREAD REAR: 3-1/2"



PRINTED CIRCUIT ELECTRONIC PROPORTIONAL SPEED CONTROL SERVO

FRONT SUSPENSION

BALL JOINT THE ROY SPEEDING SYSTEM

BUMPER POLYCARBONATE

SUPER-TRACTION SPONGE TIRES

DETAILED NYLON WHEELS

REINFORCED BLACK PLATED ALUMINUM CHASSIS FACTORY ASSEMBLED WITH POWER DRIVE UNIT

DC MICRO MOTOR 3800 RPM W/4 BULB 1 IN NOISE SUPPRESSION

PRESET TITRED NYLON MAIN GEAR



Peerless introduces the 1:20th scale revolution!

Step into a whole new world of racing excitement with 1:20th scale R/C cars. 1:20th makes a 4 ft. turning circle possible, so you can race *in* the house, *around* the house, or on the track! The DC Micro Motor is powerful enough to attain sizzling speeds of 400 scale MPH. (Over 20 actual MPH.) And that's *infinitely proportional speed*, with forward and reverse functions.

1:20th scale marks the beginning of a new era in R/C. Try it out for size. For speed, versatility, and economy. And the sheer *extra* joy it brings to R/C model car racing!

R/C EQUIPMENT AND BATTERY NOT INCLUDED DESIGNED FOR 2 CHANNEL 1 SERVO RADIO CONTROL SYSTEM

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SEND \$1.00 FOR A COMPLETE SET OF PEERLESS CATALOGS, DEPT. MAN

PEERLESS: THE BEST IN 1:12TH, TOO! LAMBORGHINI COUNTACH LP 500

Factory assembled chassis. Fully proportional speeds forward and reverse. 12,700 R.P.M. DC motor (Ni-Cad rechargeable battery *included!*) Front and rear spring suspension; rear torsion bar; differential. 'Super Traction' sponge tires. (R/C Equipment Not Included). 2 channel 2 servo R/C system.



ARR (Almost ready to Run)

PEERLESS



1st Annual National R/C "FUN FLY" Championship October 14-15, 1978

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Ted White—Events Chairman

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(214) 438-7114 (nights)

DODGE CHALLENGER

from page 136/62

pictures of the pieces used in each operation and pictures of each stage as it is completed. It is all extremely clear and concise. They include a section of tips on soldering if you doubt your abilities in this regard and a sheet of good information on nicad battery care. We may think we know a lot but are the first to admit we don't know it all so we always read everything just in case --- and it happened again --- we learned something. It is right there in black and white that using a quick start pistol-grip

type of soldering iron in close proximity to radio equipment can de-magnetize your servo motors. To quote Rowan and Martin, "We didn't know that!" Just lucky in the past apparently but, quoth the Raven, "Nevermore." About \$3.00 at Radio Shack was enough to secure a very handy 30 watt pencil iron which was used on this project while our big rapid start iron sat on the shelf. It will also be used on any future soldering around our radios.

The manufacturer states that assembly can be completed in a couple of evenings and we found that two, four-hour sessions were all that were required from opening the box to

finishing ours, including putting on the extra striping. The shaker-plate is designed around a cube style radio receiver and ours was the slim rectangular type which would not fit down in the cut-out (it also would not fit underneath the plate). No problem, there is plenty of room under the car hood so we mounted our receiver on top of the plate with thick servo mounting tape to absorb any shocks or vibration. We put our radio switch behind the receiver as its intended location was now blocked off by the receiver itself and it is fine there and can be switched on and off without removing the car body.

to page 140

TECHNI-MODELS



SUPER TOUGH MOLDED REPLACEMENT FUSELAGES

- Aquila \$29.95
- Olympic II . . . 29.95
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See your hobby dealer for our complete line of model accessories. Dealers: Techni-Models is a distributor of all major hobby manufacturers, domestic and export. No order too small. Send for our comprehensive catalog.

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to page 140

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- 1/4 Scale 4-40 threaded quick link89 pr.
- New improved Super XL Silicone Fuel Line: Small49 ft.
Medium59 ft.
Large89 ft.

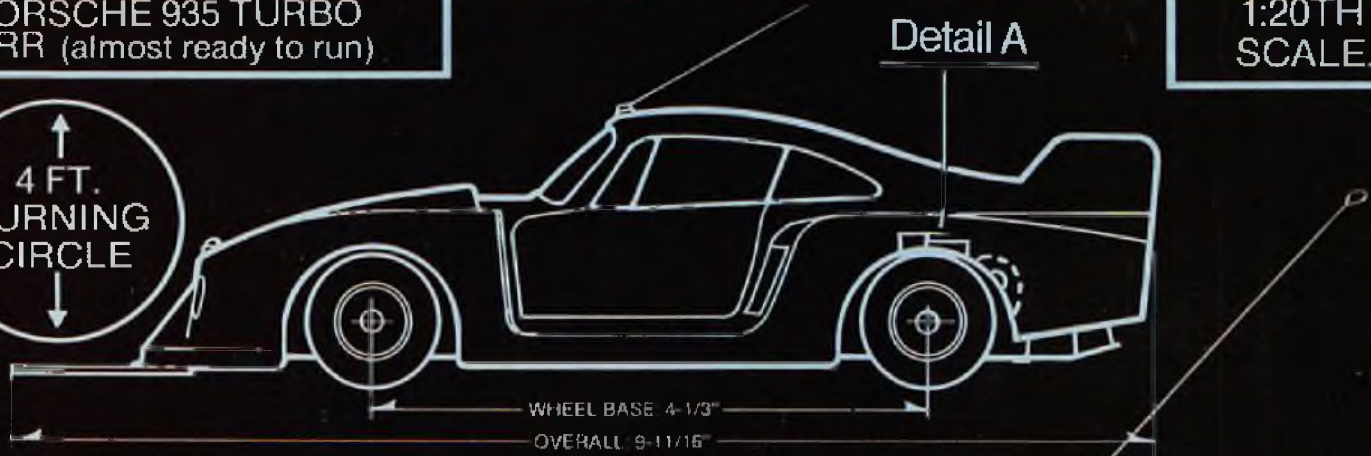
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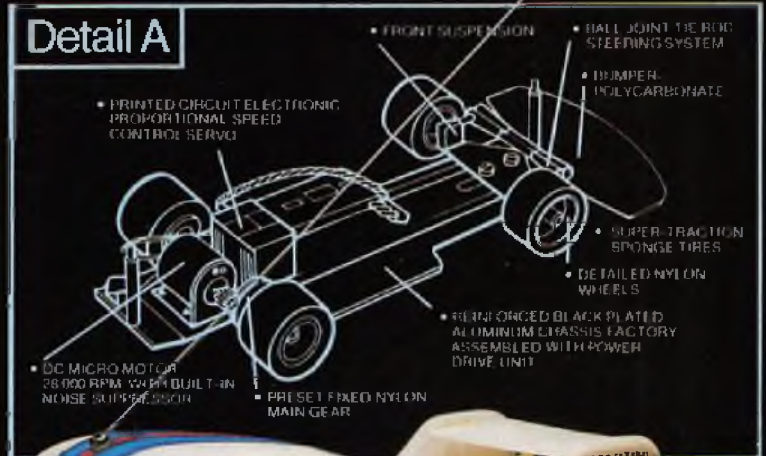
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CATALOG 25c

KS 5762



DODGE CHALLENGER

from page 138/62

The kit includes the materials to make a rapid-charger which will charge the power supply nicads in 15 minutes from your car battery. These nicads are wired with a 4-cell tap to power your radio receiver and servos, eliminating the weight and bulk of your regular receiver battery. We would like to enlarge on a point here that is mentioned in the battery care sheet but not, we feel, put strongly enough. Because of the radio drain, four of the cells will be discharged more than the other two. Rapid charging puts the same amount into each cell so as four started out at a lower level than the other two they will also have less in them at the end of the charge than the other two. Each time you run and charge, this variance will increase. The danger then becomes that you might run the entire battery pack too far down, in which case two cells will struggle to turn the motor over and the other four will actually reverse themselves doing irreparable damage to your expensive nicads. Therefore, never drain your batteries! As soon as the car shows the very least sign of slowing down and losing power you should quit right then and recharge. As pointed out in the battery care sheet you should trickle charge the battery pack (bringing all six cells up to full capacity) after about every tenth or so rapid charge. This will start out everything from an even plateau again.

What's that you say? Does it go? Well, if you really want to concern yourself with such mundane trivialities, it sure as heck does!! Like a youknowwhat out of youknowwhere. 30 mph actual, which is 360 mph scale and the incredible acceleration from a standing start makes you wonder why the body didn't fly off as the whole thing evaporated into the middle distance. Obviously, a large, flat, clean area is a big help as this thing really flies. And when you are all through for the day there is no castor oil or other sticky garbage to clean up. Just dust it off and put it away 'til next time which won't be long in coming as this machine is really habit-forming fun. □

DIXIE BELLE

from page 61/60

started the Dixie Belle project, constructed the hull and paddle wheel before passing it on to Bob. In researching the Dixie Belle, details were authenticated by information and photos appearing in a book, "Mississippi Stern-Wheelers", from Kalmbach Publishing Company. An excellent

reference book for steam boat enthusiasts.

RCM congratulates Bob Gregory on a beautiful model and wishes to express our appreciation for allowing us to make this pictorial presentation to our readers. □

RCM LOOKS AT REV-OLUTION

from page 59/58

Further, of the thousands of helicopter enthusiasts, only a small percentage can really take full advantage of the Rev-olution's total capability. Since each individual model pilot, alone, knows his own helicopter flying proficiency, he should weigh all of the facts in selecting the machine best suited for his maximum enjoyment.

In closing, we took another look at the Rev-olution and are more favorably impressed than ever with the machine and its capabilities. Our only regret is that still photography cannot do justice to the performance that we witnessed. □

DeHAVILLAND MOSQUITO

from page 55/48

control horn of the rudder.

Tail Assembly: The horizontal stabilizer is inserted into the slots previously prepared in the fuselage, and cemented. Now a 3/32" piano wire is bent at right angles to form the section of the wire that fits into the rudder, and is then pushed down through the fuselage, as close to, and parallel to, the horizontal stab as possible. The wire also passes through the horizontal stab installed earlier. The wire is removed, the 1/8" outside diameter brass tube is slid on, and the wire is reassembled in position, and cemented with epoxy. The motor mount material is then drilled to accept the brass tube (tight fit needed), and the piano wire end of the pushrod for the elevator control. This opening should be made fairly large.

The brass tube ends flush with the hardwood block, and the metal piece of the control horn that was left from the elevator is soldered to the 3/32" piano wire but **not** to the brass tube. Relieve the hardwood to allow for easy movement of the rudder clevis.

The foam section between F5 and F6 is cemented after it is relieved inside to allow for the easy movement of the elevator control horn. The pushrods are installed prior to the cementing of this foam section.

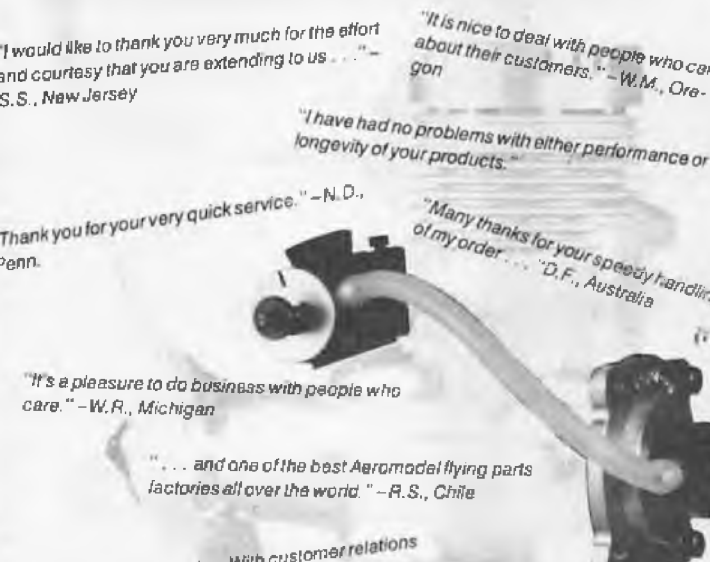
The foam is contoured, a brass wing control outlet (U-control part) is slid over the 3/32" piano wire and into the foam to
to page 144

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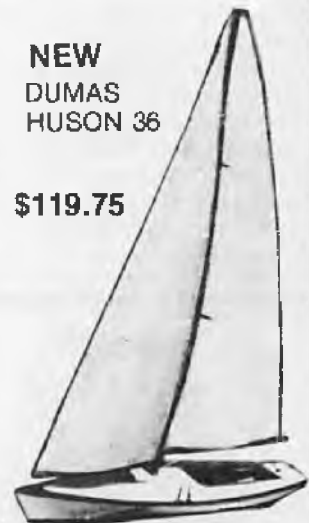
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DeHAVILLAND MOSQUITO

from page 141/48

give a hard base to the tail wheel wire, and the tail wheel wire is bent for the tail wheel.

Cabin: Two blocks of foam are cemented together to form the cabin. You will note on the plans that the rear wall of the cabin is a plywood former F3A. This is cemented to the rear of the foam to give strength to the wood dowel that anchors the back part of the cabin to the fuselage. The front is left in foam, and is held in place by a strip of Velcro which is half cemented to the cabin and

the other half cemented to the 3/8" x 3/4" hardwood stock. This arrangement is more than adequate to hold the cabin in position during flight since the wing assembly is held on independently. The contouring of the part of the cabin that fits against the wing is a little difficult and I have little to suggest except a sand and fit method. After contouring, the entire cabin is glassed with 2 ounce cloth, and resin and micro-balloons are used to close any gaps that appear between the cabin and the wing-fuselage.

As with the fuselage, sanding must be held to a minimum on the glassed foam. If you find yourself cutting into the glass

cloth very much, another cloth and resin coat is in order.

Center of Gravity: Now for the moment of truth. If you have built carefully, and light in the tail section, your C.G. will be close to the 3/8" x 1/4" main spar of the wing, and your plane will weigh 9 pounds fully loaded, and your wing loading will be a comfortable 31 oz./sq. ft. If, on the other hand, you build a little heavy like I do (I have a small dog house in the backyard I built that takes three people to lift), then you will find yourself at the sporting goods store buying a one pound lead weight (for \$1.50 no less, adding insult to injury) to

to page 146



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DeHAVILLAND MOSQUITO

from page 144/48

bury in the nose of the plane. You will also now have a 10 pound aircraft with a wing loading of 35 oz./sq. ft. The plane does very nicely at this weight, but would probably be safer at the lower weight and lower wing loading. The Center of Gravity is set at the main spar of the wing.

Flying: The day of the initial flight was marked by my usual reaction to a first-time flight of a scratch-built plane. I looked over the plane and found a dozen areas that could fail --- contours that were not right, and a dozen other assorted doubts --- the vast majority of which were groundless. So I packed up my gear, and headed down to the flight field.

I have made it a practice never to test fly a plane of my own. I don't want months of building to stand in the way of a needed snap decision. I also want someone with a lot of experience in getting out of tight spots to have that job. I happen to be very lucky to have a friend who fits that bill. His name is Colby Evette --- he has logged a lot of time with twins, and he owns the hobby shop where I get my goodies.

At any rate, Colby started the taxi, the tracking was good, and the next thing I knew the Mosquito was airborne and banking into the usual left bank upon clearing the runway. Colby found that the trim was about right on (it needed a little up elevator) and he was off on a series of rolls and loops.

The landing was a little hairy the first time. We had some concerns about the high wing loading, and reduced wing tip area because of the design of the wings, and came in a little fast, but the plane didn't show any vicious tendencies. The next landing was slower and, with the flaps down, settled into a real nice three point landing. We found that we had to cut down the aileron though so I could fly it. The way it was originally set-up, it was just a little too touchy for me. After the controls were adjusted for the Sunday Flier (me), I found that it was as easy to fly as a low wing trainer.

During the test flights, we never lost an engine, so I can't tell you how it will fly in those circumstances, and I hope I never find out but, as previously stated, there are procedures to follow when this happens, and they do work if you have the height (time).

When you go out to the flying field with this craft, take along plenty of fuel. Until you have experienced it, you can't believe how much fuel two hungry .40's can swill. When I got ready to leave for the day, I thought I lost something out of my tote box, until I realized that the gallon fuel can was almost empty.

Good luck --- hope you enjoy building and flying your Mosquito. □



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matters. I have found that attention to these details, in a fashion you feel is sound, is going to yield your kind of model.

(7) Can he meet a reasonable deadline? For the kind of building undertaking I have described, that which calls for a complete job done from a kit, three months is pretty fair, except for May through August when, if the builder is a pilot, he's going to want to spend more time at the field and less at the bench.

It may come to mind that you will be placing hundreds of dollars of equipment in the hands of someone who is perhaps a total stranger with nothing more than a short written statement of what was agreed upon and with the idea that you will see nothing for months. Is this safe? Over a number of years I have found R/C modelers to be a really great crew of people, exhibiting among their fine traits, honesty and dependability. I have never been "taken" or experienced any loss of any nature. Not that it can't happen. It did to a flying friend, but it's the only instance I have come across.

I have enjoyed working out building deals with RC'ers on both ends of the country (living as I do in the middle) which has presented another problem — moving the completed plane from builder to buyer. I have worked this out in two ways. The first is to agree that part of the deal will be for the builder to construct a shipping crate and ship same with buyer paying the freight. This has worked out fine; I have received planes in wooden boxes (1/2" plywood, re-inforced seems to work well) as well as re-inforced cardboard boxes from as far away as 2,500 miles without damage. Shipment by air express works well. The builder notifies you as to when it was delivered to the airline and gives you the number of the shipment as supplied by the airline and you are called when it arrives at the freight terminal. Depending on size and your desire for speed, UPS, rail and truck freight are all available options, as is Greyhound.

I have also had the pleasant experience of meeting the builder "half way". that is, agreeing on some spot convenient for both of us for a delivery meeting. By the way, if the builder hasn't taken pictures of the bird, why not promise some to him; it's a great "thank you."

Now, what about price. Naturally, it will vary with what you are buying; the framed-up only as against the complete "ready to fly"; the old banged up plane

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that still has some training type value against the handcrafted beauty that has stood virginally in a static show display. As to the type of arrangement I have described, that is, essentially purchasing the labor of a good builder for a completed job from your supplied kit, radio, engine and the like, the range for me has been \$200.00 to \$300.00 in either goods (the builder's choice of kits, engines, radio gear) or money, paid on delivery of the completed plane. Remember that to the labor price you have to add your cost of everything you supply: kit, engine, covering, radio and accessories, plus pay to ship or deliver same to the builder, plus pay for shipping back the model as well as those out of pocket costs for materials you didn't supply. So add these all in to really get your bottom line cost. From a money standpoint, it's not the cheap way to go, but for many, it makes a lot of good sense if building is not, for any reason, your R/C bag. By the way, anyone out there interested in working out a deal? I have some kits itching to be built! Write me at 315 S. Plymouth Court, Chicago, Illinois 60604. Happy building and flying! □

S.W. JUMBO R/C FLY-IN

from page 42/40

the speaker and radio and use the cargo space for several rolls of toilet paper to be dumped out in the air as streamers.

Several times my wife heard mention that I really didn't look much like the picture on the masthead of my column, and that I was getting a little "portly". So for next year, I promise a new picture (the one that we are using was taken in 1967, I've aged just a bit since then), to lose some weight and that we will do it all again. 81 interested spectators signed the registration blank for non-entrants, and judging from the comments made by both the entrants and the non-entrants, big models are here, and next year the skies should be full of at least twice as many models as this year. Mark it on your calendar, July 21 and 22, 1979, for the Second Annual Jumbo RC Fly-In. If you didn't make it this year, all of us who did make it feel sorry for you and, if you don't make it next year, you've no one to blame but yourself for missing the greatest modeling show in this part of the country. My pal Jerry "Here's How" Smith managed to fly down from the wilds of Indiana, and brave the heat to take pictures. I know Jerry had a ball, and I know that everyone else who attended (on Saturday, that is) had a wonderful time.

Get out the sticks, the wood, and the covering by the yard, and get in on the great new thrill of modeling, building, and flying the big ones.

See you next year. □

WINDREAK

from page 39/32

It wasn't until I tried to turn that I discovered that the entire rudder had blown off the ship in the dive. We were all amazed that it was still flying. I still needed to get it down and I tried to get it to tumble and spin by stalling it and making it flop around, but each time I tried it would recover nicely and continue flying just as before. Who says flying wings are unstable? I gave up trying to get it to spin, and concentrated on getting it to pull out when it was headed in my direction. When it did, I dived it at about 20 degrees, then pulled out near the ground and managed to land it within 30' of me with no more than a ground loop.

After we all picked our jaws up off the ground, we went over and found the ship to be undamaged except for the missing rudder.

A couple of the flyers mumbled something under their breath about my unbelievable luck (this wasn't the first time that I had deserved a total wipe-out but came through virtually untouched). I had to build another rudder as the original was never found. Probably the most amazing thing of all was that throughout the entire incident the wings never fluttered! □

PIT STOP

from page 30/28

aids in motor cooling, ball bearing rear axle with a choice of 4 different gear ratios. The motor is the Leisure 05 with special high temperature wire. The Model 100 is available completely assembled with resistor speed control, less radio, at \$135.00 or, if you prefer, ready to run with a Futaba radio at \$260.00. A deluxe version with a custom designed electronic speed control and Futaba radio at \$285.00. The Leisure battery charger is also one of their more popular items.

BO-LINK

Although Bo-Link started in 1/12 electric cars after Leisure Electronics, Bob Rule, the owner of Bo-Link, has really been busy. His electric car was also based on the Jerobee chassis, but with Bob's salesmanship, Bo-Link grew to be the leader in 1/12 electric cars. Bo-Link has just recently acquired the Mach 12 car which features an aluminum chassis plate, stamped steel front end and aluminum wheels. Bo-Link carries a complete line of related 1/12 scale car parts, with over 20 different body styles to choose from.

to page 151

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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 October 1978 issue.

NOVEMBER WINNERS

SECOND PLACE

**Major R. H. Jacquot
APO, New York**

Modified from a 1/4 Scale Practical Scale Kit of the J-3 Cub, there has been over 1000 hours to make this one something special. With an inverted Quadra, the total weight is 18 lbs. Has a span of 9 3/4', with coupled controls in cockpit, electric brakes, seats in real leather, scale pilot with headset. Covered with Permagloss Coverite and steered with a World Engine Expert radio.



THIRD PLACE

**Arthur Rygasewicz
Racine, Wisconsin**

Scratch-built 'Styros 40' designed by John Woods. All styrofoam, with fiberglass cloth on fuselage and balsa covered wing and tail. Has a 46" span with a H.P. 40 for power. Muffler is own design. Uses an RS radio for controlling and is finished in acrylic lacquer.



FIRST PLACE

**Jim Norwood
Salem, Oregon**

A totally scratch-built Stand-Off Scale Lockheed Vega. Fuselage plug was carved and laid up with epoxy resin and cloth. Wing is foam core with poster board cover. Has scale working landing gear. Sports a wing span of 62", length 43", with a Fox Eagle .60 in front. Controlled with a Kraft system. Finish is Solarfilm and K & B Super Pox. Took approx. 9 months to complete.

ELECTRO CRAFT

Electro Craft has been making 1/12 electric cars since 1975. There are different ways to transmit the battery power to the motor so that you have a controlled car speed. One is with resistors and the other popular method is with an electronic speed control. Electro Craft has been doing most of the early pioneering with electronic speed controls, making them faster responding, more reliable, higher output and lighter. Their current electronic speed control #PSC-9 FR is rated at 25 amps, giving high motor torque capabilities, and low voltage loss.

Their 1/12 car used some MRP components with special Electro Craft components, such as fiberglass chassis plate to comprise a very competitive race car.

JO-MAC

The unquestioned leader in 1/12 scale gas powered cars, Jo-Mac Jerobee MRP, was busy designing and building their new Jo-Mac radio when the electric car scene came to be, so they didn't have the time or resources to start with the 1/12 electrics. This opened the door for Leisure and Bo-Link, who started with the popular Jerobee chassis. Jo-Mac now has their radio complete and so they, too, are offering 1/12 electric cars, in both the Jerobee and MRP lines. A most complete line of related parts and bodies is available, as well as the new Jo-Mac radio with electronic speed control. Jo-Mac has many kits available, from the lowest priced Jerobee cars ready to run, to the top of the line MRP 6 cell cars with Jo-Mac radios.

ASSOCIATED ELECTRICS

The Associated RC12E 1/12 electric car is the newest challenger in electric cars. The Associated 1/8 scale gas powered cars have an unmatched racing record, having won the Road and GT Classes at the last two ROAR Nationals, as well as winning the first 7 places at the World Championships. Using their racing knowledge gained in 1/8 scale competition, Associated designed their new 1/12 car. The prototypes of their 1/12 car, won the first 4 places at the 1977 ROAR Nationals.

to page 154

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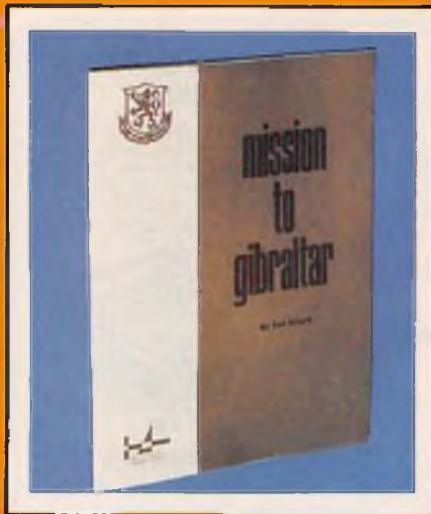
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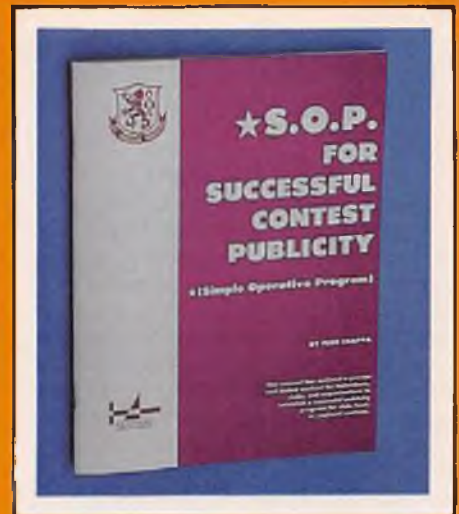
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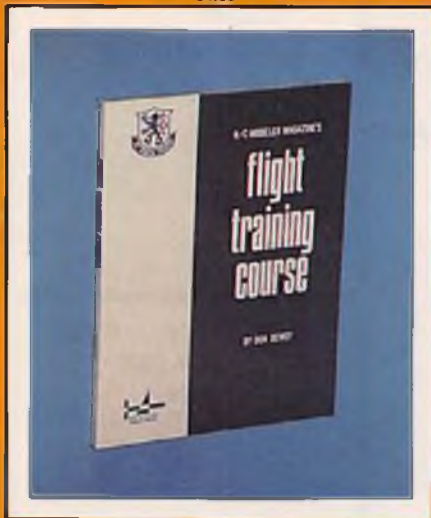
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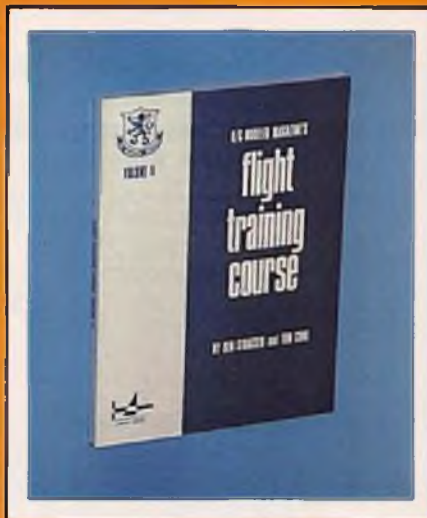
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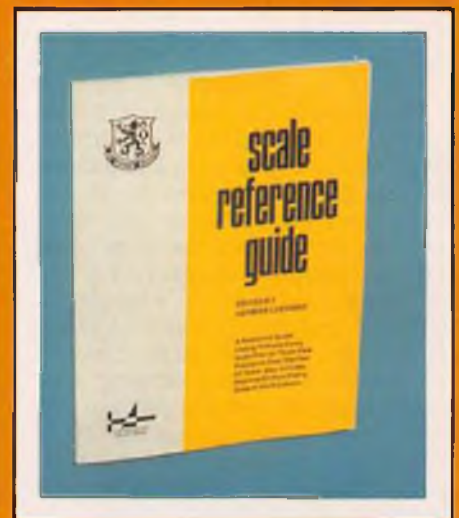
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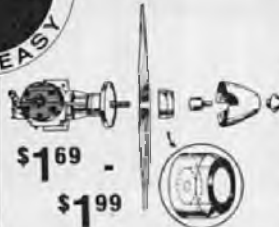
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from page 151/28

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HERE'S HOW

from page 26

beyond your capability, then there is a way out. You guessed it. EWH Specialties will be most happy to sell you a hinge kit. The kit consists of 6 aluminum hinge assemblies, 6 pieces of 5/32" x 5/8" brass tube, 6 pieces of nylon tubing, and 2 aluminum control horns complete with mounting screws and nuts. The instructions clearly explain how you can adapt these hinges to your particular design. The hinges are manufactured with precision tooling and are, from what I have seen, a quality product. The complete kit sells for

\$14.95. EWH Specialties also sells other products and materials. Their advertisement can be found elsewhere in this magazine.

Incidentally, getting back to meeting Chuck Cunningham for the first time. Meeting Chuck is like putting on an old pair of shoes — an extremely comfortable experience. He has a great sense of humor, is never lost for words and his cup runneth over with love for his fellow RC'ers. □

SOARING

from page 22

landing is possible. The aim should be to cover as much air as possible and no circling should be carried out unless lift or delayed sink is found. Circling flight outside a thermal is a quick way of losing height without searching any new area.

During the search it is important to fly

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the sailplane in straight lines and not let it turn, otherwise, it will wander or turn away slightly as it is affected by the outskirts of the thermals. Inexperienced pilots often unconsciously let the plane influence them into commencing a turn when it is banked imperceptively by lift. In this way it will find its way between the thermals. See Figure 1.

The height obtained on a winch launch gives a good chance of finding one thermal on each flight. If rising air is found and is discarded without gaining height, there is usually very little hope of finding another thermal before having to land. It is important, therefore, to work any lift encountered and not to assume that something else will be found by further searching during that circuit. Higher up, the pilot can be more selective and use only those thermals which give a good rate of climb, but low down it pays to work each thermal as though it were the only hope.

The principle of centering in a thermal is to find where the best lift lies and then move the sailplane over until it is circling in the strongest part of the thermal. Since the thermal is normally invisible, and of a small area compared with the amount of air flown through in the course of a few minutes of flight, the problem requires quick thinking and accurate and sensitive piloting.

The beginner should remember that if the lift is of any practical value it will remain useful long enough to allow time for the sailplane to be centered stage by stage without any large corrections. Below about 200', once the thermal is lost, it is most unlikely that it will be picked up again. Therefore, the beginner is well advised to concentrate on careful, accurate circling as this is the key to staying with the thermal.

The radius of turn can be affected by a change in angle of bank, variation in air speed, and by inaccuracies such as

slipping or skidding in the turn. Unless the bank is held constant and the speed is steady, the turn will be uneven, and this may result in the sailplane flying out of the thermal altogether. Since the air is generally turbulent in and near the thermal, constant care is required to keep a steady turn.

Figure 2 shows the method in which the sailplane is centered into the thermal. The first indication of the thermal is a decrease in the rate of descent. In this example the decision was made to turn to the right, and by the time zero sink was seen, a smooth turn had been initiated with about a 30° of bank and at a speed just above normal cruising. Unfortunately, the turn was away from the lift but, as the turn was held, the sailplane came back into the lift as it completed the orbit.

Since the area of lift is generally small, no attempt should be made to correct an

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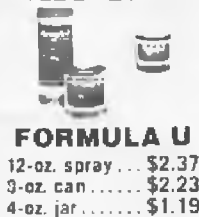


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for 1/2A-.40 models



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These retracts are designed to work with miniature servos such as the Cannon servos, or similar smaller sizes. Require the least pressure to operate. Weight is slightly less than one ounce. Will also operate flaps.

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HOLDS ONE QUART \$3⁹⁵

All you need to carry fuel and to fill or empty the fuel tank of your model. No batteries or pumps needed - just press down to fill, release to empty tank.



SOARING

from page 55/22

error like this by changing the direction of turn.

Further circles, alternately checking the position and strength of the lift and making corrections, should result in the sailplane eventually circling with an almost constant rate of descent all the time. This indicates that either the sailplane is centered in the thermal or that the area of lift is so large that the whole turn is well inside the lift.



To keep the pace going fast at a



Soaring union of Los Angeles uses transmitter tote at their contests to speed things up, see text.

contest, SC² clubs use a Transmitter Tote from the landing circle to the transmitter impound. As soon as the pilot lands, he places his transmitter in the Tote, the clip is passed to the waiting pilot already on the winch line.



David Peltz, of the San Fernando Valley Silent Flyers, was having trouble with his spoiler cords pulling uneven so he devised a slider mounted on two short sections of arrow shafts epoxied to a cross member to the rear of the spoiler servo. Dave says the pull is even with no binding or slope.



to page 162

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REGULAR COMPONENTS



MICRO COMPONENTS



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- Double sided PC boards
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- High quality servo motors
- 4.0 lb. power, 0.5 sec transit
- 8 mA drain
- Fast, precise, high resolution
- Gold plated Deans connectors

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Wt. 1.2 oz.

MICRO Size: 1.28x1.3x.6
Wt. 0.7 oz.

RECEIVER

- Double sided PC boards
- Double tuned front end
- 1.5 μ V, AGC on 4 stages
- Gold plated Deans connectors
- High selectivity and rejection
- 5 channels, 8 available

FREQUENCY: 72.08, 72.16, 72.24, 72.32,
72.40, 72.96, 75.640
REGULAR Size: 1.9x1.7x.8 Wt. 1.5 oz.

MICRO Size: 1.75x1.14x1.0 Wt. 1.5 oz.

BATTERY

- REGULAR
- 500 mA, vibration resistant
 - Nylon D&R case
 - Gold plated Deans connectors
- Size: 2.2x1.25x1.25 Wt. 4 oz.
- MICRO
- 225 mA, vibration resistant
 - Nylon D&R case
 - Gold plated Deans connectors
- Size: .85x1.45x1.45 Wt. 2 oz.

SWITCH HARNESS

- Noble high quality switch
- Deans gold plated connectors
- Nylon protective cover
- Wt. 0.4 oz. (charging connector to be supplied by user)

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best motors available. D&R mechanix production is now electronically controlled for increased precision. Finally a burn-in procedure further assures the highest reliability.

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NAME	ADDRESS	ZIP CODE		
QUANTITY	CAT. NO.	DESCRIPTION	PRICE	TOTAL
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	S5442	Rotary Dunham servo, assembled	544 IC 22.00	
	S5443	Rotary Dunham micro servo, assembled	544 IC 29.00	
	R2000	Receiver regular, assembled	Frequency _____ 36.00	
	R2001	Receiver micro, assembled	Frequency _____ 39.00	
	B1000	Battery regular, assembled	13.00	
	B1002	Battery micro, assembled	13.00	
	H1001	Switch harness, assembled	5.00	
	S5441K	Kit of S5441 servo	544 IC 17.00	
	S5442K	Kit of S5442 servo	544 IC 19.00	
	S5443K	Kit of S5443 servo	544 IC 25.00	
	R2000K	Kit of R2000 receiver	Frequency _____ 30.00	
	H2010	5 male & 5 female Deans 3 pin connectors & assortment of wire	8.00	
	S2000	Trays for all regular servos 5 pcs.	4.00	
	S2000A	Single snap on tray for all micro servos	1.25	
<input type="checkbox"/> COD, Shipping, handling & Insurance <input type="checkbox"/> Cash, money order, bank draft, certified check, shipping, handling & Insurance			2.50	
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*Pat. pend.



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CITY _____

STATE _____ Zip _____

MOTOR _____

R/C EQUIP. _____

VANTEC

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 Van Nuys, CA 91406

SOARING

from page 160/22



Dave Peltz uses slider on fiberglass tubes for smooth spoiler action.

Good lift.

SUNDAY FLIER

from page 19



pictures and your remarking that Mr. Perch's home-built would make a great R/C job, so I just can't resist sending you a picture of my latest creation!

This airplane started life as a Lou Proctor Mini-Antic and all that has been done is to make a center section and cabane, fit a turtle deck and extra cockpit and re-shape the fin. Plus, of course, a new type undercarriage, and the Williams radial kit.

The engine is an Enya .40 swinging an 11/16 prop. It is a beautiful flier (like all Antics) and is real fun on "touch and

goes."

I was trying to achieve a '20's type looking model - being an old-timer fan - and think that I have succeeded. Perhaps some of RCM's readers who were taken by your picture, etc., may be inspired to have a go and I feel that the Antic conversion may be the easiest way out. I also have noticed that RCM have had the odd gyrocopter featured occasionally. A couple of years ago I did another Antic conversion - to a gyro (no wings either - that's cheating!) which was quite successful. If anyone is interested, I would be pleased to pass on my experiences and how the problems were overcome.

Sincerely,
 Bill Aldredge
 New Zealand

If any of you modelers want to get in touch with Bill, his address is: 127 Rata St., Lower Hutt, New Zealand.

But once again, let me repeat that if you have a model that you think is unusual, send me a black and white print. That way, you'll have a much better chance of getting it in print.

to page 164

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- Number of Channels: 5.
- Case Material: Hi-Impact ABS plastic.
- Type Gimbals: Dunham open-gimbals.
- Type Pots: CTS 5K ceramic.
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- Type Meter: RF and battery condition indicator.
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- Case Material: Nylon.
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- Weight: 1.24 oz. (35.1 gr.) for 5-channel.
- Type Decoder: C-MOS 8-bit shift register.
- Type Front End: Double tuned, dual FETS. FET RF AMP. Feeding a FET Mixer.

SERVOS Model CE-4

- Case Material: Nylon.
- Size: 3/4" x 1 1/2" x 1 1/2" (19 x 38 x 38 mm).
- Weight: 1.25 oz. (35.4 grams).
- Output: Rotary type.
- Output Controls: Arms.

- Type Amplifier I.C. amplifier, utilizing T.I. 28604 I.C. chip.
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- Servos: CE-4 (Dunham Mechanics)

SYSTEM

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40 PDP* Model 4200

61 PDP* Model 6300

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SUNDAY FLIER

from page 162/19

Here's an item from Bill Giersberg, in Atlanta, Georgia, that's well worth repeating:

Dear Mr. Willard,

In getting ready for this new flight season I took down a box of equipment and found I had thrown some oily rags on top of it. I always try to be careful of doing this because of the possible fire hazard. What happens is that the oil decomposes and, in doing so, it releases an amount of heat. If this heat is allowed to accumulate, it might catch the rags on fire. You may want to remind your readers of this, especially those "Sunday Flyers."

Also you might remind them to watch those battery wires. A 1.5 volt dry cell

shorted across a piece of steel wool can cause it to glow red hot. With the fuels in the same probable location, this could be disastrous.

*Sincerely,
Bill Giersberg
Atlanta, Georgia*

Spontaneous combustion, I think it's called, when a pile of rags gets hot and ignites like that. Somehow, we always seem to think, "Oh, that won't happen to me." But Bill has a good point; we clean off our models and throw the rags in a corner more often than we think we do. I know that when I read Bill's letter, I went out and cleaned up the rag pile in my shop, just in case. You would do well to do the same.

A lot of you undoubtedly are reading Professor Sabin's excellent series on R/C and The Law. Well, here's one for the books, you might say. From Istanbul, Turkey, comes this letter written by Dr.

Selim Kusefoglu:

Dear Mr. Willard,

I am an avid reader of your column in RCM and I would like to share with you, and with my fellow modelers, a unique experience that I recently had.

I am a member of a small, but active, R/C club in Istanbul, Turkey. A number of our members, including myself, are also quite active in power and sail R/C boating. A few days ago, while sailing my 60" scale sailboat in Istanbul Harbour, a powerboat with two fishermen in it approached the model. Among our screams of protest, the fishermen picked up the model and simply motored away! During the ensuing chase, with us on shore in a car, the pirates, as I shall henceforth call them, finally put to shore, where we and the summoned police met them. Our adversaries maintained that they had

to page 166



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SUNDAY FLIER

from page 164/19

come across an "unmanned vessel" on the "high seas" and claimed her according to the rules of the sea! They expected salvage dues according to the Lloyd's open form!

Now I've heard of model airplanes hijacked or shot at, but this is the first incident of this nature that I have ever come across. The model was clearly "unmanned"; as it would take a crew of considerably less than average height to man it! However, at the time of the incident the model was under my

complete command and in no danger and not more than 50 meters from the shore, where I stood. Unfortunately the pirates' intellectual capacity did not allow them to comprehend the fine details of radio control. They claimed that this "toy" had broken her tether line and was adrift; and that their intention was to turn it over to the police anyway. I feel, on the other hand, that our friendly fishermen saw a quick buck (or the lira in this case) in the whole episode and were it not for the presence of police officers, they would not have returned the model without payment. As it turned out, we recovered the model with minor dents and bruises and as our fury had

somewhat subsided, we did not press charges.

The argument may now seem academic, but I wonder if an R/C model boat could be considered "a vessel, unmanned, not under control or in peril": when, in fact, it is under perfect control by radio waves. Is the presence of a crew a criteria for being under control? Similarly, could the term "high seas" as it appears in Lloyd's forms cover a patch of sea in a harbour, well within sight of shore?

Clearly, this incident had much to do with the shadyness of our adversary's intentions. But if one were to assume

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from page 166/19

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them to be totally honest and conscientious sailors, do you think their claims could be justified from a maritime law point of view? I would appreciate your comments on this incident; please keep up the excellent work on your column.

Dr. Selim Kusefoglu
Istanbul, Turkey

I feel certain that the good Doctor's question is rhetorical, and that, in a court of law (at least in this country) it would be accepted that the craft was under control by its "crew" and therefore not subject to claiming for salvage. However, it's just one more example of some of the complex situations which can arise.

We had a somewhat similar occurrence recently, at a local meet, when the airplane, in this case, went out of control and crashed in a yard. No damage was done, but the owner of the house was mad, and was not going to return the airplane to its owner. Hot words followed, the sheriff was called, and after a lengthy discussion, in which the modeler was accused of trespassing, and the house owner of "stealing" the model, the sheriff, somehow, was able to appease both parties, and the incident was closed. But again, it raises the question — who is liable?

So just remember this. Our sport, and hobby of flying radio controlled aircraft involves certain legal responsibilities. And if you haven't read Professor Sabin's series on R/C and the Law, then go back and do so. Then, when you do go flying, make sure you have taken all possible precautions against a malfunction. Even that may not preclude the possibility of an incident in which you are charged with one of the apparently unlimited number of charges that lawyers are able to dream up in order to file suit against you. But at least you can present some evidence of good faith in your preparations for indulging in your chosen sport. Also, as a member of the Academy of Model Aeronautics, if you are flying in accordance with the AMA safety code, you have further proof of conscientious care.

If that doesn't do it, then you better get yourself a good lawyer.

Wonder if Professor Sabin would be available?

To put things in perspective, though, the odds are that you are far more liable to get involved in a legal hassle just in pursuing the business of living — driving your car, buying food, clothing, or shelter, or the like.

So keep up your Sunday flying. And keep up your letters to your column. The Chief Sunday Flier loves them.

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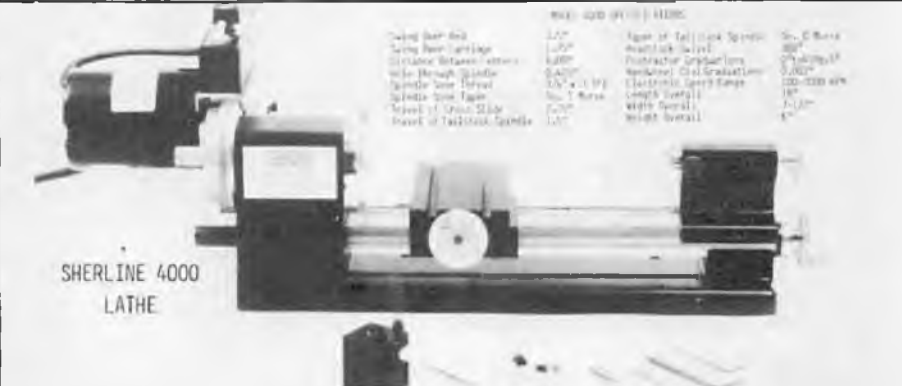
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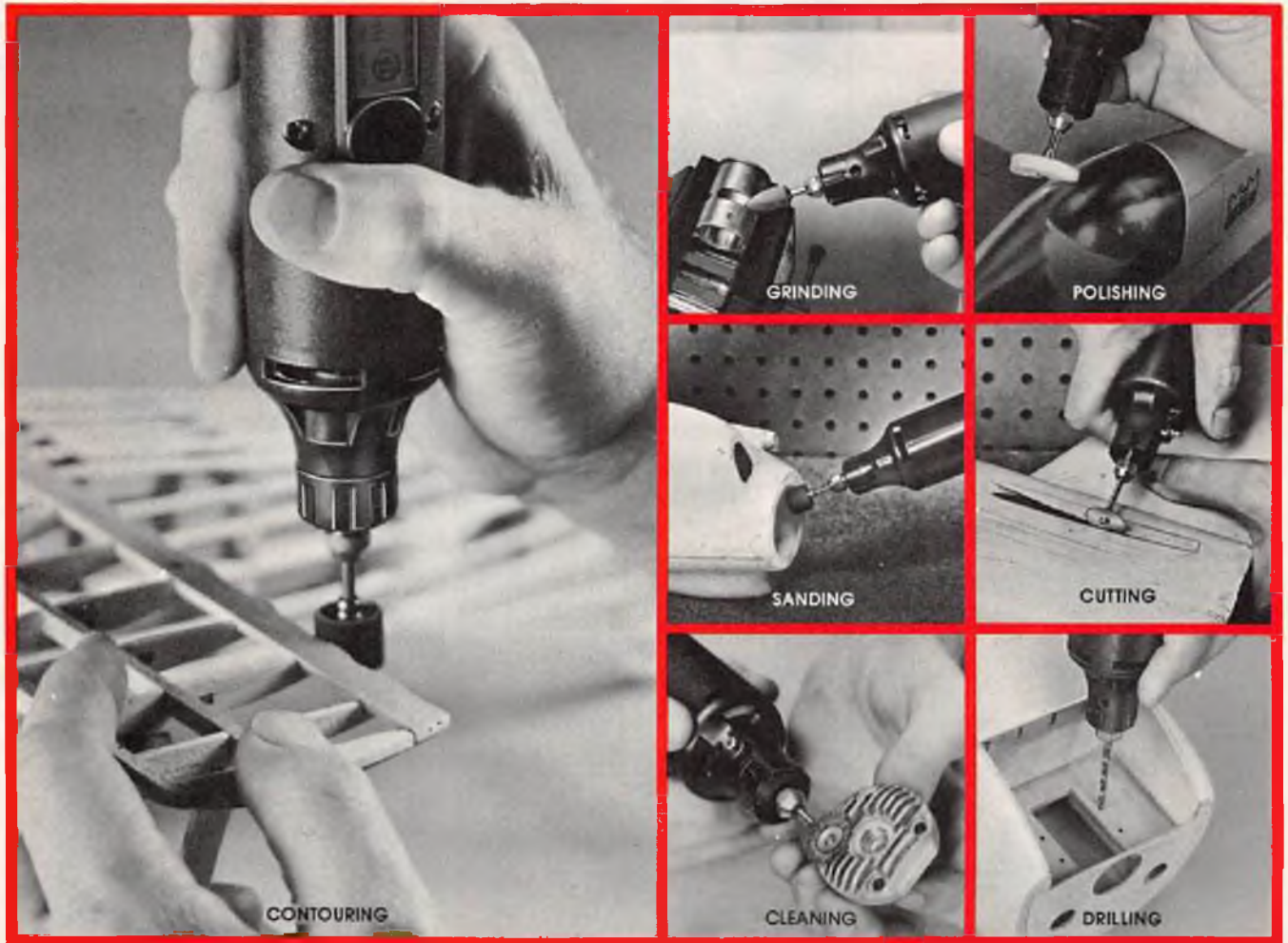
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from page 15/10

set screws hold the carb in place.

I decided to buy a Tarno-Carb, one of the new designs which you have probably heard of - produced in Montreal by Bill Tarnowski. I have installed this carb on my K & B and no better results. I am very disappointed. The carb is well adjusted, runs perfectly on the ground and on take-off - same thing occurs in the air as with the Perry Carb.

I have tried pressure from muffler and without. I have tried with muffler off and still no better results. I am just baffled. Your help would be very much appreciated. The engine idles and accelerates beautifully. I am using a Fox plug and Apollo 7 fuel, if this will help you find my problem.

Sincerely,
Bernard Langevin
Pierrefonds, Quebec

Nine out of ten times when an engine richens up in the air after take-off, it is due to fuel foaming. On the ground, vibration is transferred to the fuel causing it to foam. In the air the foaming stops and the engine goes rich. Even though you have your tank wrapped in foam, excessive vibration will still cause the foaming. Many times a battery pack wedged against the tank will transfer the vibration. Check your prop and spinner if you're using one for run out and balance. Plastic spinners that do not have a back plate are notorious for causing vibration. Has the engine ever been in a crash so that the prop drive spool can wobble? Again this would cause excessive vibration.

You did not say what type of aircraft you are using the engine in. If it is a tail dragger, richening up is characteristic due to the low tank position at rest. In flight, the tank level is higher causing the richening. In this case, the tank needs to be mounted higher to begin with.

Is the engine cowled in? If so, the engine is not getting sufficient cooling air on the ground and running hot. In the air it cools off and richens up. With the limited information supplied, I have to stab in the dark.

Dear Mr. Lee,

I have been a subscriber to RCM from its inception and have also followed your column assiduously. I have noticed that with almost monotonous regularity over the years you have had queries from the owners of OS engines to the effect that they have problems with these engines insofar that the engines run okay when first obtained and then

to page 174

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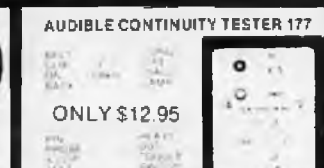
	LIST	BHC
EXPERT 7 CHAN 2 STICK 4 SERVOS	440.00	259.95
EXPERT 7 CHAN 2 STICK 5 SERVOS	465.00	271.95
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OS 10 FSR R/C	35.95	28.80	OS 40 RSR MARINE	99.95	80.00
OS 15 std	32.95	26.40	OS 45 RSR MARINE	109.95	88.00
OS 15 R/C	39.95	32.00			
OS 20 std	35.95	28.80			
OS 20 R/C	42.95	34.40			
OS 25 std	37.95	30.40			
OS 25 R/C	44.95	36.00			
OS 25 FSR R/C	55.95	48.00			
OS 25 FSR std	52.95	42.40			
OS 30 std	45.95	36.80			
OS 30 R/C	50.95	40.80			
OS 35 R/C	53.95	43.20			
OS 35 std	47.95	38.40			
OS 40 R/C	74.95	60.00			
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	128.00			
OS WANKEL	119.95	96.00			
OS 65 RSR	139.95	112.00			
OS 65 RSR MARINE	142.95	114.40			
OS 60 4 CYCLE	225.00	157.50			
OS 21 MARINE	64.95	52.00			
OS 10 FSR R/C MARINE	42.95	34.40			

ENGINES	LIST	BHC
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OS 40 RSR MARINE	99.95	80.00
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G60 ABC PYP R/C	109.95	88.00
G60 B/H w/pump & carb	99.95	80.00
ST 60 FIBB R/C w/muff	79.95	64.00

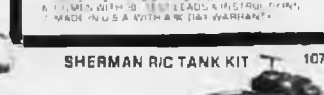
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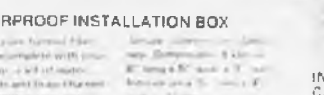
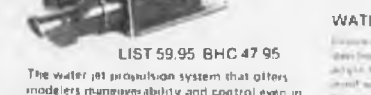
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ABLE - NOSE GEAR - ONE
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ENGINE CLINIC

from page 171/10

sufter overheating and sagging off coupler with loss of power on the plug leads.

Having used practically nothing else but OS for quite some years now, perhaps my solution may be of some assistance because when I first started, I had exactly the same problems, i.e., the engine would start and run okay and almost straight after the first run then the rot would set in.

This had me baffled for a while and

then after some examination of the engine I found that the head screws could be tightened down anything up to 1/8th to 1/4 turn - whether the screws are not torqued enough on assembly or whether the threads stretch slightly with combustion pressure, I would not have a clue, but tightening certainly cured my problems.

Since then my OS engines are given a run and, invariably, I have found the screws can be tightened down afterwards.

As far as the OS carbs are concerned, these can be vastly improved by removing and stripping and then reaming out to a venturi shape

with a tapered reamer (I use a 3 1/2 degree one) making certain that the narrowest part of both tapers is dead on the needle valve centre. This improves the draw and idle and also gives good acceleration. I combine this with exhaust pressure and now never have any idling or acceleration troubles. Incidentally, my engines are run on straight fuel (4 to 1 mix) and with no muffler or exhaust baffle - - - just a piece of 1/8" copper tubing mounted in a hole drilled in the rear portion of the exhaust and with a 1/8" slot filed facing the exhaust gases to slightly pressurize the tank.

to page 176

NEW FROM THE MODEL MERCHANT

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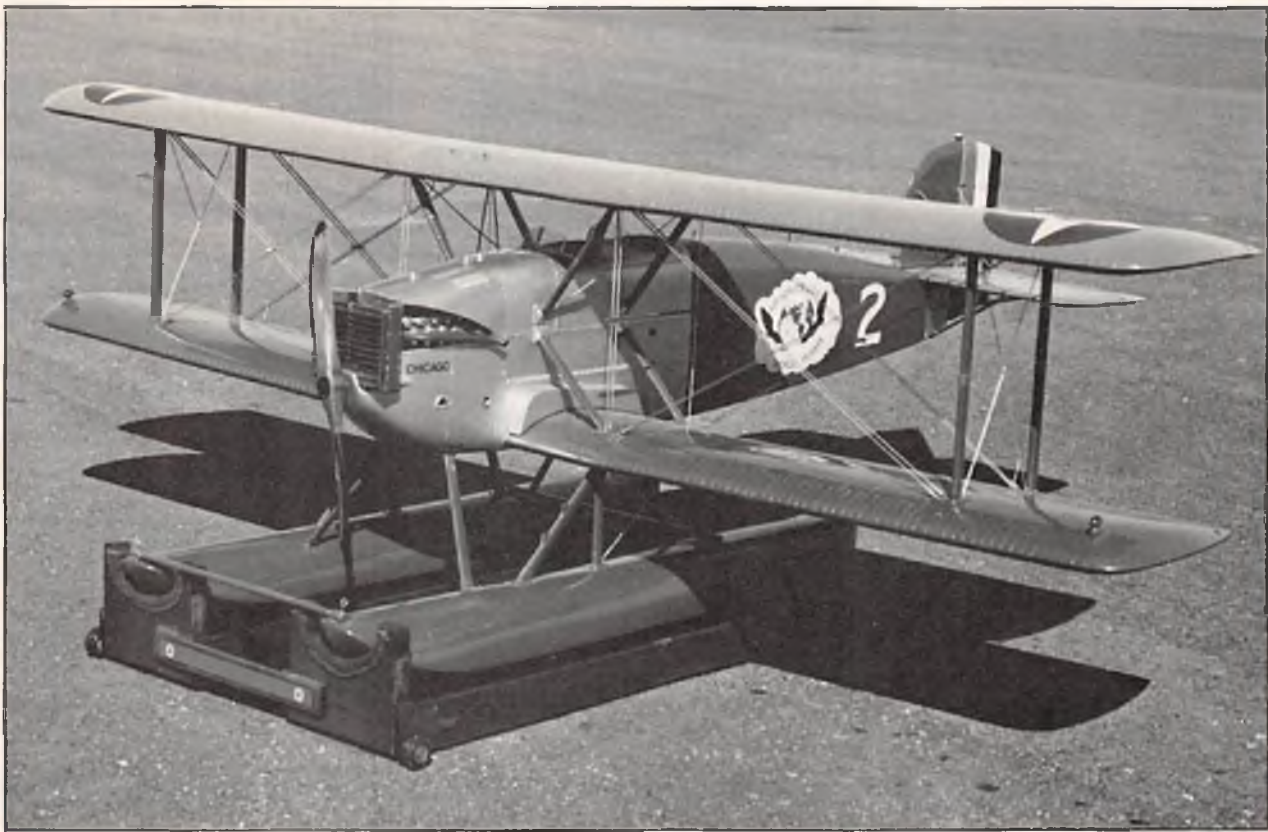
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Satellite City

Dear Bill & Bob:

142 Tabard Drive
San Antonio, Texas
June 30, 1978

Do hope all is well for you both and "HOT STUFF". Here's some thoughts of mine that perhaps you'd like to know. As a professional scale model builder, I use many techniques and products to help me duplicate full size aircraft in model form. I've used your product "HOT STUFF" since it was introduced by R/C Modeler, and I must say it's strength and instant setting time have become increasingly valuable in my work.

I've enclosed several photos you might like, such as the Douglas World Cruiser, Sikorsky S-42 Clipper, P-26 Pea Shooter, Winnie Mae, Ford Tri-Motor and my latest project, the Curtiss Condor, which was the last of the luxury airliners to feature sleeping accommodations. All models, of course, have full interior detail.

The Curtiss Condor is now on display permanently at the Nut Tree Restaurant near Vacaville, Calif., so if you ever happen to be on U.S. 80, between San Francisco and Sacramento, stop in at the Nut Tree airport. Don Birrell, the design director, commissioned me years ago to build scale aircraft for their extensive display, and I'm sure you would enjoy browsing thru aircraft of years gone by. The dining is great, so the visit would appeal to your wives also.

We had eighty-nine visitors to view the Condor at my shop in San Antonio prior to delivery. Most were model builders all interested in model building of some sort. Many were already "HOT STUFF" users and the rest were amazed to learn that the entire Condor was built with your wonderful product.

The Curtiss R3c-2—will be next and the Nut Tree is interested in an 8 ft. DC-3, lots of "HOT STUFF" will go into that.

Sincerely yours,

Edward Chavez
Edward Chavez

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ENGINE CLINIC

from page 174/10

Hoping that this may be of some assistance, I remain,

*Yours faithfully,
Bill Aldridge
New Zealand*

Checking the head screws on any new engine is always a good policy, particularly after the first few flights. Gaskets, if used, compress the screws, have a slight initial stretch, etc. After a few initial runs and checking the tightness they will usually then hold for quite a while unless the engine is run too lean. One lean run is all it takes to loosen head screws. The aluminum parts expand stretching the screws. Then the aluminum parts cool and contract leaving the screws loose. So, always check head screws (as well as all other screws) occasionally and especially after a lean run. □

CUNNINGHAM ON R/C

from page 9

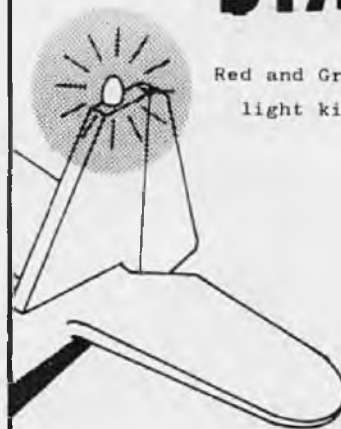
greatly added load that you, the pilot, are going to put on the structure while flying the bird. The best example that I can give is the methods used to beef up my Powerhouse which is acrobatic enough to do loops, rudder rolls, fly inverted, etc., and yet flies well enough to win the First and Third Texas Pride Tournaments, and place in the Second one. The wing spars were replaced with 1/4" square spruce and 1/8" hard webbing added to the two forward spars. Keep the grain of the webbing vertical to the spars. The fuselage had 1/4" sheet balsa added to the structure, cut and fitted between the upright pieces, but if I were doing it over again, I would just add 3/16" sheet inside the fuselage sides back to the trailing edge of the wing. All of the intersections of the sticks and the longerons at the rear of the fuselage are beefed up by the addition of 1/8" hard sheet triangular gussets glued in at each joint. Speaking of glue, I use Hot Stuff to tack everything together and then go back over the structure with Titebond, or Elmers Carpenter Glue, painted on with a dime store paint brush. Use lots of epoxy around the firewall and at the dihedral brace for the wing. Speaking of dihedral braces, I like to use a 12" long, 3/16" thick, plywood brace full depth at the front spar of the wing and almost as large at the rear spar. Frankly, I do not like a small dihedral brace that is roughly 4" long. This really doesn't provide enough strength to the wing. If a wing is going to fail in shear, it is going to fail right where it joins to the fuselage. If you have dihedral braces that extend past the point where the rubber bands clamp

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the wing to the fuselage, it is going to be much, much stronger. Beefing up is really a matter of common sense. Just keep the weight low if you can, make good glue joints and keep the tail feathers as light as possible.

When building from these old time plans, you will find out that they were drawn from the original free-flight plans, and no provisions have been made for the size of the rudder or elevator, nor is the balance point shown on many of the plans. Use about 1/3 of the total horizontal stab for the elevator, and use about 1/2 of the vertical fin for the rudder. You can add structure to the stabs to make the hinge lines, etc. Some of the stabs are woefully weak so you can add a few trusty gusset pieces to the joint between the stab ribs and the leading and hinge line pieces to help out. Makes for a much stronger joint with very little weight build up.

The methods of beefing up these airplanes and the structure of them are exactly the same as I have used in the Lazy Ace, the Lucky Lady, the Miss Texas, and my new 104" span Eindecker. When I went back to the old timers, I re-fell in love with the stick method of construction, and have used it on all of my large airplanes ever since.

I received a letter the other day from George Zink, who is the Quarter Midget Editor for the NMPRA.

Dear Chuck,

Having just recently discovered that you proposed the original Quarter Midget rules in the June 1968 RCM and that Quarter Midget was enjoying it's 10th anniversary, I asked for copies of those original rules from our readers. Dick Tichenor sent us copies of those rules, as well as an article on a Q.M. Rivits. We are planning to run a typed version of your rules proposals in the next issue of NMPRA News Release. We hope this meets with your approval.

I was pleasantly surprised to find your original rules have held up rather well despite the passage of 10 years. On behalf of all the people who now enjoy the sport of Q.M., thank you for all the development and testing you went through in order to bring us this event. The popularity and longevity of Q.M. racing stands as a tribute to your original proposals. Many, many thanks.

Very best regards,

George Zink
Q.M. Editor, NMPRA

Thanks for the very nice letter, George, and though I haven't raced a Q.M. since the Max .15 fell from favor, I'm sure glad that a bunch of guys are still enjoying this size racer. Now, if the 1/2A racers will look back in history, sometime in '67 as I remember, they will find that the rules that I put forth then for the Midwest-RCM racers still hold up today as design parameters for this

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★
As all of you know, who manage to make it through this column each month, I am totally hooked on big airplanes. They are super fun, and the new wave in modeling. The just completed Jumbo Fly In, and the upcoming Monster Bash in Las Vegas (though it will be history when you read this column) are indications of the fantastic interest in big models. I am sure that at the World Scale Champs in Woodvale, England this year was the scene of many, many new jumbo aircraft. And, as I have reported earlier, many experiments are being conducted by the military, and defense contractors using radio control in full size models. But ... I received a terrific book for Father's Day from my group of offsprings, "History of Aviation" by John W.R. Taylor, F.R. Hist. S. and Kenneth Munson, Editors and compilers of Janes "All The Worlds Aircraft." I recommend this book to any of you who are interested in aviation (and aren't we all?). Did you ever hear of the Queen Bee? Well, hang on to your MonoKote irons and listen about the Queen Bee. In the middle of the 1930's, deHavilland Aircraft Company constructed 420 Queen Bee aircraft. 320 were used by the Army, and 100 were used by the Royal Navy, equipped with floats. These aircraft were launched by catapult. The Queen Bee was an exact, full size, copy of the deHavilland DH 82 Tiger Moth, and was constructed of wood and fabric, just like the Tiger Moth. The only real difference was that the pilot stayed on the ground, or on the ship and flew these aircraft by **radio control**. They were used as target drones. Wing span was 29', 4" and length was 23', 11". So, you think that we have big models today, when 43 years ago bigger ones were flying by radio. I wonder if somewhere today there is a Queen Bee packaged in a box, just waiting for some enterprising British modeler to liberate her, and put her back into the air. The picture in the book shows a Queen Bee flying over several soldiers, one working the control console. Looks like the controls were push buttons, and that the control was not proportional. I'll bet that somewhere is an RCM reader with first-hand knowledge of the Queen Bee. If so, let us hear from you.

★
This hobby/sport grows more interesting each year, and continues to provide each one of us with something that we can enjoy. Each time that I design a new aircraft, or head out in a new direction, I realize just how much of my life has been wrapped up in the pure enjoyment of modeling. A great sport, with really great people --- people willing to share their ideas and secrets with others for the total benefit of the whole bunch. I really feel sorry for all of

to page 180

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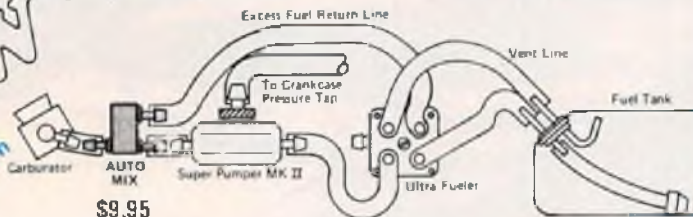
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CUNNINGHAM ON R/C

from page 178/9

those who have never felt the pride of viewing a new creation, or have never felt the thrill when that new creation takes to the air. It's great, give it all a try, be it 1/2A or Jumbo R/C, you will enjoy it. □

FROM THE SHOP

from page 2

compression of an air space over, or in, the nitro. In other words, if the air space in the top of a can could suddenly be compressed, the nitro could be made to explode. If nitromethane were flowing through a pipe with an air space, and the air space suddenly compressed, the nitromethane would explode. This is called adiabatic compression.

Now, consider the point that Clarence made when he stated "keep the nitromethane away from any swimming pool chemicals such as chlorine." Nitromethane CH_3NO_2 is a nitroparaffin and is a colorless liquid that is soluble in water and alcohol. It has a specific gravity of 1.139, a boiling point of 101°C, a vapor pressure of 27.8 mm and a flash point of 95°F. The derivation of nitromethane is by the reaction of methane, or propane with nitric acid under pressure. It is toxic by ingestion and inhalation and has a lower explosion limit of 7.3% in air. It is listed as a dangerous fire and explosion risk. The tolerance of nitromethane is 100 ppm in the air. It is primarily used as a solvent for cellulosic compounds, polymers, rocket fuel, and as a gasoline additive.

Now, chlorine as sodium hypochloride ($NaOCl \cdot 5H_2O$) is what is normally used for laundering as a household bleach, as a fungicide, for water purification, and for use in swimming pools. Its derivation is the addition of chlorine (Cl) to a cold dilute solution of sodium hydroxide in order to make it stable in air. It is a strong oxidizing agent, usually stored and used in solution. It is soluble in cold water and decomposed by hot water. Sodium hypochloride is a strong irritant to skin tissue and there is a consequential fire risk if it comes in contact with organic materials. When pure nitromethane and chlorine come in contact with one another, there is a high risk of explosion. However, when nitromethane is mixed with other ingredients, for example as with methanol and oil such as used in model aircraft fuel, and chlorine, as sodium hypochloride as used as a common household bleach, the risk of explosion is virtually eliminated, but the reaction of the two chemicals together can form a severe eye, skin, and tissue irritant. This is what happened to Bill when he placed his fuel soaked towel in the washing machine and added the laundry bleach. The two chemicals

to page 183

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See next month's ad for other details & hints.

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\$46.50

Span: 48 in.
Area: 480 sq. in.
Wt. complete: 3 lb. 8 oz.
For .23 or .35 engines

Files with rudder,
elevator and motor
control.

Files with motor,
rudder, elevator
control.
(No ailerons).



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Cessna

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LA 119

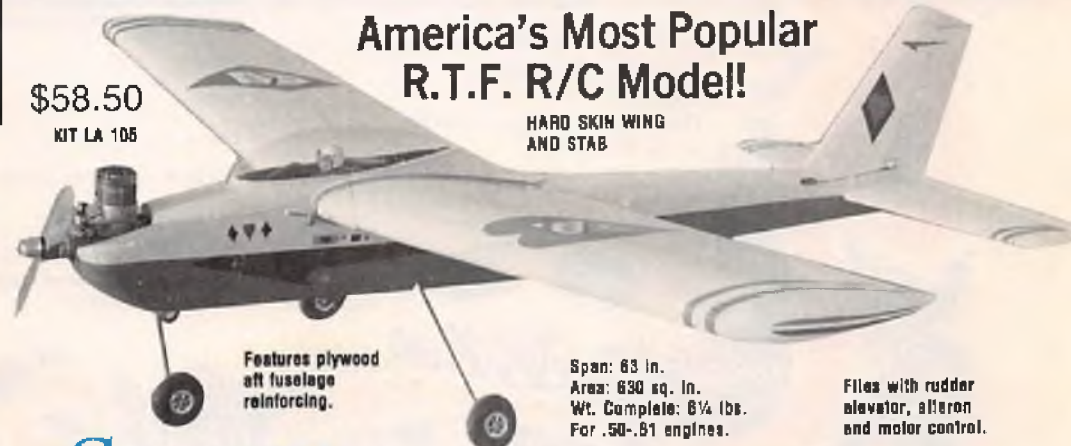
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Files with motor,
rudder, elevator
control.
(No ailerons).

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Area: 480 sq. in.
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KIT LA 105



HARD SKIN WING
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Wt. Complete: 8 1/4 lbs.
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Comet II

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MINIMOUSETANG BY KEN WILLARD

The Minimousetang is a sport airplane designed by Ken Willard with kit engineering by Model Engineering of Norwalk.

This quick building, fun flying plane will put you at ease on the ground and in the air. With a Cox ORC motor this plane can easily be flown in areas where noise and size would not have permitted you to fly before.

Model Engineering of Norwalk's "THRU-CUT" die cutting, combined with "TRI-SQUARE-LOG" assembly in life plywood and balsa makes construction simple enough for the beginner.

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TRI-SQUARE-LOG enables us to bring you the best in life plywood construction. This method of squaring, straightening and holding parts in relation to one another revolutionizes construction.

The Minimousetang is designed for two channel radio control operation with a 1/2 A motor.

The 35 inch wing span combined with approximately 15 ounce flying weight gives a wing loading of 9.2 ounces per square foot. The kit features quality materials, rolled plans, building instructions, complete hardware package, canopy, and pre-shaped landing gear. The building time for the Minimousetang is 7 to 14 hours.

The following items are needed to finish the model: radio, motor, tank, covering material, glue, 1 1/2" main wheel, 1/2" tail wheel, 1/4 collars, 1/8 collars, and motor mounting bolts.

M.E.N.

Model Engineering of Norwalk
54 Chestnut Hill - Norwalk, Connecticut 06851

DEALER AND DISTRIBUTOR INQUIRIES INVITED

ENGINE SIZE: .049



FLYING WEIGHT: 15 OZ.

2 CHANNEL R/C

\$24⁹⁵

WING SPAN: 35"

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Wing Span 72"

Length 52 1/2 In.

Weight with
3 Channel Radio,
3 Lbs. to 3 Lbs. 12 Oz.

Engine .25-.40 Glow .45-.60 Ignition
(1975 S.A.M. Competition Rules .361 Glow Max.)

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reacted, one with the other, forming the irritant to Bill's eyes, throat and lungs.

If you are going to wash those fuel soaked rags, either wash them by hand, or in the washing machine without the addition of any chlorine bleach. This is simply one of those unknown hazards of which you are normally not aware unless someone points out the chemical reaction. So, as the old saying goes, "to be forewarned is to be forearmed."

★

We feel that we should present the following warning on hazardous materials that we modelers use:

Mr. Don Dewey,

Enclosed is a copy of a report that was just shown to me. Due to the fact that most all of us modelers use fiberglass resin to some extent, we should be informed of the potential hazards we are exposing ourselves to.

The contents of the accompanying report are self-explanatory and quite alarming. Just stop for a minute - - how in the past you have used MEKP and resin? Do any close-calls come to mind? Disturbing, isn't it!

Some time ago while adding catalyst to some resin, a drop of catalyst ran down the side of the bottle and wet the ends of two fingers. After stirring the mixture I used a paper towel to wipe off the catalyst. Later that evening I noticed a slight discomfort on those two fingers under the nails, so I scrubbed them with hot soapy water. The next morning I was rudely awakened by, yes you guessed it, commonly known as a chemical burn. For the next two days it felt like I had hot coals under the nails of those two fingers, and soon after, the skin under the nails just fell away. Needless to say, that was an uncomfortable week.

Like most of us, I hate being preached to about safety. We all know the hazards of our hobby and deal with them accordingly. But what about the materials we use that we consider "safe?" It's for that very reason that this letter is being written. Until today, I was only aware of the chemical burn hazards of MEKP. I was a bit concerned when I found out what else it can do under certain conditions. In my job I work with other strong oxidizers and know their dangers well. But not until today did I realize that the catalyst I use at home is also a very powerful oxidizer and, if not handled or stored properly, can have disastrous results.

So before you mix that next batch of resin, just think about that little bottle of stuff you've got in your hot little hands.

"I'd Rather Be Flying"

Rick Meyers
Hollister, Calif.

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K&B

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40 R/C	67.50	44.95
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61 R/C	90.00	54.50
61 R/C W/Pump	115.00	69.50

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RC-2 T-28	79.95	57.99
RC-3 FW190	79.95	57.99
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Skylark 62	59.95	36.99
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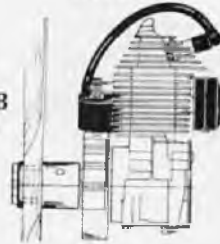


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GOVERNMENT-INDUSTRY DATA
EXCHANGE PROGRAM
SAFE-ALERT - June 16, 1978

Catalyst Used in Fiberglass Resins Problem Situation and Cause

(1) An eye specialist recently described a hazard that could affect you and your families. That hazard is the catalyst which is added to fiberglass resin. The specialist stated that a drop of this catalyst in the eye will result in blindness unless immediate action is taken (within 4 seconds) to wash the catalyst from the eye with water.

(2) The specific toxic agent involved is MEKP (methyl ethyl ketone peroxide). Material published on the subject indicates that washing an affected eye within 4 seconds after contamination prevented injuries in all cases, but no known chemical neutralizer has been reported.

(3) Reports on one experience described disastrous results. The victim had both eyes contaminated while fiberglassing a chair at home. Though he did make an effort to wash his eyes out, several minutes apparently elapsed before he found water. One eye was lost immediately, the other was lost gradually over a period of about 8 years.

(4) MEKP is often used by those who work in aircraft maintenance. Its characteristics are similar to organic peroxides, which are irritants, powerful oxidizers, and very often unstable. An explosive reaction can occur when this material is shocked, exposed to heat, or by spontaneous chemical reaction. Suggested storage for this catalyst is in a cool, ventilated isolated area away from organic or other easily oxidizable materials, and away from acute fire hazards. Containers should be kept closed and plainly labeled.

(5) Protective equipment must be used, including clothing to prevent skin contact, chemical safety goggles for protection of the eyes, and a respirator when extensive amounts of these materials may be present in vapor form.

★

We have received information that Kraft Orange County Distributors (KOCD) have recently moved to a new facility: 330 E. Orangethorpe Ave., Suite J, Placentia, Calif. 92670. Phone (714) 996-9730.

KOCD was formed as an outgrowth of the Kraft Orange County Service Center that was established 3 1/2 years ago by George Killeen. KOCD is a narrow based distributor serving the model



Kraft Orange County radio repair and service operations are personally supervised by George Killeen.

dealers throughout the United States and was established as many other small businesses are: to fill a need within the industry, that is to service what they sell. This philosophy is also carried on with other R/C systems that are serviced at this facility.

They, KOCD, have recognized a need in other technically oriented products and are presently producing and marketing these and other items in the modeling field.

★

From "The Transmitter", newsletter of the Jersey Coast Sport Fliers, Ed Runkel, Editor, comes the following bit of screwy whimsy.

The Turn of the Screw

Ever stop to think how much you use a screwdriver in assembling your planes? Probably more than you realize.

This fact came vividly to my attention a while ago after I bought a used Kaos .60 at an auction. This was a complete, covered airplane, truly an A.R.F. All I had to do was to plunk in the radio and engine and make a few minor adjustments to pushrod lengths, landing gear, etc. Best of all, the plane had previously held a Kraft Radio with KPS-15 servos and a Webra .61 engine, which was exactly what I was installing. I didn't have to drill a single hole. An hour's work, right?

Wrong. It still took me between four and five hours to complete the installation. What took me so long? Then I sat down to review what I had done. I had turned in an awful lot of screws and bolts.

How many? First the servos had to be switched from an oblong tray to a three-across tray — 12 screws. Install tray in plane — 4 more screws. Install switch harness and charging jack — 4 more. Install motor in mount, install servos in wing, remove, adjust and re-install landing gear, etc., etc. Over fifty screws and bolts had been put in and tightened. And since most of these screws had to be first removed from a former installation, I had been involved in the unscrewing and rescrewing of over 100 screws and bolts. 100 times anything takes a long time. Never underestimate the value of your screwdrivers.

And when you're putting together a brand new plane there are a lot more threaded objects to be taken care of. For example, how about up to 6 wheel collars? Clevises? 11 on one plane that I counted. Control horns? Spinner? Muffler? What holds them on? You guessed it. All in all, putting together an RC airplane sure is a screwy job!

The screwy business never ends with this plane, either, because when you start the engine and the plane goes up in the air, what is pulling it? A propeller, of course, also known as (what else?) ... an air screw! □

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If you've been good all year and think you deserve a Radio Controlled Helicopter Kit as a present and don't want to ask outright ... here's what to do.

- Fold the paper so this ad is showing,
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Now, with Cyalume® Lightslicks you can fly your R/C aircraft at night for up to eight hours. Used extensively by RC'ers on the West Coast for night flying of R/C sailplanes, one Cyalume® Lightslick is mounted on the bottom of each wing, near the tip, and another on the Hi-Start just below the chute. Originally designed by the germanian Cyanamid Company for use by the U.S. Navy, Cyalume® chemical lights are far higher in visibility than conventional electric light sources. Completely non-toxic or hazardous, simply bend the external plastic case which breaks the internal glass tube. Shake vigorously, and the fluorescent green liquid material glows brightly and can be seen further than any normal light source or emergency marker. The light source lasts up to 20 hours with maximum brilliance for R/C usage diminishing after 6 hours. Simple capacitor clips can be used to mount them to your aircraft. A cellophane, or plastic, sleeve or a different color can be slipped over one, if so desired, in order to differentiate aircraft direction. Cyalume® Lightslicks are also excellent to carry in the car or camper as emergency light sources. Price is \$4.75 per box of three Cyalume® Lightslicks and includes postage and handling.

FOAM CUTTING WIRE



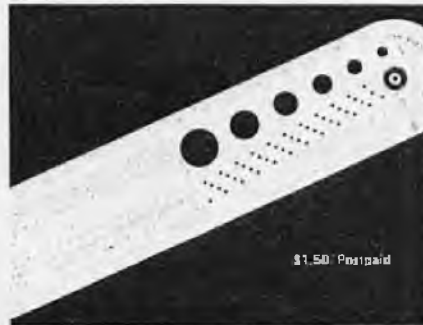
Now available from RCM Products is the finest quality Nichrome wire for foam wing cutters. Available in packaged 5 foot lengths for \$2.00, this is the finest material of its kind available. It is designed for extremely precise and smooth cutting of foam wing cores, and can be used with any commercial or home-built foam wing cutter.

WANT AN RCM DECAL?

Send a self addressed stamped envelope to:
 RCM Decals,
 P.O. Box 487
 Sierra Madre, Calif. 91024.



Lay the decal face down with enamel side on a table top. Peel the backing paper away. The plate will have the sticky side up & will adhere to your finger. Holding it flat, apply in position. After application, wipe hard with a soft cloth, then with squeegee, lie down all the edges. After 48 hour set up at room temperature, decal will adhere permanently.



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It's a compass for accurate circles to 6" in 1/8" increments.
 It's a metric scale from 0 to 150 millimeters.
 It's a 6" scale with 1/8" division.
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G21/35 RC	46.00
X-40 ABC Sch. W/Rear Valve	63.00
X-45 FI RC W/Rear Exhaust	64.00
G60 FI PP	77.00
G60 ABC RC 109.95	84.50
G60 BH W/Pump and Carb	92.50
X-69 FI SP	99.95

OS MARINE ENGINES

OS 10 Sch 42.95 33.00
OS 20 52.95 40.98
OS 21 FSR 64.95 50.00
OS 60 RSR 139.95 108.00
OS 65 RSR 142.95 110.00
OS 45 RSR 109.95 84.50

NEW OS ENGINES LESS MUFFLERS

60 RSR 136.50 105.00
65 RSR 142.95 110.00
40 SR RV 84.95 65.50

OS ENGINES WITH MUFFLERS

10 FSR S. 28.95 22.35
10 FSR RC 35.95 27.75
15 STD 32.95 25.50
15 RC 39.95 30.50
20 STD 35.95 27.75
20 RC 42.95 33.00
21 FSR CAR. 62.95 48.50
25 STD 37.95 29.50
25 RC 44.95 34.50
30 FSR STD. 52.95 40.75
25 FSR RC 59.95 46.00
30 STD 45.95 35.50
30 RC 50.95 39.00
35 STD 47.95 37.00
35 RC 53.95 41.50
36 117.50 80.00
40 RC 74.95 67.50
40 FSR RC 89.95 69.50
45 H 104.95 81.00
45 FSR RC 104.95 81.00
60 BH RC 99.95 77.00
60 FSR RC 129.95 100.00
60 FSR RC W/Perry Pump & Carb 159.95 123.00
WANKEL 119.95 93.00
60 FS 225.00 158.00

*Denotes Combat with PP

SUPERTIGRE ENGINES WITH MUFFLERS

60 FI 88 RC 79.95 61.75
23 RC 53.95 41.50
46 RC 69.95 54.00

K&B (VECO) ENGINES

List	Indy
Veco 19 Std.	45.00 31.50
Veco 19 R/C	50.00 35.00
35 Pl. Bg.	30.00 21.00
35 Pl. Bg./R/C	34.95 25.00
40 R/C	67.50 47.00
40 R/C With Pump	95.00 66.00
4.9 F.R. Std.	85.00 66.00
3.5 Outbrd.	89.00 69.00
61 R/C	90.00 63.00
61 R/C W/Pump	115.00 80.50
6.5 F.R. Perry Carb	110.00 77.00
6.5 F.R. Racing	95.00 66.00

KITS

Indy's Special Low Prices

MK
Spirit St. Louis 98.50 73.50
Zero 54.95 42.95
Matthias 40 54.95 42.95
Matthias 20 43.99 34.99
Curare 40 79.95 63.00
Curare 60 98.50 79.00
Blue Angel Jr. 54.95 42.95
Happy 20 S 29.95 23.95
Astro 20 45.00 35.50
Curare 40 Retract 49.95 39.95

MIDWEST

Lil T. Glider 26.95 21.00
Tri Squire 29.95 23.50
Lil T. Squire 22.95 17.90
Cessna Cardinal 29.95 23.50
Twin Stik Trainer 49.95 39.95
Das Lil Stick 32.95 25.70
Sweet Stik 39.95 29.00
Chimpunk 29.95 23.50
Attacker 39.95 29.00
New Hawk
Glider 139.95 104.00
Silent Squire 39.95 29.00



BUD NOSEN MODELS

%A Aerona Champ. 99.95 84.00
Cessna 310 169.95 135.96
Citabria 99.95 84.00
Gee Sport 120.95 110.00
Jenny 129.95 110.00
Mr. Mulligan 139.95 112.00
J-3 Cub 119.95 95.99
Trainer 79.95 65.00
P-51 168.95 135.96



SIG

Kavaliar 39.95 30.84
Kiwi 37.50 28.95
Colt 20.95 16.18
Super Sport 19.95 15.95
klipper 20.95 16.75
S. Chimpunk 59.95 46.00
Sig P-51 57.95 45.00
Kallit 34.95 27.95
Kommander 39.95 31.00
Kougar 44.95 35.75
Smith Mini plane 49.95 39.95
Zin Akrobat 54.95 43.99
Yak 18 73.50 59.00
Citabria 57.95 45.00
Liberty Sport 64.95 51.50
Ryan STA 73.50 59.00
Clid Wing Cub 39.95 31.00
Skybolt 62.50 49.95
Piper J-3 39.95 31.00
Doubler II 24.95 19.95
Cessna 150 69.95 55.00
Minnow 27.95 22.25



Pump - 1 oz. per revolution so you can partially fill tank if you desire. Extra heavy duty gear train for rugged service. Fast pumping not necessary as with most hand pumps. These manual hand pumps are always ready to go - no batteries to worry about. List - \$12.50. Indy - \$8.95.

RADIO CONTROL SYSTEMS



WORLD EXPERT MARK II

	List	Indy
7 Ch DS (5 Servos)	464.95	279.00
7 Ch SS (5 Servos)	484.95	290.00
7 Ch DS (4 Servos)	439.95	263.00
7 Ch SS (4 Servos)	459.95	276.00
5 Ch DS (4 Servos)	399.95	235.00
5 Ch SS (4 Servos)	419.95	251.00

FLIGHT PACKS

7 Ch. 5 servos	\$264.95	\$188.95
7 Ch. 4 servos	\$259.95	\$162.95
5 Ch. 4 servos	\$249.95	\$157.98

SERVO S

\$-10 & S-11	\$45.00	\$36.00
Retract	\$52.00	\$42.00



COX/SANWA

2 Ch. 2 servos S S	139.95	99.95
2 Ch. 2 servos, all dry	99.95	73.00
3 Ch. 3 servos, nicads	229.95	149.95
4 Ch. Championship	449.95	337.50
4 Ch. 4 servos, nicads	299.95	199.95
6 Ch. Championship	479.95	359.95
6 Ch. 4 servos, nicads	369.95	239.95

KRAFT

KP-3C dual stick	\$219.00	\$175.95
KP-5C dual stick	\$375.43	\$295.00
KP-6CS single stick	\$375.43	\$295.00
KP-7C dual stick	\$515.43	\$399.00
KP-7CS single stick	\$515.43	\$399.00

NEW FROM KRAFT

KP4A dual stick, 4 channel, 4 servos, all nicads	\$299.95	\$209.00
KP6A dual stick, 6 channel, 4 servos, all nicads	\$329.95	\$229.95
KP2A 2 channel, single stick, dry batteries	\$129.95	95.00

SERVO S

KPS-11, 12, 14 & 15	\$44.95	\$38.00
KPS-15H & 16	\$49.94	\$41.90

RADIO CONTROL SYSTEMS

NEW FROM WORLD

4 channel, 3 servos, Transmitter takes dry batteries. Nicads and charger in airborne system.
L. \$239.00 I. \$149.95



A-JUSTO-JIG CO.

%A Retracts-mains 11.95 9.95



MICHIGAN HOBBY HANGAR SMALL WONDER

MICHIGAN HOBBY HANGAR
Quickie 28.95 20.25
Quickie Bipl. 35.95 25.17
Miss Vintage 54.95 38.47
Small Wonder 33.95 23.75

WORLD ENGINES KITS



CUB



GLASS HAWK



MULLIGAN

WORLD ENGINES DAS BOX FLY SERIES

20-L (low wing)	34.95	26.00
20-W (biplane)	39.95	29.00
10 mg-(motor glider)	24.95	18.95
20-S (shoulder wing)	29.95	21.95
15-H (high wing)	22.95	18.00
Box Fly-19-25	34.95	27.00
Box Fly Jr.	24.95	16.95
Miss World	49.95	36.00
Air. Mulligan	47.95	36.95
WE Cub	39.95	29.00
WE Champ.	38.95	29.00
Lil John (low wing)	59.95	47.00

SPECIALS GOOD THRU 12-25-78 SUPPLIES MAY BE LIMITED

Indy
32% OFF
CRAFT AIR VIKING
L. \$79.95
I. \$54.37

Indy
35% OFF
ACE VARI-CHARGER
L. \$19.95
I. \$12.97

Indy
28% OFF
DREMEL D-VICE
L. \$24.95
I. \$17.95

Indy
40% OFF
HOT STUFF
L. \$3.50
I. \$2.10

Indy
32% OFF
A JUSTO JIG FULL HOUSE
L. \$59.95
I. \$40.77

Indy
40% OFF
DAE SERIES IV POWER PANEL
L. \$34.95
I. \$20.97

INDY

CALL TOLL FREE
1-800-428-4682
Indiana Res. - 317-846-0768

INDY



SEE
INDY ADV.
3RD COVER

SPECIALS
GOOD THRU
12-28-78
SUPPLIES MAY
BE LIMITED

KITS Indy's Special Low Prices

AIRTRONICS

	List	Indy
Gere Sport	38.95	30.50
Square Snar	24.95	19.00
Cadet	36.95	28.00
Questor	34.95	26.50
Grand Spirit	129.95	95.00
Super Questor	39.95	30.50
Aquila	69.95	54.00
Olympic II	49.95	35.95

ACE

Pacer	10.95	15.50
Dicks Dream	11.95	9.95
Ace High	19.95	15.50
Up-Start	17.95	13.75
All Star	24.95	19.95
Whizard	18.95	14.76
Mach Nine	19.95	15.95



TRAINMASTER

ANDREWS

S-Ray	34.95	27.95
A-Ray	44.95	35.95
H-Ray	39.95	31.95
Sportmaster	69.95	55.95
Mini Master	44.95	35.95
Trainmaster	52.95	42.95
Aeromaster Two	74.95	59.95

ASTRO FLIGHT

Electra Fly	24.95	17.96
Bushmaster	44.95	33.75
Fourstar RF/A	44.95	33.75
Melba	29.95	22.50
Monterey	39.95	29.95

DIRTY BIRDY



BRIDI

	List	Indy
Strike	184.95	129.99
Down Racer	134.95	102.00
Tipmunk	124.95	93.00
Dirty Birdy (balsa)	84.95	63.95
Dirty Birdy 40	59.95	45.99
weedy Birdy	43.95	34.50
orster	39.95	31.00
siner 18	27.95	21.50
siner 20	34.95	27.00
siner 40	54.95	42.00
siner 60	62.95	49.00
ic Trainer	39.95	31.00
500	39.95	31.00
Flh 4 20	29.95	23.00
ckest 200	24.95	19.00
ckest 500	42.95	33.00
er Kaos 40	55.95	43.00
er Kaos 60	69.95	54.00
l	66.95	52.00
Lockhead	134.95	102.00
l	129.95	99.95

KITS Indy's Special Low Prices

CASS ENGINEERING

	List	Indy
Pulsar Biplane	95.00	79.95



CRAFT AIR

Windrifter	44.95	33.75
Sailaire	129.95	97.50
SD-100	59.95	44.95
Buehl Pup	34.95	25.50
Butterfly II	49.95	39.95
Viking II	79.95	61.50

GMC MODELS

1/4 Corsair	31.95	23.95
1/4 Zero	31.95	23.95



SR. FALCON

GOLDBERG MODELS

Ranger ARF	23.95	19.00
Sr. Falcon	59.95	47.95
Falcon 56 MKII	44.95	34.00
Skylane 62	59.95	47.95
Jr. Falcon R/C	13.95	11.00
1/4 A Skylane	15.95	12.95
Jr. Skylark	14.95	11.95
Skylark 56 MKII	49.95	39.95



PETE AIR CAMPER

HOUSE OF BALSA

Miss Dora	39.95	27.99
Pietenpol	49.95	39.95
1/4 Pietenpol	22.95	17.99
P-51	27.95	21.95
ME-109	27.95	21.95
P-39	27.95	21.95
Chippmunk	27.95	21.95
P-47	29.95	23.99
PW-190A	28.95	23.99

LANIER MODELS

Jester II	73.50	51.50
Invader	84.50	59.00
Scamp	52.60	36.75
Comet II	58.50	40.95
Cesana	46.50	32.75
Pinto	46.50	32.75

MARKS MODELS

Sunny (Bipe)	32.95	24.75
Windward	32.95	24.75
Windfree	44.95	35.00
Wanderer	19.95	15.95
Boschwaeker	44.95	35.00
Wanderer 90"	35.99	27.50

MILE HIGH MODELS

Joy Stick	18.95	14.99
Super Joy Stick	35.95	25.95

GLUE & FILM

ADHESIVES

	List	Indy
Willhold R/C 56	1.50	1.25
GMP Styro Sdk.	2.30	2.00
Hobby Poxly II	4.90	2.99
Hobby Poxly IV	2.00	1.75
Willhold Aliphatic	1.80	1.50
GMP 6 mn. Epoxy	5.95	4.75
GMP % last	5.50	3.75
Devcon 5 mn. lg.	2.50	1.85
Devcon 5 mn. sm.	1.35	1.00
Devcon 5 mn. 9oz	5.80	3.99
Devcon slo cure	5.80	3.99
Hot stuff	3.50	2.40
Blue Line H.S.	4.95	3.50
Giant Zap	3.50	2.40
X-30 Adhesive	3.25	2.40
Ambroid 4 oz.	1.25	1.10
Ambroid 1/2 oz.	.65	.55
Super Cement	.75	.65
Blue Goo	2.95	2.59
Glaskote 1/4pt	2.95	2.75
Glaskote Thinner	2.55	2.25

COVERING MATERIAL

INDY SILK

WHITE ONLY

1 yd. pkg.	4.20	3.15
2 yd. pkg.	7.50	5.75

COVERITE

Super 38 x 47	7.75	6.20
Silkspun	7.75	6.20
Permagloss	9.75	7.25
Day-glo permagloss orange, yellow, olive drab & aluminum	10.70	7.95
Camouflage 1 1/2 and 2"	9.95	7.25
Balsacite 1/4 pt.	2.95	2.75

MONOKOTE

Opaque	9.00	5.50
Transparents	9.00	5.50
Metallic	10.50	7.00
plain trim sheets	1.19	1.10
Chequerboard trim	1.59	1.50

SOLARFILM

Opaque	7.80	5.00
Transparent	9.00	6.50
Metallic	10.00	7.00

MIDWEST

MicroLen.	1.95	1.75
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BUTY -- FLEX DOPE

22 Colors

Quartz - colors	5.95
Quartz - clear	4.95
Gallons - clear	10.95
Gallons - thinner	6.75

GLIDER ACCESSORIES

AIRTRONICS

Std. launch pail	36.95	28.00
HD launch pail	38.95	30.00

CRAFT AIR

Del. Hi Start	39.95	31.00
Std. Hi Start	34.95	25.00
Super HD Hi	59.95	42.00
Papa Pod	89.95	67.00

ASTRO FLITE

HD HiStart	41.95	31.95
(real heavy duty)		
Astro-start	38.95	31.00

BOATS & CARS

JEROBEE CARS



CARS WITH RADIOS

MK-88	177.95	142.00
Challenger	187.50	150.00
Alfa	226.95	181.00
Vette	215.95	172.00

CARS LESS RADIO

MK-88	55.00	44.00
Challenger	65.00	52.00
Alfa	97.50	78.00
Vette	87.50	67.00

MRC CARS



RA-1204 FMC XR311
Combar Vehicle 74.98 59.95



RA1603 Tyrrell P34
Six Wheeler 67.98 51.85



RA1202 Martini Porsche
935 Turbo 67.98 51.95



RA1201 Porsche
934 Turbo 64.98 50.00

MRC



2 Channel Radio, 2 Servos, All
Dry 119.95 94.00

Battery Pack & Charger for
RA1201 and RA 1003

29.95 24.95

Battery Pack and Charger for
RA1202 and RA 1204

29.95 24.95

CARS



Ferrari R/C Electric Car
L. \$99.95 I. \$79.95



BMW 3.5 C.S.L. Electric Car
L. \$99.95 I. \$79.95

Lamborghini R/C Car & Radio
L. \$129.95 I. \$99.95



DREMEL
NO. 381
MOTO-TOOL KIT

L. \$69.95
I. \$48.97

STARTERS

Std. Sullivan	36.95	26.89
Del. Sullivan	39.95	28.99
Sonic Tronic	38.50	27.00
Kavan	45.00	32.00
Astro-VA.	16.95	13.50

FUEL PUMPS

Sonic Tronic MKII
Electric 14.95 11.75

HAND PUMPS

Du-Bro	10.95	8.50
Six Shooter	10.95	8.50

HELICOPTERS

KAVAN

Bell Jet	400.00	320.00
Alouette II	200.00	175.00

ACCESSORIES

Instrument panel	12.00
T.R. blades	3.00
Reg. main blades	18.00
Expert main blades	19.95
Nylon tail cone	5.95
Comp. window set	20.00
window channel	2.95

RETRACTS

ROM-AIR

2 gear mains	85.00	57.75
3 gr. firewall	114.00	79.95
3 gr. belly	114.00	79.95
pressure gauge	13.50	
Freon	2.75	
1 1/2 oz. Oil	1.65	
line coupler	1.90	
quick disconnect	2.00	

POWER PANELS

DAE

Dual range	24.95	18.00
Mini panel	15.95	11.00
Series IV	34.95	24.95
Std. panel	18.95	14.85

Indy
30% OFF

WORLD ENGINES
MR. MULLIGAN

L. \$47.95
I. \$33.56

Indy
30% OFF



FRANCHISE DEALERS

For those of you who read this magazine monthly, you will surely note how our Indy franchise dealer list is growing. It is about to push this column right off of the page.

Also, growing is the number of exclusive Indy products. We are expanding the number of Commodore engines to include both a 48 and 35. We are adding the Colpo, 09 Marine engine.

INDY R/C

CALL TOLL FREE 1-800-428-4682

INDIANA RESIDENTS call 317-846-0766

10620 N. COLLEGE AVE., INDIANAPOLIS, IN. 46280

Preview - Our next month's advertisement will feature our new Indy 3 Channel R/C System.

Details - 72 MHZ frequencies. Indy US 2 servos, expensive two axis stick plus engine control. Vinyl clad metal case. Offered for dry cell operation at this price, but, can easily be converted to acids.

Retail price \$189.95
Indy's amazing introductory price \$89.95



JIM GOAD SEZ:

INDY

INDY

INDY FRANCHISE HOBBY DEALERS

ARIZONA
Hobby Den, Inc.
3347 W. Greenway Road
Phoenix, Az. 85023
ph. 692-993 6630

Hobby Haven
2751 N. Campbell
Tucson, Az. 85719
ph. 602-325-0112

ARKANSAS
Family Hobby & Toy Center
Route 5, Box 84 B
Conway, Ar. 72032

Ron's Hobbies
360 N. Wright Street
Salem Springs, Ar. 72761

Cash Auto Supply, Inc.
P.O. Box 166
Cash, Az. 72421

CALIFORNIA

Active Hobby
717 E. Main Street
Santa Maria, Ca. 93454

B & F Train & Hby Shop
1424 Baker Street
Bakersfield, Ca. 93308
ph. 805-322-7955

Ray Hobby
1448 Cary Avenue
San Mateo, Ca. 94401

Dave's Custom Models
1844 W. Glenoaks Blvd.
Glendale, Ca. 91201
ph. 213-240-5818

Reg's Hobby Hut
6038 Telegraph Ave.
Oakland, Ca. 94609
PH: 415-655-4543

The Hobby Shop
9255 12th Avenue
Hanford, Ca. 93220
ph. 582-5571

COLORADO

Musick Drug & Hobbies
309 E. Fontanero St.
Colorado Springs, Co. 80907
ph. 303-632-2635

FLORIDA
A & J Models, Inc.
Coralwood Mall
Cape Coral, Fl. 33904
ph. 813-542-8668

Action Hobbies
4301 A. North Dixie Hwy
Ft. Lauderdale, Fl. 33334
ph. 305-561-5611

Daytona Hobby Center
320 Big Tree Road
S. Daytona, Fl. 32019
ph. 904-767-8351

Ocean Hobby
323 N. Federal Hwy.
Baynton Beach, Fl. 33425
ph. 972-3496

Trails Hobby Hanger
236 N. Nova Road
Orlando Beach, Fl. 32074

GEORGIA
Atlanta Hobby Center
6125 Roswell Road, N.E.
Atlanta, Ga. 30328
ph. 404-255-8033

Country Cloth Shop
Rt. 4, Teamon Road
Griffin, Ga. 30223
ph. 404-227-8015

ILLINOIS
Bob's Hobby Hut
88 Main Street
Downer, Il. 60543
ph. 554-9243

ILLINOIS Cont'd

Wings & Things, Inc.
1122 Broadway
Rockford, Il. 61104

Lake County Hobbies
3102 N. Sheridan Road
Waukegan, Il. 60085
ph. 312-682-4584

INDIANA

Craft & Hobby House
324 Main Street
Vincennes, In. 47591

Frank's Hobby Shack
4954 E. Robin Court
Rolling Prairie, In. 46371
ph. 219-778-4670

Hobby Hut
Huntington & Main St.
N. Webster, In. 46655
Ph: 349-834-2236

Hobby World
154-13A W. Hively Avenue
Elkhart, In. 46514
ph. 219-293-3715

Hobbyland
343 Lincolnway West
South Bend, In. 48601
ph. 219-287-0180

Kirk's Hobby Shop
117 E. Main
Monroe, In. 47365
ph. 317-282-4121

Wings N Raik, Inc.
1824 E. Main Street
Plainfield, In. 48168
ph. 317-839-5383

IOWA

Amusement Radio Models
First Street
Colesburg, IA 50620
Ph: 515-228-7861

A-Z Hobby, Ltd.
1314 Army Post Road
Des Moines, Ia. 50315

KANSAS
Del's Rody Shop
607 N. Penn
Ovatin, Ka. 67740
ph. 913-475-2624

The Modders Hobby Shop
1226 South Main
Wichita, Ka. 67211
ph. 316-681-2941

LOUISIANA
Ron's Hobbies
713 E. McNeese
Lake Charles, La. 70605
ph. 318-478-8651

MAINE

Pets & Pastimes
6 Central Street
Bangor, Me. 04401
ph. 207-942-9346

MASSACHUSETTS
Bill's Hobby Supplies
800 N. Main Street
E. Longmeadow, Ma.
ph. 413-736-7711

MARYLAND

Moat's Hobby Center
Upper Level Valley Mall
Hagerstown, Maryland 21740
Ph: 301-582-3550

MICHIGAN

Berry's Hobby House
3535 10th Avenue
Fort Huron, Mi. 48060
ph. 313-882-1237

Bridgeton Gun Store
5462 W. 112th Street
Grant, Michigan 49327
ph. 834-5306

Hobby Center
206 S. Michigan
Howell, Mi. 48843
Ph: 546-9555

John's Radio & TV Ctr.
531 W. Hwy
Bayshore, Mi. 49711

The Hobby Shop
2307 N. 5th St.
Niles, Mi. 49120

U.P. Model Air
326 W. Genesee St.
Iron River, Mi. 49935

Sugar Plum
154 Shaver Road
Portage, Mi. 49082
Ph: 616-323-3450

MINNESOTA

Mac's Models, Inc.
1322 N. Rice Street
St. Paul, Mn. 55117
ph. 612-489-6060

Wickland's Hobby House
Route 1
Lake Lillian, Mn. 56253

MISSISSIPPI

A-OK Pym & Gun Shop
918 Hwy 90, Box 590
Gautier, Miss. 38553
ph. 601-487-8671

Creative Sources
1802 Jackson Avenue
Oxford, Ms. 38656
ph. 601-234-2475

H & B Models
1319 W. Main
Tupelo, Ms. 38801
ph. 601-844-7946

MISSOURI
Sho-Me Hobby Center
1235 E. Republic Road
Springfield, Mo. 65807
ph. 417-867-2327

MONTANA
Viking Hobbies, Inc.
1745 E. Main
Billings, Mt. 59101

NEW JERSEY
Frank's Hobbies
28 Fairfield Rd.
Fairfield, N.J. 07006
ph. 201-227-1978

NEW YORK
Custom Hobbies
785 Broadway
Kingston, NY 12401

Hobbies Galore
98 Central Avenue
Lancaster, NY 14086
ph. 716-681-8567

Jim's R/C Hanger
Rt. 4, Box 4-Canton Road
Ogdensburg, NY 13689
ph. 315-383-2580

NEW YORK Cont'd

King Arthur Cosmetics & Hobbies, Co.
Bridge Rd.
Hudson Falls, NY 12839
ph. 518-747-5818

Ray's Hobby Supplies
488 Jerusalem Avenue
Uniondale, NY 11553
ph. 516-486-4047

Walt's Hobby Shop
7909 5th Ave.
Brooklyn, N.Y. 11209
ph. 212-745-4991

NORTH CAROLINA
B & J Hobby Enterprise
4909 Western Blvd.
Raleigh, NC 27605
ph. 019-851-4492

NORTH DAKOTA
Crafts Etc.
Northport Shopping Ctr.
Fargo, ND 58102
ph. 701-293-7121

Hobby World
631 W. Willard
Dickinson, ND 58601
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Midwest City, Okla. 73110
ph: 727-1085

J & E Hobby Hole
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Moore, Okla. 73160

Talco Hobbies
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ph. 621-2434

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American Modeler
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ph. 216-826-3088

Dad's Toy Shop
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Wapakoneta, Oh. 45895

Hobby Hut, Inc.
8753 Ravenna Road
Twinsburg, Oh. 44087
ph. 425-7353

Hobby Hut Inc.
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Northfield, Ohio 44067

Lafayette Escadrille Hobby
1414 S. Avenue
Toledo, Ohio 43009
ph. 419-385-8739

Lighthouse Hobby Supply
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Prospect, Oh. 43342
ph. 614-494-2110

Lima Radio Control Spts.
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Lima, Oh. 45805
ph. 416-229-6117

Paul's Hobbies
Route 4, Box 125
Lucasville, Oh. 45648
ph. 614-259-5298

Yee Pee Hobby Shop
420 N. Main
Berget, Oh. 79007
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The Hobby Mart
Smith Road
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S & M Print Shop
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Amsterdam, Oh. 43003
ph. 614-543-4024

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Galesburg, Oh. 44833
ph. 419-468-7694

White Birch Toy Hobbies
114 Park Ave. West
Mansfield, Oh. 44902
ph. 419-526-4093

F. L. Yocum Hobbies
7651 State Street 118
Celina, Oh. 45822

Xenia Hobby & Craft Ctr.
195 Ballbrook Avenue
Xenia, Oh. 45305
ph. 513-376-9928

OREGON
Crabtree Store
37526 Crabtree Drive
Crabtree, Or. 97335

The Hobby Shack
1008 S. Main
Milport-Forewater, OR 97062
Ph: 530-7229

R/C Model Corral
1209 Kelly Ave.
The Dalles, Or. 97058
ph. 796-4076

Strictly R/C
7868 SW Capital Hwy.
Portland, Or. 97219
ph. 503-244-3356

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H & S Sales & Service
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ph. 412-463-0191

Laurel Shop
176 Main Street
Beaumont, Pa. 15825

The Silver Mine
301 Oak Spring Road
Washington, Pa. 15301
ph. 412-228-3470

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Andy's Hobby Shop
Harrison Building
Airport Heights
Walterboro, SC 29488
ph. 803-549-7825

Creative Pastime Shop
101 T Third Avenue
Conway, SC 29526

TENNESSEE
Myers Auto & Farm Parts
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Covington, TN. 38555
ph. 614-484-6168

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Olton Rt. 180 Bldg
Plainview, Tx. 79072
ph. 806-889-3441

Hobbies Unlimited
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Kingwood, Tx. 77339
ph. 713-358-2224

The Hobby Habit
2290 Bandera Road
San Antonio, Tx. 78228
ph. 434-0228

Sight & Sound
715 Porter
Dumas, Tx. 79029
ph. 806-935-7422

Yee Pee Hobby Shop
420 N. Main
Berget, Tx. 79007
ph. 273-7037

VIRGINIA

Kilowatt Kage, Inc.
Waterlock Plaza
Lynchburg, Va. 24502

WASHINGTON
Hobby Town
14814 Pacific Ave.
Tacoma, Wash. 98444
ph. 531-8111

Kitzap Hobby Supply
Poulsbo Jet & Hwy. 3
Poulsbo, Wa. 98370
ph. 206-719-7676

Stewart Enterprises
at McCary's TV & Radio
429 S. Chelan Street
Wenatchee, Wa. 98801
ph. 509-663-2232

WEST VIRGINIA
Nites N Things
East Gate Shopper
RT 60 E
Bastoparville, W.V.
ph. 726-6868

McCoy's, Inc.
Box 51
Smithville, WV 26178

Mountaintop Shop
117 Court Street
Ripley, WV 25271
ph. 384-372-8544

WISCONSIN
Hobby House Gift Shop
218 S. Knowlton Avenue
New Richmond, WI.
ph. 715-246-2184

R.C. Hobbies, Inc.
18305 W. Lisbon Rd
Brookfield, WI. 53005

Van's Hobby Shack
1603 8th Ave.
Monroe, Wi. 53566
ph. 608-325-6651

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34 Maxwell Street
St. Catharines, Ontario,
Canada

B & H Hobby Supply
30 Georgian Drive
Barrie, Ontario,
Canada

Calgary Hobby Supply Ltd.
3820 Edmiston Street
Calgary, Alberta,
Canada

Elgin Cycle & Hobby Centre
441 Talbot Street
St. Thomas, Ontario,
Canada

Royal Oak Hobbies
4454 W. Saanich Road
Victoria, British Columbia,
Canada

Skycraft Associates
139 York Road
Dundas, Ontario,
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Smart's Hobby Supplies
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Cipolla

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We are now offering the following three versions. Cipolla .09 Std. U/C - L: \$14.55 I: \$11.75. Cipolla R/C - L: \$18.95 I: \$14.95. Cipolla R/C Marine - The price is to be announced.



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Complete with muffler and ST carburetor. L: \$69.95 I: \$43.00. U/C version less muffler L: \$59.95 I: \$33.95. Taking orders for 48 R/C and 35 Combat.



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Series 775 . . . 5 channels, 4 servos, all metal open gimbal sticks, nickel cadmium batteries for transmitter and receiver, charger and carrying case.

775 features precision machined all metal open gimbal sticks.

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IN COMPONENTS . . . Here we take great pains in selecting quality you can appreciate on the field. Our 772, 765 and 775 systems all feature "Centi-Loc" connectors using mil spec gold plated contacts from ITT Cannon Electric. They may be more expensive than conventional connectors, but we don't compromise our systems anywhere along the line. First, gold is not only durable but an excellent electrical conductor. Secondly, the design is unique. Our connectors have flexible, spring action "Twist pin" contacts that mate and hold even under severe misalignment, providing excellent electrical continuity through even punishing landings and rugged



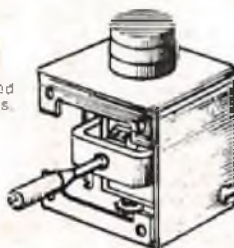
As opposed to conventional connectors, MRC mil spec gold-plated pins are recessed for protection. The more rugged female connector is exposed instead of the pin itself.

vibration. It's part of MRC's quality thinking every step of the way.

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and put it together in the end.



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