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RCM radio control MODELER

THE WORLDS LEADING PUBLICATION FOR THE RADIO CONTROL ENTHUSIAST

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LI'L SWIFT
A .30 POWERED AEROBATIC SPORT AIRCRAFT

UFO'S? NOT REALLY!

A HEATH PARASOL YOU CAN BUILD FOR LESS THAN FOUR DOLLARS

VOLUME 13 1976 NUMBER 4

rcm

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THIS MONTHS COVER

If you're a vintage aviation buff then you can't help but become nostalgic over this magnificent scale model of the Waco FS34, recently kitted by Sterling Models. Ektachrome transparency courtesy of Ed Manulkin.

APRIL

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FROM THE SHOP

Don Dewey

● The following letter was received from William R. Jacobs of Dunedin, Florida, along with copies of letters he had sent to the Academy of Model Aeronautics and the Federal Communications Commission. The letter from Bill is being presented without editorial comment:

Dear Don,

I want to give you credit for exposing what I consider to be one of the biggest misrepresentations of the times.

We in R/C have been led down the primrose path by being told, or at least led to believe, that we had exclusive frequencies on the 72-75 MHz band. I think that all of us, including yourself, considered this to be a fact. A multi million dollar industry has been built on this assumption.

Who in their right minds would spend any money or time building to fly on a frequency shared with another station? That's what we have, shared frequencies. In fact we don't even have that, because if we cause any interference (with our 1/2 watt of power) we would not be allowed to operate on that frequency. So we share the frequencies with Public Safety, Land Transportation, Industrial, and Aviation. Depending on the type of service, they may be licensed to use up to 500 watts, AM or FM, on any of the frequencies.

Let me tell you a short story. It could be entitled "License to Kill".

It's a beautiful Sunday afternoon and the old Ugly Stick is ready to go. I thought I was taking an old docile plane up for a few minutes of the sport that I enjoy the most. Actually that wasn't what I was doing at all. I was about to launch a deadly missile. While circling lazily a couple hundred feet over the field, I suddenly discovered that I had no control. The old bird has now become a 6½ pound 120 mph missile headed for a couple of cars parked about ten feet apart with a group of people standing between them. I stood there helpless as the plane plowed into them, I should say amongst them, burying itself about eight inches into the ground. It didn't hit any body or anything. Lucky? You bet, but a foot either way and the story could have a different ending. Somebody could have been lying there dead and the beautiful Sunday afternoon wouldn't have been so beautiful.

How could this happen? The equipment was working perfectly, just got it back from the factory after a check up. Nobody else on the frequency, or so I thought. The 72.320 MHz is one of the assigned frequencies for model R/C use. It happened because we were never informed that another service could use this frequency.

This event prompted a little research. I decided to listen on the frequency and see what was going on. I took the audio out of the receiver and fed it into a small audio amplifier. Imagine my amazement when I heard a lot of chatter on frequency. I picked up the station call from the automatic code identifier and called the FCC. They gave me the name of the company and I went over there to find out why their signal was splattering all over the band. What I found out was that their mobile radio telephone service was licensed to operate on that frequency.

I went to the FCC office to see who else might be assigned to operate on what I thought was our frequencies, only to discover that the FCC Station Frequency Register in the local office is dated January 1975. This means that there is no record of any station that has received a license since last January. A sad situation, to say the very least. As the station that caused my interference was licensed to operate on 72.320 in November 1975 there would be no way to find out that they were operating on this frequency except to monitor the frequency. A current record is kept of call signs, but nothing current on licenses or frequencies that are assigned to other services.

The FCC says that it is the duty of anybody operating a station, and when you turn that transmitter switch ON you are operating a station, to monitor the frequency before transmitting. Everyone will have to admit that with our equipment that is impossible.

There are only about eight or nine stations operating on the 72-75 MHz band in Florida. Of course the Register is one year out of date, but it doesn't seem that the demand for these frequencies is so great that the seven frequencies that have been designated for model use could not be used on an exclusive basis.

In closing all that I can say is that when the AMA got us these frequencies they got us nothing.

Which brings up another good question. Other than contests (a very small percentage of the membership are contestants) just what does the AMA do for us?

To use a phrase that is gaining in popularity, I feel that we have been "ripped off".

Sincerely yours,
Bill Jacobs
Dunedin, Florida

☆

On another matter, we received a letter from Ray Wijewardene, Director of the International Institute of Tropical Agriculture in Nigeria. And this true incident, is going to be a hard one to top!

Dear Don,

I believe this is the first time you will have heard of such a modeling experience. It could only happen in Nigeria where I believe we have about the only R.C. modeling group in the tropical belt of Africa.

A few weeks ago while flying a Graupner Hi Fly about 500 feet up, the radio suddenly went 'on the blink' – and Hi Fly just kept circling up and away in neutral trim but – as luck would have it – in a snorter of a thermal. We last saw her circling into cloud base some 2500 feet up!

We thought that would be the end of Hi Fly and wondered what had happened to cause the radio failure – the Hi Fly had earlier been attacked by a swarm of about 8 hawks, all in the same thermal, and we noticed a mid-air collision, but she seemed to carry on un-concerned.

Now for recovery!

One of my bright Nigerian assistants remembered the 'talking drums' – a method of communication practised by Nigerians in the bush – whereby an intricate tattoo is beaten out on a drum, while simultaneously tensioning the skin to result in what is to all intents a very distinct language understood

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RADIO SPECTRUM

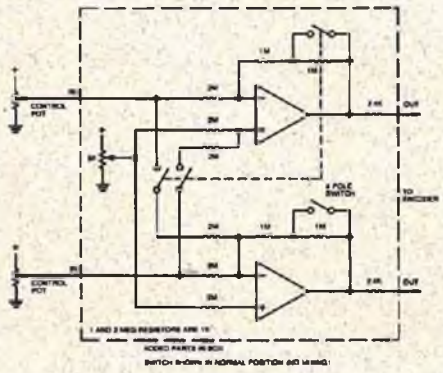
BY JIM ODDINO

● Well I really took a lot of flak for the January column. I guess autopilots and pure digital systems are too far out for most guys. They want circuits they can start playing with right now. So this month we're going to hit you with some stuff I hope you can use this year.

The response to the Christy Mixer has been outstanding, and Don assures me he will print the article when it comes in. However, there may be some people out there who can't stand having another package the size of a receiver, in their aircraft, but would still like to have the mixing function. I have put together a circuit that can be installed in the transmitter if you have an encoder in which the voltage from the control pots is not switched during the frame. The Kraft Sport and Signature Series are examples of this type of encoder. The voltages from the two controls to be mixed are summed in ah OP amp circuit prior to being fed to the timing circuits. This technique can't be used on the common half-shot type encoder because the two voltages to be mixed are never present at the same time.

One other caution before you start hacking up your transmitter. You are probably going to lose some overall system resolution when you use mixing because you are going to have to cut down the "throw" of each channel. For example, let's say you're mixing rudder and elevator on a V-tail aircraft with a servo on each surface. Normally either rudder or elevator would give you ±45° servo throw. With the mixer circuit, both controls affect both servos so, if you don't cut the gain someplace, you will end up with 90° of travel in one servo when both controls are hard over. Even if your system could process these extreme pulse widths, this probably wouldn't be satisfactory from a linearity standpoint. The best solution is to cut the gain in half (which is easy to do in the OP amp) such that one control gives you ±22.5° and both together give you ±45°. The problem is you don't reduce the backlash in the gear train, or the slop in the horns and clevis', so these become a larger percentage of the total throw, hence less resolution. The Christy Mixer, or any mixer that goes between the receiver and servos, will have the same problem.

If you still want electronic mixing, proceed. The following circuit (Fig. 1) is installed between the control pots and the encoder, so simply lift the wire from the wiper on the control pot and connect it to the output of this circuit. Add a wire from the wiper to the input.



The 5K pot is set for the proper neutral. Make sure the trims are neutral when you make this adjustment. The switch allows you to switch the mixer in or out and restore the gain at the same time. I used two LM 108 OP amps which require a capacitor for compensation but there are many dual and even quad OP amps available, such as the LM324, that do not require compensation. In the Kraft signature you wouldn't need the 2.4 resistors on the output of the OP amps. One other caution: The OP amps invert so your controls will be opposite of what they were. No problem if you check everything out, and make the necessary adjustments.

If there is a large enough demand, I'm sure we could find someone to either offer a kit or supply a built-up module that would be simple to install.

One of these days you'll be able to buy a system with this feature built-in, which will save you a lot of hassle.

■ ■ ■

Dear Mr. Oddino;

In the December1975 issue of R/C Modeler Magazine in the article entitled "Electric Race Car," photo #5 on page 59 shows a "PSC-12" proportional speed control.

I was interested in this because I am building an R/C boat from scratch and could use such a circuit for control of my two 6 volt Dumas-Pittman motors. However, I am very reluctant to pay about $100.00 for two of these circuits.

I thought that you could help me by letting me know whether there are any of the following available:

(a) Similar articles offered by other manufacturers.

(b) Circuits such as the PSC-12 available in kit form.

(c) Magazine article's which might have provided a circuit which would perform like the PSC-12.

(d) Anything else that might be of help to me.

Thank you very much.

Sincerely yours,
Geoffrey Kingston
West Boro, Massachusetts

There are similar electric motor speed controls offered by other manufacturers, but I'm afraid none are very cheap. What you are asking for is a circuit similar to a servo amplifier plus a healthy power stage. My guess is that any circuit that can deliver 5 to 10 amps will cost you at least $30.00 to $40.00. I'm not up to date on what kind of Pittman motors are being used in boats, but I believe Dumas sells an inexpensive speed control for Pittmans which is operated from

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engine clinic

By Clarence Lee

● Last month we changed the format of the column slightly and led off with a short article on a little known prototype engine, the Savage .60, which pioneered the way for the Aero .35 which was marketed in the early 60's. This month we'll start the column off with another little known engine — the Cave Cobra. This engine had quite a few unique features and is one of the favorite racing engines in my collection. Although known to engine collectors I doubt if very many of you readers out there have ever heard of the engine or its designer, Walt Cave. However, I am sure many of you who were modeling in the 40's will be familiar with another design of which Walt Cave was co-designer — the Hornet .60 - - -one of the "winningest" engines of its time, holding more world speed records on land, air, and water than any other engine.

During the mid 30's model car racing was developing into a very popular sport here in Southern California. Most of the early engines such as the Bunches, Ohlssons, Dennymites, etc., were aircraft engines converted for car use and just couldn't take the beating imposed by race car use, the exotic fuels of the day, and hopping up procedures. Crankshafts broke with regularity, cylinders blew off of crankcases, pistons shattered, etc. So Walt Cave and a friend, named Clark Anderson, set down and designed an engine strictly for race car use. They came up with a design using a double ball bearing crankshaft (the first) rear rotory induction, and a piston design copied after outboard motors of the day. A crude set of patterns were made and three sets of castings cast. The name of the engine was to be the A/C Special. The first engine finished exceeded all expectations by winning several model race car meets in the Fresno, California area. Two other members of the Fresno race car group, Ray Snow and Ross Clark, finished up the two remaining sets of castings so a total of three A/C Specials were built. One of these original A/C Specials is in the engine collection of Art Swift, of Woodland Hills, California, and another in the collection of Ted Dodd, of Bakersfield, California, both old time engine collectors. The whereabouts of the third A/C Special is not known. Walt Cave, Clark Anderson, and Ray Snow combined forces to mass produce the A/C Special. Due to A/C being too similar to the spark plug of the same name, the name of the engine was changed to Hornet. Approximately 5000 Hornets were produced prior to 1941. When WW II came along model engine production had to cease and Ray Snow went into war work. Walt Cave and Clark Anderson, thinking they were a cinch for the draft, sold their interests in the Hornet Company to Ray Snow. Walt Cave, much to his surprise, was classified 4-F and did not have to go into the service. It was during the war years that Walt worked on the design for his new improved engine, to be known as the "Cobra". He had in mind an engine with the smallest possible frontal area, still retaining the ruggedness of the Hornet, and still be lighter in weight. By moving the wrist pin bosses higher in the piston the overall height was decreased. The two piece bolt-together crankcase, as used in the Hornet, was eliminated in favor of a one-piece case. Other features of the engine included a fully machined piston head and combustion chamber for a more uniform compression ratio, a 'single ball' thrust bearing to keep the rear rotor from rubbing on the back of the crankcase, and an eccentric adjustment screw by which the rotor clearance could be adjusted while the engine was running. This, in itself, was an outstanding feature. Even on our present day racing engines the rotor clearance has to be set with the back plate off of the engine. Through trial and error the best clearance is obtained usually in the .004" — .006" range. However for optimum performance two engines of an identical make may actually require slightly different clearances due to seal characteristics, etc. One engine may put out maximum power with .004" clearance while another performs best with .006". With the Cave Cobra the clearance could be adjusted with the engine running. Port area in the engine was increased over the Hornet by using duel intake and exhaust ports with the normal baffle on the piston eliminated. Walt, sure that the engine would be a complete success, ordered a set of match plates made. Match plates are a series of wood, or metal, forms mounted on a board. These, in turn, are pressed into

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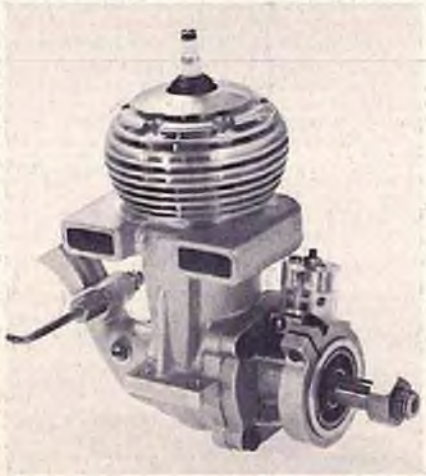

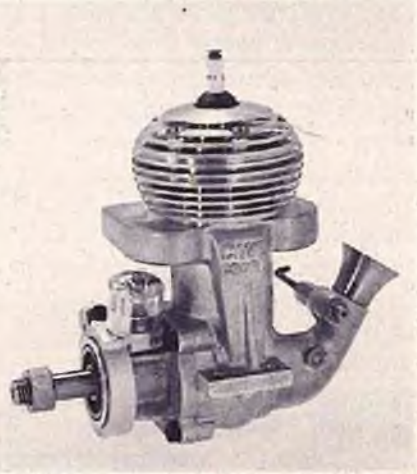

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A SURE CURE FOR LOOSE AND LEAKY .049'S

BY DUIE MATENKOSKY

● One of the problems facing the users of the excellent Cox .049/.051 engines is the fact that parts like the backplate and glo-head often loosen up during a run, destroying our chances for a good flight.

As a solution to this problem, it is possible to both "lock" these parts together, so they will not loosen under load, and 100% seal them as well, to maintain internal working pressures so necessary with these engines. And, lastly, one can **easily** disassemble the above treated engine with standard Cox tools, even at the field.

Sound too good? Well read on.

The secret is to use a specific grade of Loctite to lock and seal the threaded engine parts.

Loctite products can easily be found in your area (contrary to popular belief that Loctite products are made in the Black Forest by elves!). Look in the Yellow Pages under "Adhesives" or "Sealants", because Loctite does both. Simple? Now, you'll undoubtedly find that you'll have to go to your local industrial bearing distributor, industrial tool supply house, or power transmission house. They will almost always have a retail counter, so go in and ask for "Loctite 222" — accept **no** substitute, no matter what the guy tells you!! Product 222 is light purple in color, and milky (a lubricant, no less!). You can get a bottle of 222-21, a 10cc bottle for about $3.25 plus any tax; a 50cc bottle would be a 222-31, and would run about $9.75, but would last your whole club for years!

Now, how do you use this stuff?

Loctite 222 is one of many products belonging to a family of materials known as "anerobics", meaning "life in the absence of air." That's why your new bottle is only half full. Neat, huh?

Anyway, disassemble your engine, and clean the threaded parts in dope thinner. Now, shake up your bottle of 222 (remember the milky lubricant) and put a few drops on to a non-metallic, non absorbing, surface such as a plastic lid or wax paper, etc. Now, with a toothpick, pick up small portions of 222 and apply all around the **male** threads only, and use only enough to color and slightly fill the threads. Immediately screw the treated parts together, snug them up with the proper Cox wrench, but **do not** over torque; let the Loctite do the holding.

The Loctite treated parts will cure at room temperature in about two hours, and you will have an engine whose threaded parts are both locked & sealed.

To disassemble, simply use the appropriate Cox wrench and presto! No problem, since Loctite 222 is the absolute weakest product in the line, and that's whats needed for these engines.

For field use, simply remove the part, usually a glow head, clean off the powdery cured Loctite with a clean rag, apply new 222 as before, but remember, go **sparingly**, as you don't want any inside your engine. Use a lighter, such as a Bic Butane to heat the parts to about 200°F, and you've cured your Loctite treated parts in 3 minutes! By the way, any liquid Loctite which does get into an engine, will completely dissolve in the fuel, so don't sweat it.

That's all there is to it. No real magic at all — just a little knowledge on a little known material. Follow the above advice to the letter and your "loose & leaky" engine will sing with happiness. □

AERONCA 7AC CHAMPION

BY DOUGLAS HOBBS

My model of the Aeronca 7AC Champion is from the Bud Nosen 105'' span kit. A few scale items were added that are not shown in the kit. Most of these can be seen in the photographs.

The scale instrument panel is made up from ''IM'' Instruments. The step is made from sheet aluminum with a piece of balsa epoxied to the bottom side and sanded to a streamlined shape. A piece of black wet type sandpaper is glued to the top side for the non-skid surface. The plastic air vents on both sides, just in front of the door line, are for cabin ventilation and are home-made by pulling a piece of heated plastic over the slightly rounded end of a 1/2'' dowel.

A kit is a kit - - - a box of bits and pieces. A model is what the builder makes it - - - -

The wheels are 4½'' ''PB'' Aero scale low bounce. The scale gas tank cap and filler pipe were made up from Jerry Smith's ''Here's How'' column that appeared in the January 1975 issue of R/C Modeler Magazine. It is made from the top of a large size vitamin A and D Ointment tube. This top has an opening of about 3/8'' and outside diameter of 1/2'', and the cap is about 3/4'' in diameter.

The rudder and stabilizer brace wires are 1/16'' diameter piano wire. The lugs on each end of these wires were made from the connecting link split sleeves that come with Du-Bro Quick Links. The cross braces in the cabin area are 1/4'' diameter hardwood dowel. The top and sides of the cabin interior are sheeted with 1/16'' sheet balsa and painted beige to simulate the headliner and side panels.

The entire model is covered with World Engines' silk and finished with Randolphs butyrate dope. The registration numbers on the wings were masked with masking tape and painted with dope. The numbers on the rudder and the insignia on the fin are made up from small strips of trim MonoKote.

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SUNDAY FLIER

BY KEN WILLARD

An example of an 'Unlimited Class' slope racer. Aileron and elevator control, no dihedral needed. Wing loading can vary from 16 to 24 oz./sq. ft. depending on lift available. Speeds to 80 mph.

● How about that! Another two years, another survey, and Clarence Lee is still RCM's most popular columnist. And that's in the face of the ever increasing popularity of soaring. The only way I can figure it is that there must be a lot of sailplane fliers using power assist.

Only kidding, Clarence! I've got four or five power jobs myself and, like the majority of RCM's readers, I keep checking your column to see what can be done about making my engines run better — or quieter. Some of the mufflers seem to be more cosmetic than they are effective. Then, too, when you get into the 1/2A engine category, you've got a whole different set of problems. Especially if you want to race with them. By and large, though, today's model engines are marvels of reliability — just like today's radios. In fact, you might as well face it, in today's R/C systems, the most unreliable part of the entire system is the part that holds the transmitter!

And speaking of reliability, and dependability, I received a letter recently that I had to read a couple of times in order to get the true message. Here it is:

Dear Ken,

It seems that everyone who has a beef about R/C manufacturers gets around to writing RCM sooner or later. Well here's my beef.

In 1968 I purchased a P.C.S. radio made by Kraft. The following Spring a storm blew part of the roof off my house and it rained my transmitter full of water. I dried it out for a day and it worked perfect. However, wouldn't it have been nice if Kraft made a storm proof transmitter?

About a year later, I was out at the flying field and I was in a hurry to get in the air so I screwed the antenna down fast and tight, twisting the guts around inside the transmitter. Smoke boiled out of the transmitter and I could see fire inside. I took it apart and a coil was burned up. Kraft took 4 whole days to send me the part. Don't you

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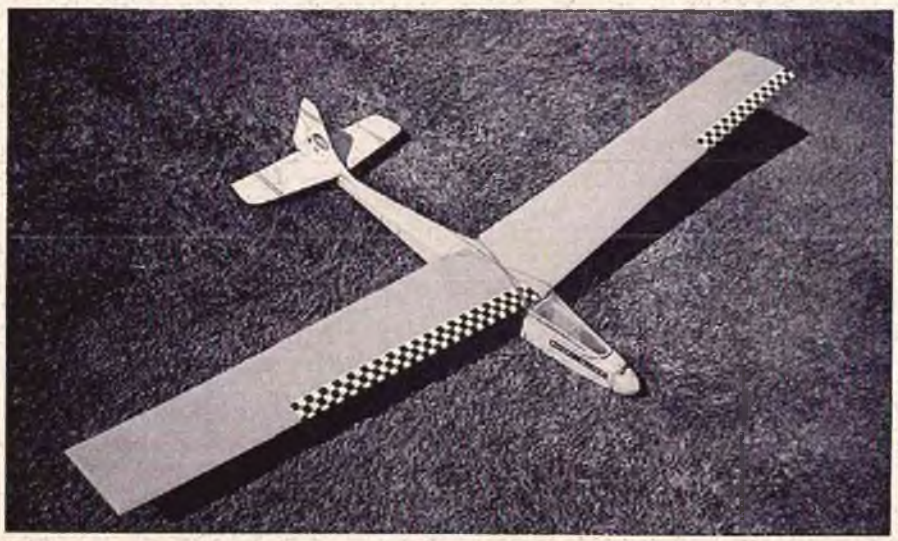

An example of a 'Sportsman Class' slope racer. Six foot span, 10-12 oz. wing loading. Rudder and elevator control only. Needs dihedral to make good turns. Speeds to 35 mph.

CUNNINGHAM ON R/C

BY CHUCK CUNNINGHAM

The group of Ft. Worth Thunderbirds prior to take-off for the flight to Waco.

A cold pit stop along an access road during the ninety mile flight.

● A couple of months ago I reported that the flight of the Liberty Bell was spawning a lot of smaller imitations. One of the cross country feats that I mentioned was an upcoming trek from Fort Worth, Texas, to Waco, Texas, some 90 miles away. This great race was held on a cold, windy Sunday morning in early November and a gaggle of intrepid(?) pilots from the Fort Worth Thunderbirds assembled along side of I-35 to begin the great adventure that would culminate in a fun-fly contest in Waco several hours later. In between, the valiant pilots guided their craft through the chilly Texas skies accompanied by other T-Birds, wives and lovers, small helping of Johnnie Walker and Old Grandad, a goodly amount of fuel and lots of luck. The topography is relatively flat in this part of the world, so no great problems arose from the ground, but emergency landings in fields, on access roads, and in a filling station driveway added to the days events. Some six or seven aircraft began the trek, while only two finished the task in the air. One of these two was a .19 powered aircraft, proving that all of the glory doesn't belong to the big engines. A lone flier made a similar journey from Kileen, Texas, to Waco at the same time. Both air armadas were met at the outskirts of Waco by members of the Hot Macs Club and were escorted through the town, accompanied by members of the Police Department who helped keep the way clear. All in all, it was a successful trip, with not too much loss of property, and a lot of good fun and friendship. And, all who participated are raring to go on another such jaunt in to the wild blue yonder.

★

Several months ago I wrote about concocting an airshow, and some of the interesting things that could be done to make any airshow really turn on a group of spectators. I also asked the question in that issue if anyone knew of a method of towing a banner behind an RC aircraft. Two of the answers that I received were from Gene Palada, who researched his old magazine files and came up with an answer from the March 1942 issue of *Air Trails*, and from Paul Hook who dredged back into his memory to recall how he used to tow a banner behind a .19 powered aircraft. Here is Paul's letter:

"I read your article in the January 1976 issue, about flying shows, asking for anyone ever towing a banner to send information to you.

"About 7 or 8 years ago I developed a two position release for dropping parachutes, towing banners, etc. This was in the reed days and I used a deBolt Super Cub, K & B .19 R/C green head engine, Controlaire 10 channel radio and Annco servos.

"The banner was made of 15 dener nylon. It was 8" wide and 11' long. The material was sprayed with two coats of clear dope and the lettering was put on with a felt tip pen. Then one coat of clear dope was sprayed on top of this to seal it. I used a 3/16" or 1/4" dowel 10" long, which was fastened to the leading edge of the banner. A 10" piece of 1/16" music wire was taped to the trailing edge of the banner."

Sincerely,
Paul W. Hook

Thanks — Paul, now let's take a look at what Gene dug up from way back when. In the *Air Trails* method letters were cut from "Black Buckram" (found at the material counter in a dry goods store). These letters were held in place by a folded length of cellulose mending tape, and attached with this same tape directly to the rudder. This was in the days when free-flight was king, and any excess weight had to be tossed away. For today's use, I think that the method that Paul has used should do a great job. I haven't tried it yet, but plan to do so

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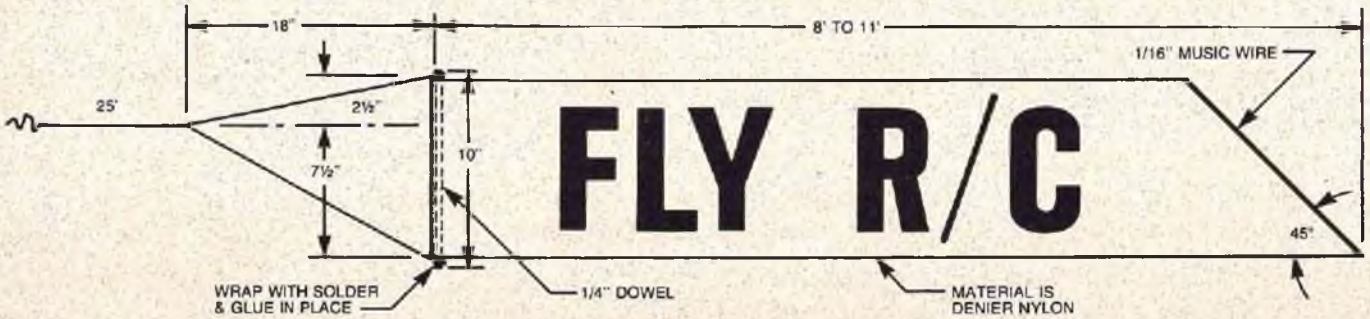
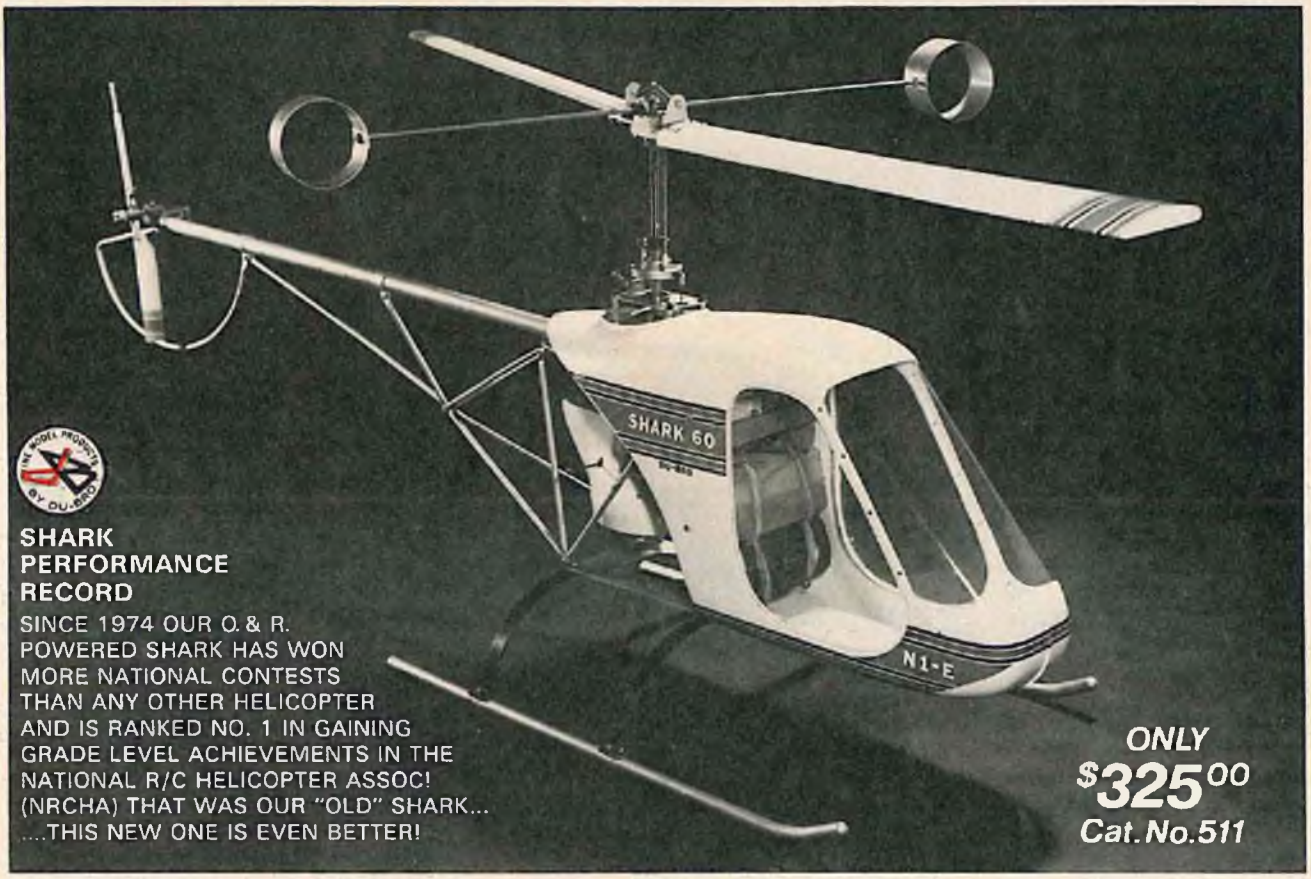


BANNER TO BE TOWED BEHIND AIRCRAFT

AT LAST....
A HELICOPTER THAT CAN FLY ITSELF!!!
(ALL YOU HAVE TO DO IS STEER IT.)



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SINCE 1974 OUR O. & R. POWERED SHARK HAS WON MORE NATIONAL CONTESTS THAN ANY OTHER HELICOPTER AND IS RANKED NO. 1 IN GAINING GRADE LEVEL ACHIEVEMENTS IN THE NATIONAL R/C HELICOPTER ASSOC! (NRCHA) THAT WAS OUR "OLD" SHARK... ....THIS NEW ONE IS EVEN BETTER!

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SHARK .60

THE FINEST, MOST DURABLE R/C HELICOPTER AVAILABLE TODAY FOR TRAINING, ALL AROUND FLYING AND COMPETITION.

WITH OUR NEW TRAINING GEAR AND TEACHING METHODS, LEARNING TIME FOR BASIC HOVERING IS CUT DOWN BY 75%. ONE REASON BEING IS IMMEDIATE CONTROL RESPONSE DUE TO THE USE OF "CANS" ON THE FLYBAR INSTEAD OF PADDLES. DU-BRO'S DAVE GREY, WHO DESIGNED AND DEVELOPED THIS NEW CONTROL SYSTEM LAST SUMMER STATES, "BY EASILY ADJUSTING THE AMOUNT OF "CAN" MOVEMENT, YOU CAN EITHER INCREASE OR DECREASE THE CONTROL SENSITIVITY ALLOWING IT TO BE VERY DOCILE FOR BEGINNERS, SUPER SENSITIVE FOR EXPERTS, OR ANYWHERE IN-BETWEEN." BEFORE A CROWD IN CINCINNATI LAST YEAR, DAVE PERFORMED THREE CONSECUTIVE LOOPS WITH THE SHARK .60 PROTOTYPE. OUTSTANDING!

FACTORY TESTS WITH ABSOLUTE BEGINNERS USING OUR NEW TRAINING GEAR, MADE 30 SECOND FLIGHTS ON THEIR 1ST 12OZ. TANK OF FUEL WITH NO DAMAGE TO THE HELICOPTER - YOU CAN DO THIS TOO!

ALMOST ANY .60 ENGINE WILL GIVE YOU PLENTY OF POWER EVEN WITH A MUFFLER. NO MODIFICATIONS NEED BE MADE TO YOUR ENGINE — JUST BOLT IT IN! STARTS EASY TOO WITH AN ELECTRIC STARTER AND NO TIMING BELTS ARE LEFT DANGLING WHILE IN FLIGHT. LOCK NUTS AND BALL LINKS ARE USED THROUGHOUT AS WELL AS BALL BEARINGS ON ALL DRIVE SHAFTS. THE KIT COMES COMPLETE WITH TRANSMISSION AND CLUTCH, ENGINE SHROUD, COOLING FAN, CANS, A.B.S. PLASTIC BODY WITH WINDOWS AND MANY STEEL, BRASS AND ALUMINUM PREFORMED PARTS READY TO BOLT TOGETHER. FULLY ILLUSTRATED, ULTRA COMPLETE STEP BY STEP INSTRUCTIONS LEAVE NOTHING TO THE IMAGINATION, AND ASSURE A QUICK, EASY ASSEMBLY.

FOR THOSE OF YOU WHO ALREADY OWN A SHARK OR HUGHES 300 AND WISH TO CHANGE OVER TO .60 POWER, WE HAVE A SPECIAL CONVERSION KIT AVAILABLE FOR YOU. BY MERELY REMOVING THE O. & R. ENGINE, DRILLING 4 HOLES AND BOLTING A NEW UNIT IN PLACE, YOU'LL BE READY TO EQUIP IT WITH A .60. FANTASTIC! .60 CONVERSION KIT - ONLY $75.00 CAT. NO. 513.

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4 CHANNEL RADIO, .60 ENGINE AND 12 OZ. FUEL TANK ARE NOT INCLUDED

The Saracen is equally at home on the slope or hi-start as demonstrated by model Diana Garber, launching for the author. Sixteen Saracens have been built with wingspans from four feet to ten feet. Photos by Milt Lewis and Bruce Robertson.

SARACEN

BY BILL EVANS

The "Saracen" is dedicated to all modelers who have had their interest aroused by the mystique of the "flying wing."

If a poll were taken of modelers asking "which aircraft configuration holds most interest and challenge to build and fly," the answer would very likely be "the flying wing."

When asked the obvious second question — "Have you built and successfully flown a flying wing," the majority would answer no . . . because there is a lack of sufficient information about the design and construction of flying wings — the information available tends to be conflicting — if flying wings were practical, we would see them in use as full-sized aircraft — it has been reported by the experts that flying wings are unstable.

Though the above list is partial and you, the reader, could add additional comments, the author suggests that what is needed to satisfy the would-be flying wing modeler is added printed information based on experience and modeler awareness of successful flying wing designs.

As you read on, you will find out about the author's experiences, problems and successes with the "Saracen", a six foot flying wing sailplane that the sport modeler can easily build and fly successfully.

In August of '74, while on a trip back to Indiana, I had a long chat about R/C sailplanes with a long time modeler friend, Bill Braatz. In fact, he and I began flying together more than thirty years ago, anyhow the "old pro" got me to do some heavy thinking about a flying wing sailplane.

In speaking with other modelers about such a project, I became even more turned on when I heard remarks like, "wings won't fly well," "wings are unstable," "wings have serious C.G. problems," etc.

In the past months, since the Indiana trip, I have learned a great deal about flying wings, first hand. During the period from August of '74 to January '75, I have designed, built and successfully flown sixteen flying wings. They are in the order of Airplane Number, Wing Span, and Description and Remarks:

(1) 6' — Glider — airfoil proved to be faster than necessary for thermal flying.

(2) 5' — Glider — repeat of number one, redesigned airfoil and fuselage.

(3 & 4) 4' — Glider — flying weight 15 ounces.

(5) 10' — Glider — high aspect ratio required control surface changes to produce effective turns.

(6) 6' — Glider — repeat of number two with fuselage modifications.

(7) 4' — TD .049 powered — very fast requiring full attention while flying, no landing gear.

(8) 5' — .15 powered — very smooth flying excellent glide on dead stick landings.

(9) 4' — AFI .05 electric powered.

(10 & 11) 6' — Glider — repeat of number six.

(12) 4' — TD .049 powered — repeat of number seven, fuselage redesigned.

(13) 6' — Glider — repeat of number six, construction improved.

(14) 5' — .15 powered — repeat of number eight, with redesigned fuselage.

(15) 5' — .15 powered — repeat of number fourteen, motor control added.

(16) 6' — Glider — repeat of number twelve, final changes complete.

The purpose behind building this number of ships was to insure the design reliability. All of the above listed ships are in good flying condition, with one exception which I never bothered to re-build after a mid-air.

The significant design features of the

"Saracen" are:

(1) Straight leading edge with a tapered forward trailing edge, aspect ratio 7.5:1.

(2) A semi-symmetrical airfoil with a slight reflex.

(3) Control surfaces consisting of elevons (combination of aileron and elevator functions.)

(4) Far forward center of pressure, producing longer than normal tail moment.

(5) Foam wing construction for building ease.

The Saracens flight characteristics, from the start, have been excellent. Launching from the Hi-Start or towline is done with ease and you need only to be careful of over-correcting (you may be conditioned to the slower rudder response of large conventional ship). Just go easy on the left/right control, remember the Saracen employs ailerons which make turns very easy. Once in the air, keep your speed up while searching for thermals. When the ship bumps (indicating lifting air) make smooth tip up turns. At this point you will find that the elevons function as flaperons in that down trim will increase the lift producing effect of a thermal.

Those of you readers fortunate enough to have a slope to fly from will find the Saracen to be an aerobatic slope machine with near full pattern ship capabilities.

The following conclusions from my experiences with flying wings are listed for your information:

(1) The straight leading edge and tapered forward trailing edge with C.G. as shown on the plans produces good tail moment which, in turn, produces very stable pitch.

(2) Keep the wing loading as light as possible, 5 to 8 ounces per square foot. The stall speed of the flying wing at a light wing loading will be lower than the stall speed of conventional aircraft at the same light wing loading. Conversely, the stall speed of a flying wing at a high wing loading will be much higher than the stall speed of conventional aircraft at the same high wing loading.

(3) The semi-symmetrical airfoil, slightly reflexed, produces excellent thermal flying.

(4) Elevons produce adequate control surfaces with aspect ratios of 8-to-1 or less. At 9 or 10-to-1 aspect ratio, the elevon effectivity is significantly reduced and will become ineffective, making it necessary to employ spoiler both top and bottom as the aspect ratio reaches 10-to-1 or greater.

(5) The elevon mixer shown on the plans has proven to be very reliable. I have not experienced or been made aware of any failures of this system. At this time, there are more than 100 Saracens being flown, and all reports, without exception, have been good.

All you need to do is follow the plans and construction instructions to make your Saracen building project a flying success. For your convenience, Saracen wing cores are available for $8.00 postpaid from the author. Address to: Bill Evans, 19216 Calvert Street, Reseda, California 91335.

Material List

6 — 1/16" x 4" x 36" balsa sheet.
3 — 3/16" x 3" x 36" balsa sheet.
2 — 1/4" x 3" x 36" balsa sheet.
2 — 1/2" triangular balsa strips.

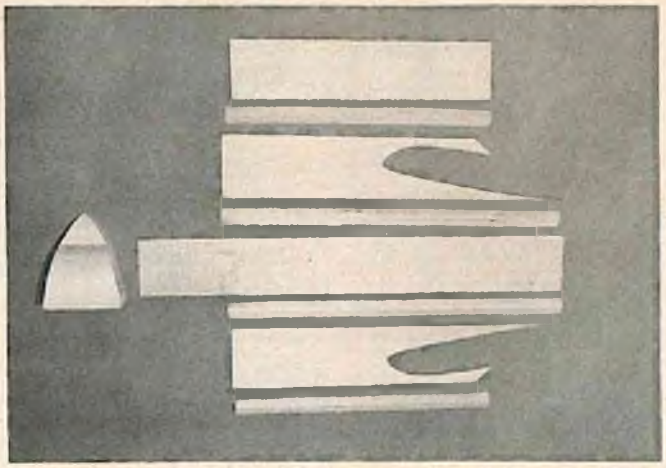
CONSTRUCTION

☐ Cut two 1/2" and two 3/8" strips from the 1/4" sheet.

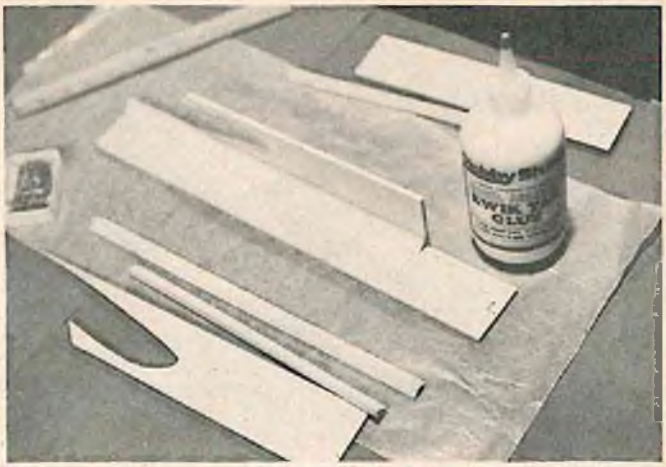
☐ Cement and pin the 1/2" x 1/4" balsa strip to the leading edge of each wing panel, making sure that the leading edge is kept straight.

☐ Cement and pin the 3/8" x 1/4" balsa strip to the trailing edge of each wing panel.

☐ Set these assemblies aside to dry.

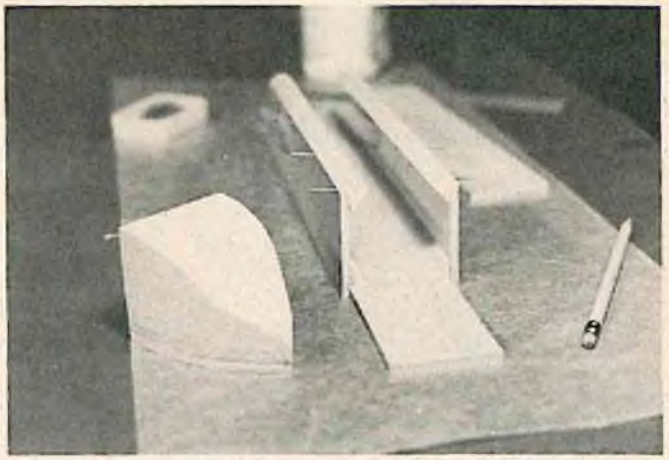


The Saracen fuselage parts cut out and ready for assembly.

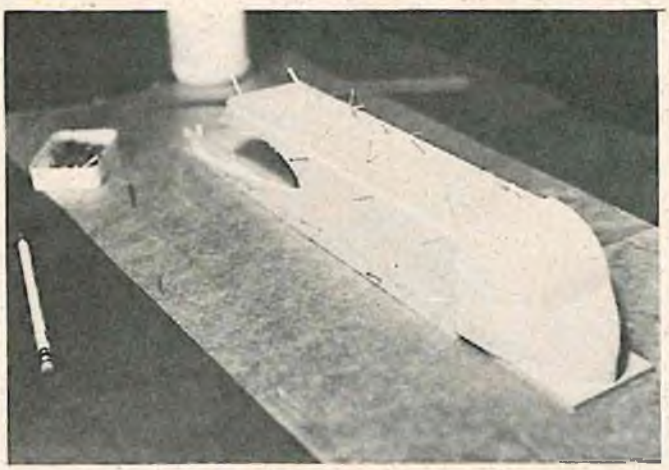


Fuselage bottom with left side and 3/8" triangular stock glued in place.

A view of the fuselage with both sides glued and pinned in place.



At this point the top 3/8" triangle stock is glued to the fuselage sides.



This photo shows all the fuselage parts glued and pinned in place.

After drying, the completed Saracen fuselage is rough sanded.

☐ Cut the fuselage sides, top and bottom from 3/16" sheet. At this point, you must decide which fuselage width you require. The plans show a wide fuselage which is for brick installations using the Kraft elevon mixer. The narrow fuselage is designed for independent servos using a sliding tray.

☐ Pin the fuselage bottom to a flat surface.

☐ Glue and pin the left fuselage side against the fuselage bottom. Pin the 1/2" triangle stock against the left fuselage side and the fuselage bottom.

☐ Repeat above step for the right side.

☐ Glue and pin 1/2" triangular stock to the top inside edges of the fuselage.

☐ Glue and pin the fuselage top, making sure not to glue the top to the sides, since this top piece fits between the sides, not over them.

☐ Cut the nose block to shape.

☐ Glue and pin the nose block in place on the fuselage bottom and up against the front of the fuselage.

☐ Glue and pin the 3/16" sheet pieces for the rudder together on a flat surface.

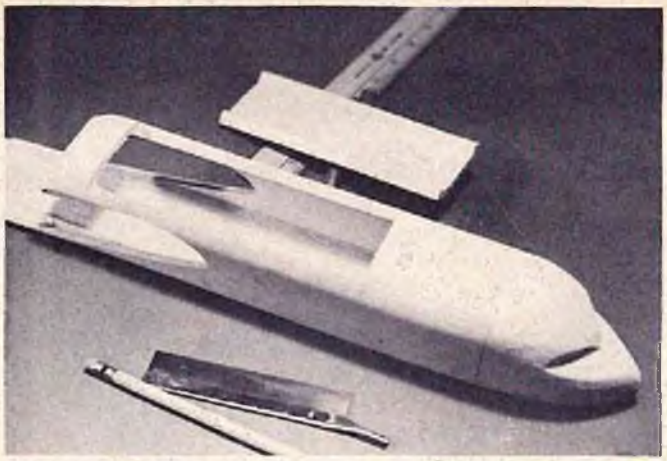
☐ Trim and sand the wing leading edges so that the leading edge wing skins will fit nicely over the leading edge.

☐ Trim and sand the trailing edge strips to be flush with the foam.

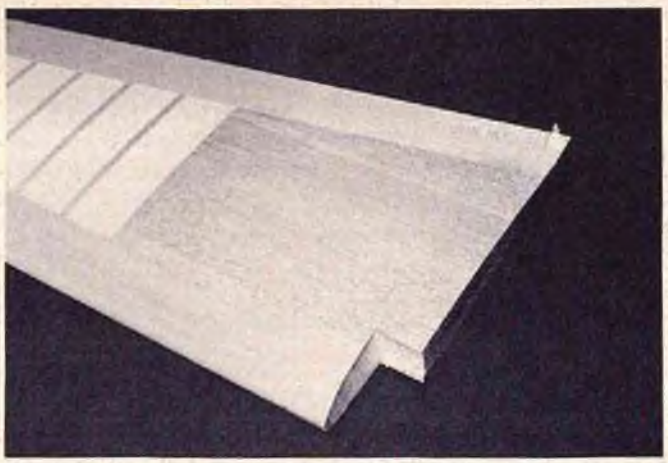
☐ Locate and mark the position of the wing skins on each wing panel.

☐ Apply contact cement to both the foam and the wing skins.

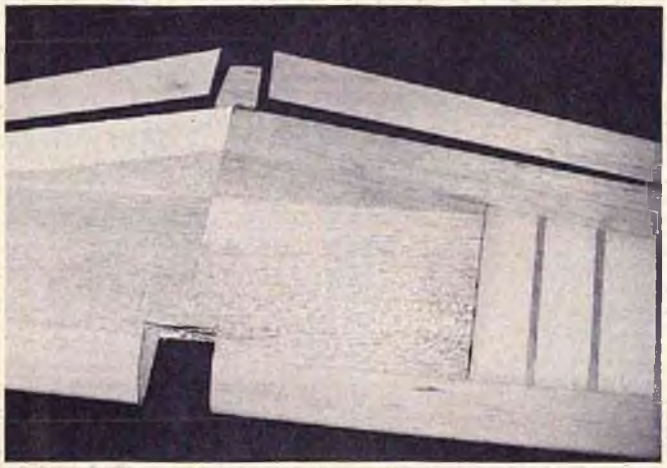
☐ Bond the wing skins to the wing panels, making sure that no warps occur when



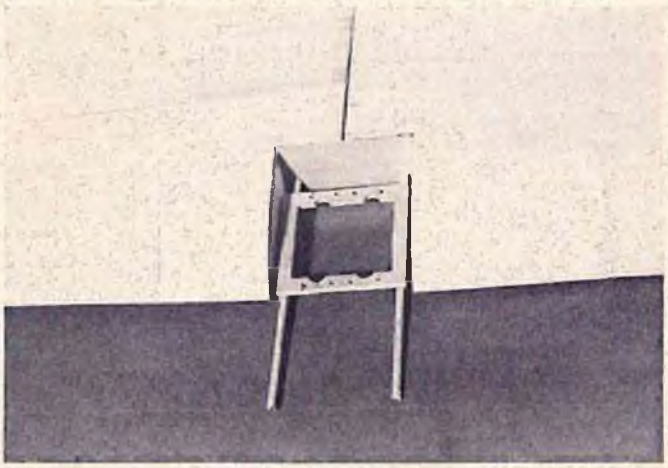
The hatch is cut out with an X-Acto knife for the horizontal cuts and a Zona saw for the cross-cuts.



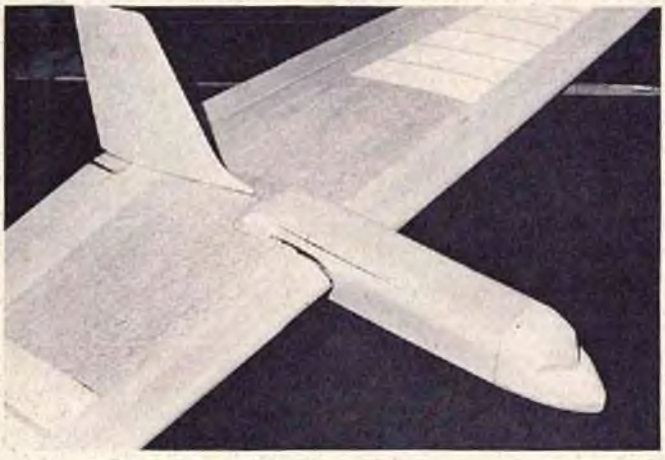
One wing panel showing the sheeting, capstrips, and fuselage cut-out.



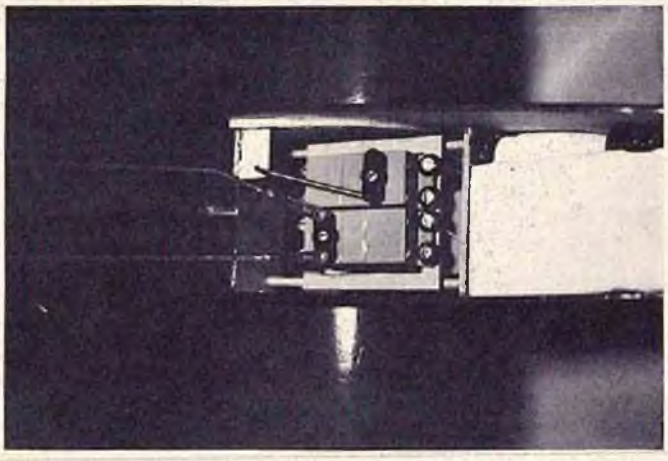
A view of the two wing panels joined together.



At this point, trial fit the servo tray in the wing recess.



The Saracen complete – ready to cover.



A cutaway showing the servos and elevon linkage installed.

bonding the skin to the wing. This should be done on a flat surface.

☐ Sheet the wing center sections.

☐ Glue and pin on the 1/4" x 1/16" capstrips at 2" intervals.

☐ Sand the wing panels smooth, round the leading edge to an airfoil shape, and slightly round the trailing edge as shown.

☐ Epoxy the wing panels together using a 2" block under each tip.

☐ Cut and glue the tail block to the wing (see plans — tail block fits between the elevons.)

☐ Cut the elevons from 1/4" sheet and sand to shape as shown.

☐ Cut the rudder from 3/16" sheet and sand to shape as shown.

☐ Cut a notch in the wing to accept your choice of radio installation. In most cases, cut a 2" wide piece out of the wing at the center section the length of the cut should be about 3" starting at the leading edge.

☐ Cover the wing, elevons, and rudder.

☐ Trim and sand the fuselage to shape.

☐ Cut the hatch as shown.

☐ Cover the fuselage.

☐ Locate the fuselage on the wing and pin in place, then mark the fuselage location with a pencil. Remove the fuselage and trim the wing covering away where the fuselage covers the wing.

☐ Construct and install the sliding servo tray if the narrow fuselage is your choice.

☐ Epoxy the fuselage to the wing.

☐ Epoxy the rudder to the wing,

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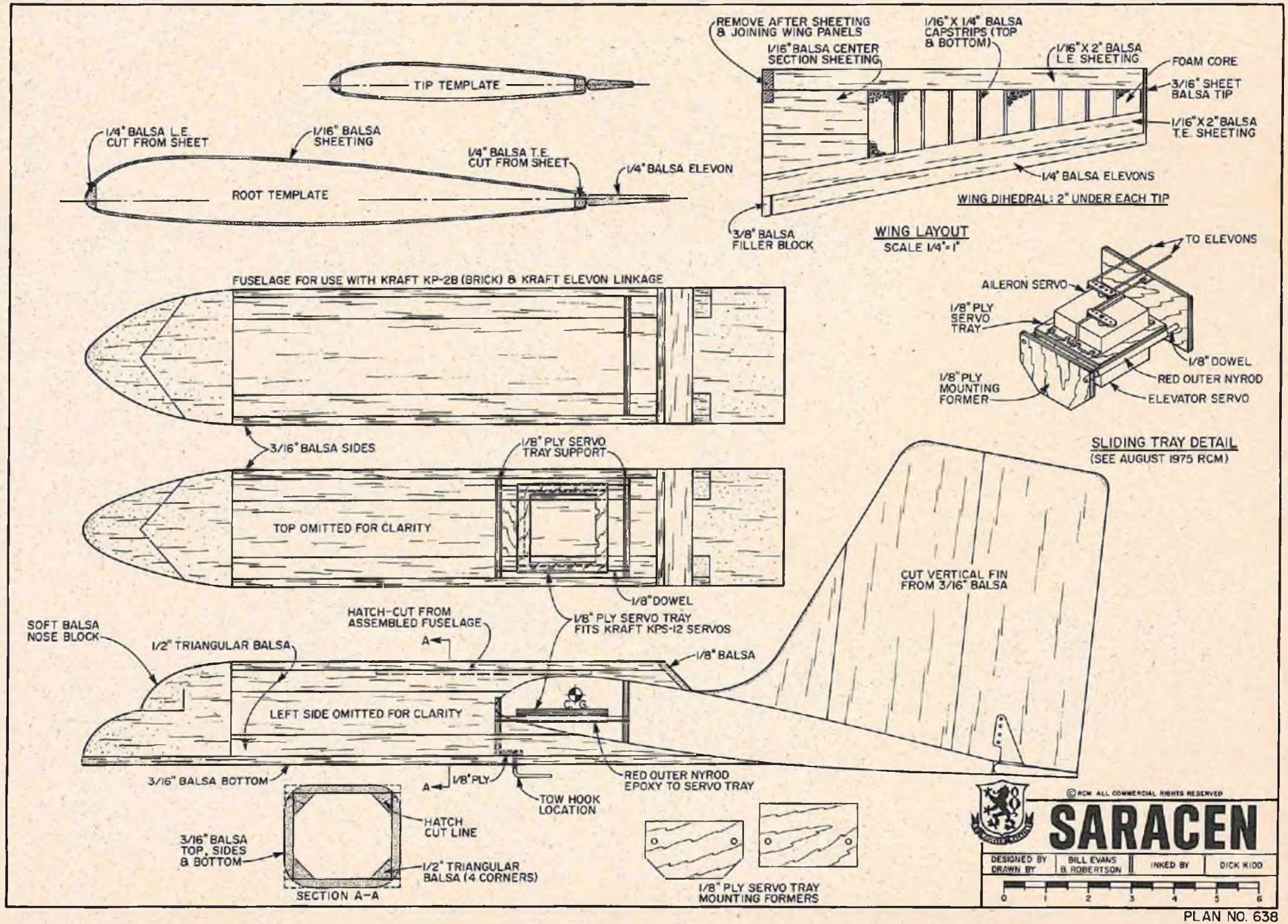
TIP TEMPLATE
1/4" BALSA L.E. CUT FROM SHEET
1/16" BALSA SHEETING
1/4" BALSA T.E. CUT FROM SHEET
1/4" BALSA ELEVON
ROOT TEMPLATE
REMOVE AFTER SHEETING & JOINING WING PANELS
1/16" BALSA CENTER SECTION SHEETING
1/16" X 1/4" BALSA CAPSTRIPS (TOP & BOTTOM)
1/16" X 2" BALSA L.E. SHEETING
FOAM CORE
3/16" SHEET BALSA TIP
1/16" X 2" BALSA T.E. SHEETING
1/4" BALSA ELEVONS
WING DIHEDRAL: 2" UNDER EACH TIP
3/8" BALSA FILLER BLOCK
WING LAYOUT
SCALE 1/4"=1"
FUSELAGE FOR USE WITH KRAFT KP-2B (BRICK) & KRAFT ELEVON LINKAGE
TO ELEVONS
AILERON SERVO
1/8" PLY SERVO TRAY
1/8" DOWEL
RED OUTER NYROD
1/8" PLY MOUNTING FORMER
ELEVATOR SERVO
3/16" BALSA SIDES
1/8" PLY SERVO TRAY SUPPORT
TOP OMITTED FOR CLARITY
SLIDING TRAY DETAIL
(SEE AUGUST 1975 RCM)
1/8" DOWEL
1/8" PLY SERVO TRAY FITS KRAFT KPS-12 SERVOS
CUT VERTICAL FIN FROM 3/16" BALSA
SOFT BALSA NOSE BLOCK
1/2" TRIANGULAR BALSA
HATCH-CUT FROM ASSEMBLED FUSELAGE
A
1/8" BALSA
LEFT SIDE OMITTED FOR CLARITY
C.G.
3/16" BALSA BOTTOM
A
1/8" PLY
TOW HOOK LOCATION
RED OUTER NYROD EPOXY TO SERVO TRAY
HATCH CUT LINE
3/16" BALSA TOP, SIDES & BOTTOM
1/2" TRIANGULAR BALSA (4 CORNERS)
SECTION A-A
1/8" PLY SERVO TRAY MOUNTING FORMERS
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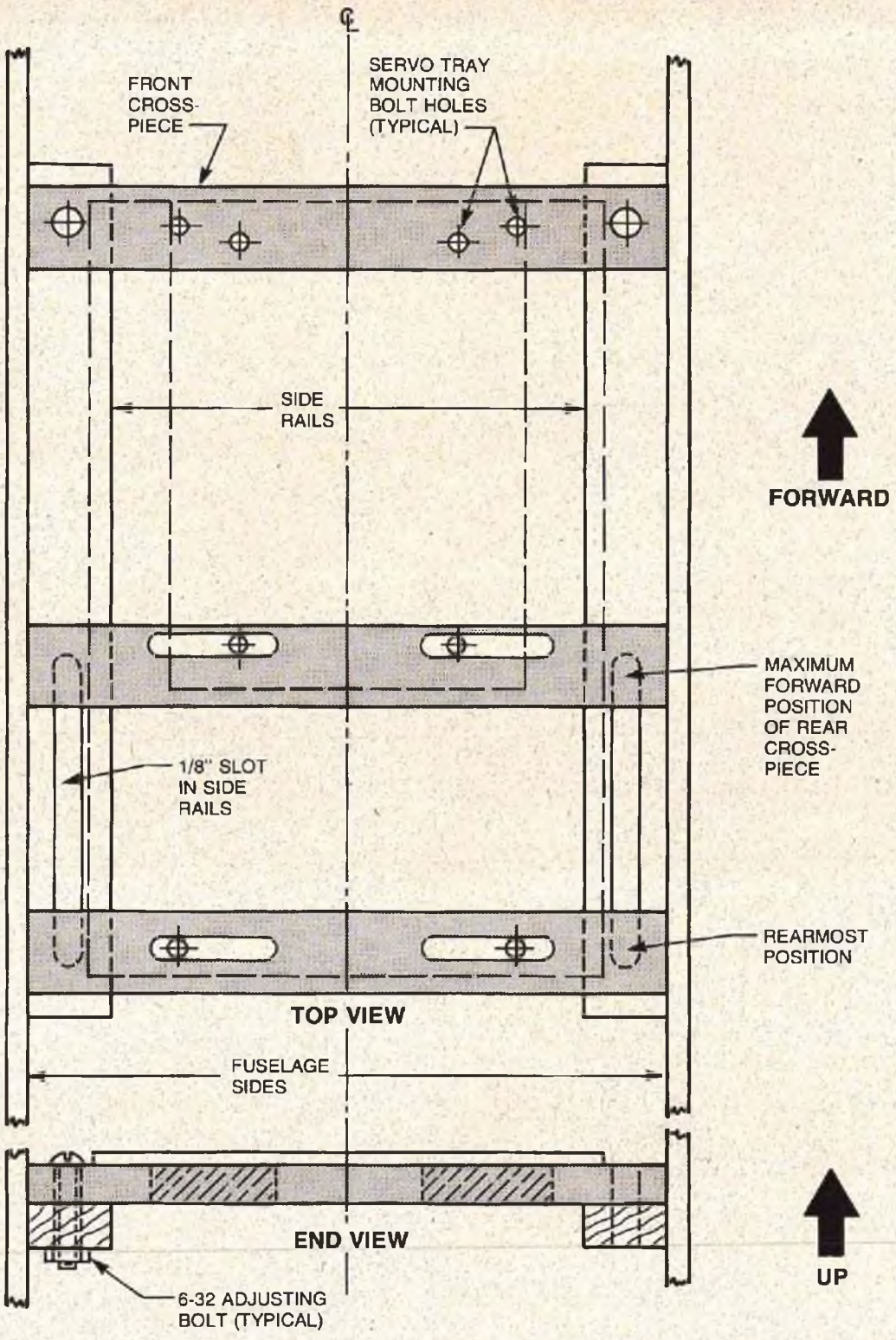
SARACEN
DESIGNED BY
DRAWN BY
BILL EVANS & ROBERTSON
INKED BY
DICK KIDD
0 1 2 3 4 5 6

PLAN NO. 638



DASHED RECTANGLES ABOVE REPRESENT THE LARGEST AND SMALLEST SERVO TRAYS AVAILABLE

UNIVERSAL SERVO TRAY RAILS

BY: J.A. de Vries **FULL SIZE**

THE CASE FOR UNIVERSAL

By Col. John A. de Vries

SERVO-TRAY RAILS

● Most R/C radio manufacturers agree — mount your fuselage servos in servo trays! To reinforce this point, most R/C radio sets include servo trays in their big styrofoam boxes. Thus, when you plunk down your hard-earned cash, you receive the best mounting system for servos — the servo tray. Servos are mounted to the tray on rubber grommets and the tray further isolates their delicate electronic innards, again, on rubber grommets.

To the frustration of many R/C modelers, however, there is little standardization in the radio industry of either servo case or servo tray sizes. The major manufacturers offer several servo sizes and, consequently, the appropriate servo trays vary substantially in their dimensions. When you consider that there are several servo-mounting arrangements for each servo size, the proliferation of possible installations is monumental!

There is another important reason other than servo vibration isolation for the use of servo trays. It allows you to install the same (expensive) radio in more than one model, simply. By removing four screws and detaching the pushrods, fuselage servos (usually, rudder, elevator and engine) may be moved from plane to plane. This interchangeability is great — as long as you have **all** of your models pre-prepared for your radio's servo tray. But what happens if you have two or more radios **and** several models? Chances are that, because of the different sizes of servo trays, you'll be limited as to which radio fits into which model. Wouldn't it be highly desirable if you could install **any** radio into **any** model? What we're proposing is a Universal Servo-Tray Rail system.

In addition to the modeler with several radios and several models, there are two other scenarios in which a universal system for servo mounting is needed. Let's assume that your club has a "goat" — an old, worn trainer that is used by everybody to learn to fly. It's passed from hand-to-hand, and it's had every conceivable type of radio installed. The sheet balsa sides are getting pretty doggy-looking — servo tray rails have been epoxied in and sliced out so many times that a new fuselage has to be made. Or — your own "Ole Reliable", an Ugly Stik that you use to break-in engines in the air and to test new or repaired radios, is also the model that you use for fun-flys. And, you usually wait until the night before the contest to stick a radio in it. Multiple models and radios, the club "goat", the "Ole Reliable" — three reasons for a universal servo tray mounting system! With a bit more labor than is needed to glue in a set of fixed servo tray rails, you can install a universal system that will allow the use of trays, from the longest to the shortest, the widest to the narrowest. The only restriction, of course, is the size of the servo

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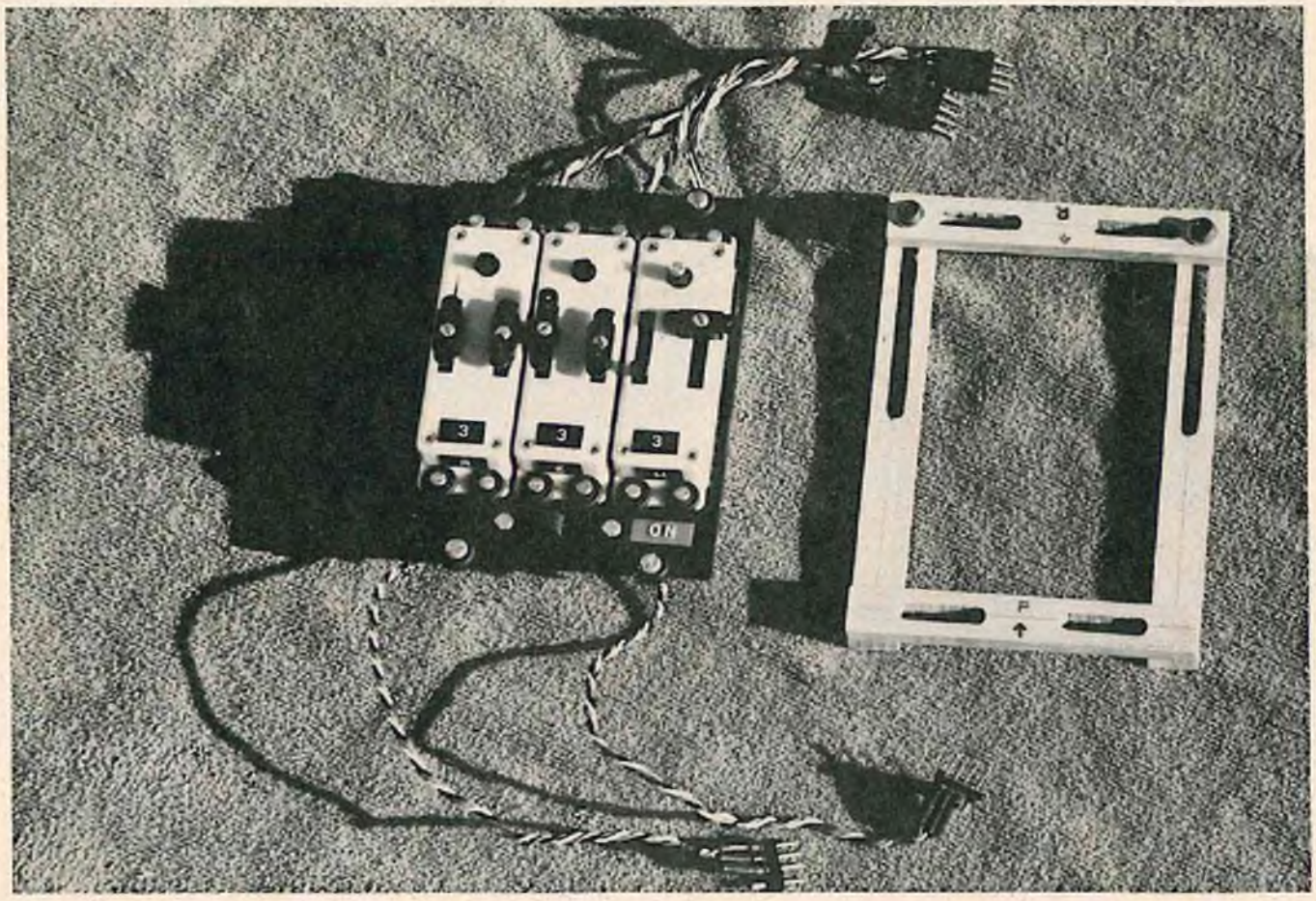
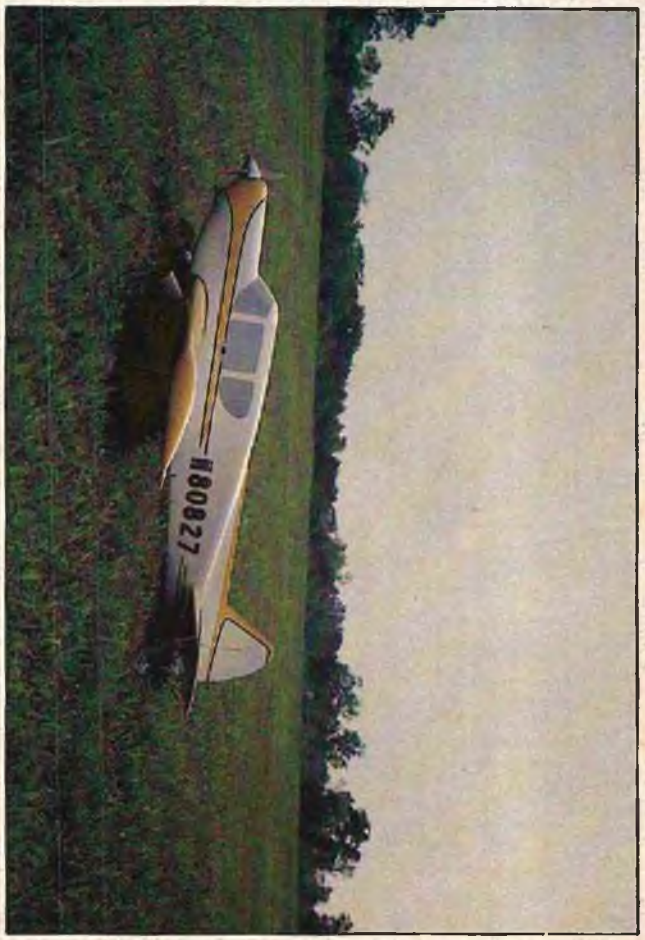
A prototype of the Universal Servo Tray Rail system, built of 1/4" x 1/2" maple servo rail stock, and adjusted for mounting three KPS-9 servos (left). Note that the front cross-piece is glued to the side rails, although it can be made adjustable, in the same way as the rear cross-piece. 6-32 bolts are used although 4-40 bolts, sliding in narrower slots, will work as well. The side rails are epoxied to the fuselage sides. The servo tray is bolted to the front and rear cross-pieces which are mounted above the side rails so that plastic ridges on the bottom of the tray clear the installation. This particular unit is flying in an Ugly Stik.



LI'L SWIFT

A forty-eight inch span all-purpose sport aircraft patterned after the Globe Swift. For .29 to .35 engines. The Li'l Swift will perform large, graceful loops, rolling maneuvers, multiple snaps, flat spins, Lomcevaks, and knife edge flight. BY DUANE GALL



●This model was conceived in the Fall of 1974, shortly after the untimely demise of my VK Cherokee Babe due to a fractured elevator linkage. Left only with fond memories and an OS .30, I began hunting for a replacement, something combining the scale-like appearance and good flying qualities of the Cherokee with originality and a little more spunk. A slightly shorter nose, a tapered wing with flatter dihedral, more rudder area below the stab for better spin control — these were some of the features I was looking for. I found these features and more in the 1946 Globe Swift.

The full size subject for this design is actually a modified Swift which appeared on the cover of the June 1972 *Air Progress* magazine. It is owned by Mr. Steve Halpern of Woodmere, New York, and sports a turbocharged 250-hp engine in place of the standard 145-hp. Billed as the world's fastest Swift, N80827 was modified by John D'Arcy of Miami, who specializes in making Swifts swifter. The article by Budd Davisson included several pages of excellent color flight photos which showed the aircraft's lines and proportions from a variety of angles. This made the basic eyeballing of the design an easy task. Here was an ideal modeling subject: it was overpowered, just like a model; the squared-off wing tips and extra dorsal fin area would adapt well to model use; and the dihedraled stabilizer added a touch of class I couldn't resist.

The first prototype flew early the next spring. It proved to be a good flyer, but heavy, being burdened with a Toledo-style dope spit shine. (Just too much of a good thing, I guess.) Don't be alarmed by the past tense — it still exists down in the dank confines of my basement. The reason it's not flying is that I'm having gangs of fun with the second prototype, which is nearly a pound lighter and much more energetic.

The name, by the way, is a result, not of planning, but of having to call the bird **something** during all the sketching and hacking stages. It's pronounced Li'l Swift as in "When are you going to be done with that li'l Swift?" Not too original, maybe, but descriptive.

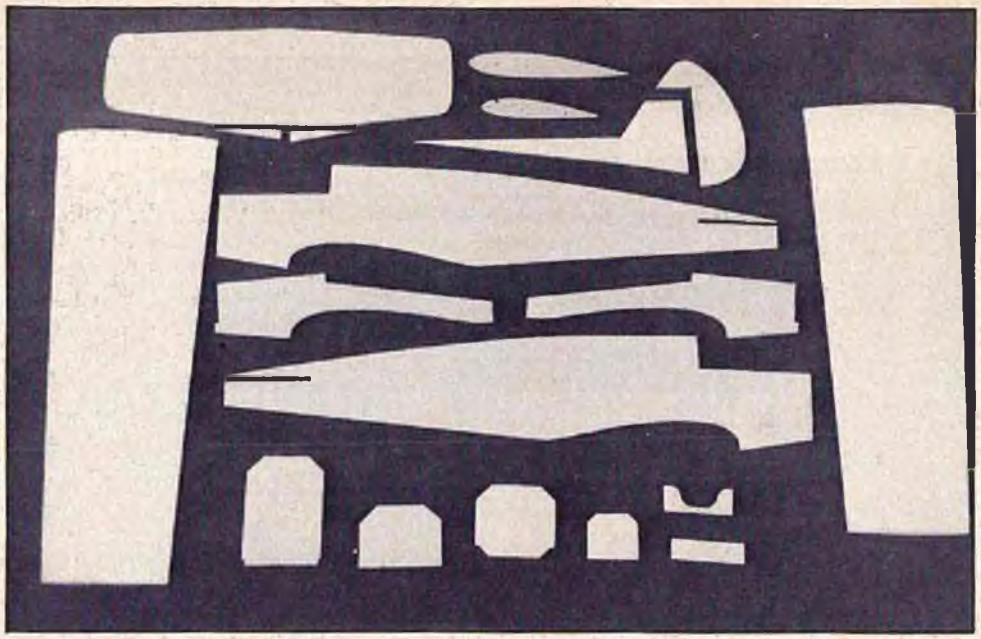
Both prototypes are stable and scale-like in the air, with good control response in all three axis. The short tail is evident in spin and snap maneuvers, and the strip ailerons are quite effective. The plans specify some approximate control throws for general sport flying. Do not exceed these throws unless you are an experienced flyer. This plane is not a trainer and will do anything in the book without much persuading. It is capable of large, graceful looping and rolling maneuvers as well as multiple snaps, flat spins, Lomcevaks and knife edge flight, all using the .30 for power. I've tried my best to fold a wing and haven't yet, but if you must use more that a .35, please add a dihedral brace. There's no sense pushing your luck!

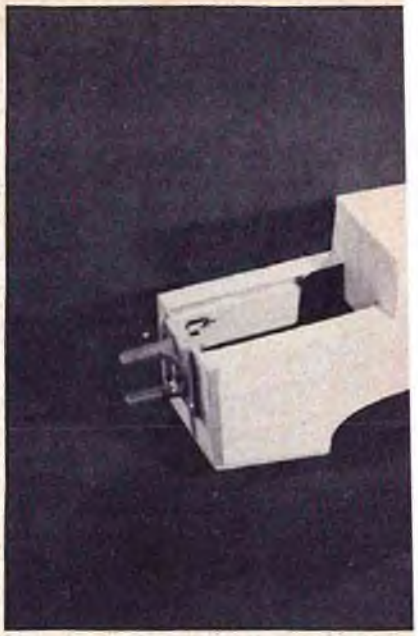
Well, enough talk. It's time to start building. I'm assuming you're familiar with basic building procedures so I'll just briefly outline the construction sequence. The only special tools required are a good sanding block and a sharp carving knife with at least a 3" blade. By "a good sanding block" I mean a flat piece of hardwood about 6" x 4" or bigger with coarse sandpaper glued to it. Both these tools will make carving a lot easier. There's a considerable amount of carving on this plane and it may as well be done right.

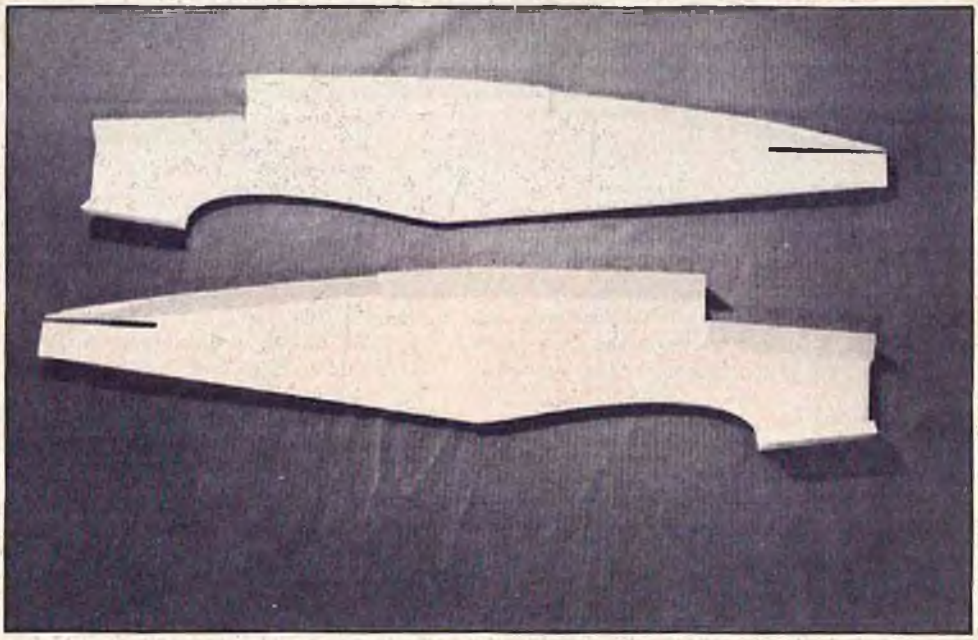
Wing

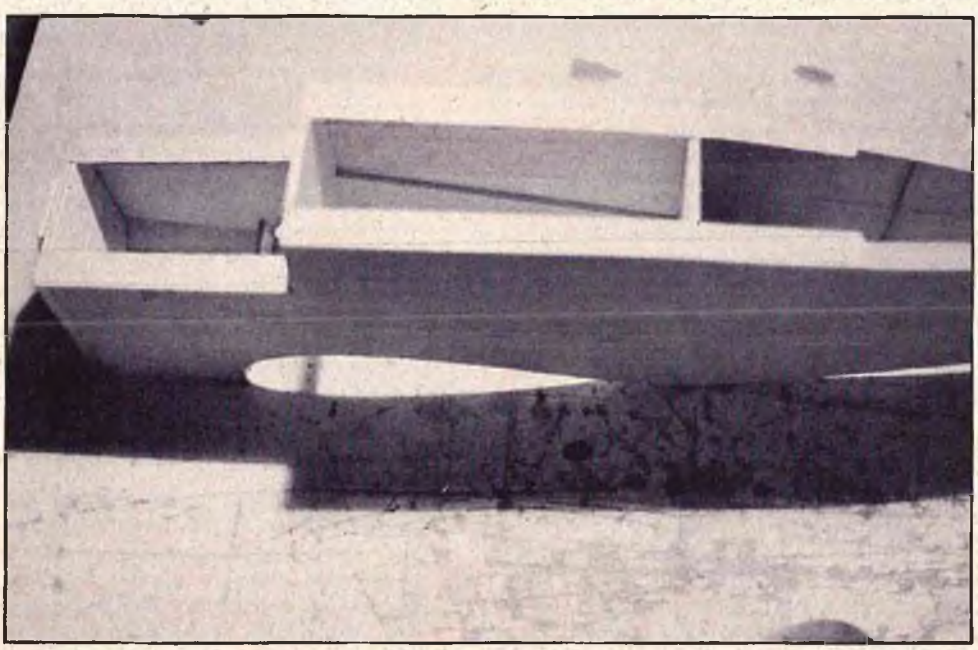
The wing is of conventional foam and balsa construction. Cut two panels 23½" long, one left and one right. Glue on the 1/4" trailing edge and sand it down flush. Sheet both panels with 1/16" balsa using a good contact cement such as Sorghum which is compatible with the foam. The most economical cut of balsa for this is 1/16" x 6" x 48". Use three pieces and cut them in half to make six pieces 24" long. Have one piece wrap evenly around the leading edge of each panel. The remainder works out just right with only a small amount of extra wood required at the center section.

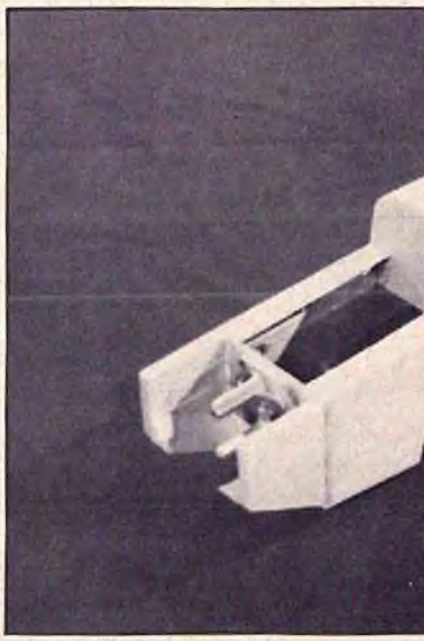
After both panels are sheeted, sand the ends flat and epoxy them together at the center with a dihedral angle of about 4°. A 1¼" block under each tip will give the right amount of dihedral. Before the glue sets make sure the panels line up properly, front to back, or otherwise you will have built a set of 10" wide ailerons! After the epoxy has cured, add the center trailing edge stock, the wing hold-down dowel, and the aileron control rods, and allow these to cure also. At this point decide whether or not you have a good solid center section. If so, you can save some weight by only fiberglassing a 4" square area at the trailing edge to

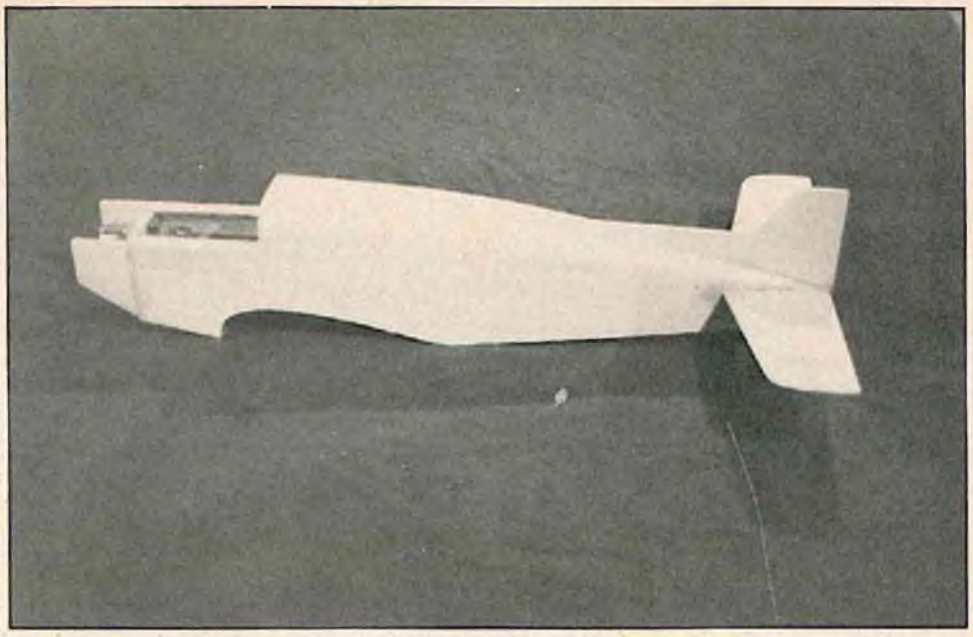


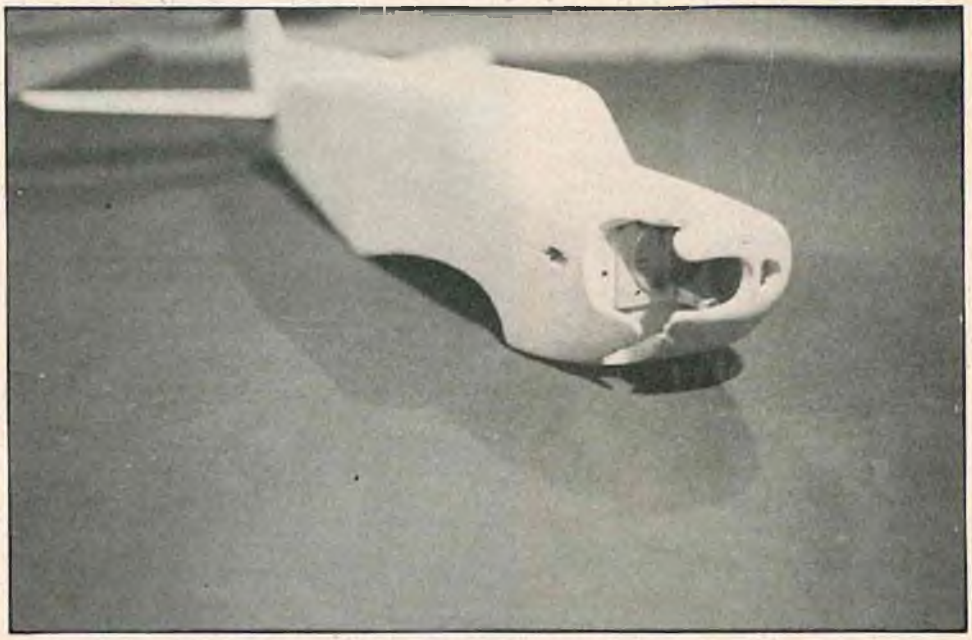


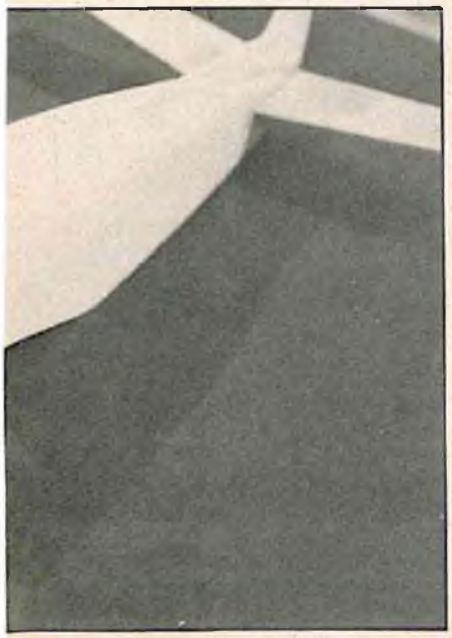


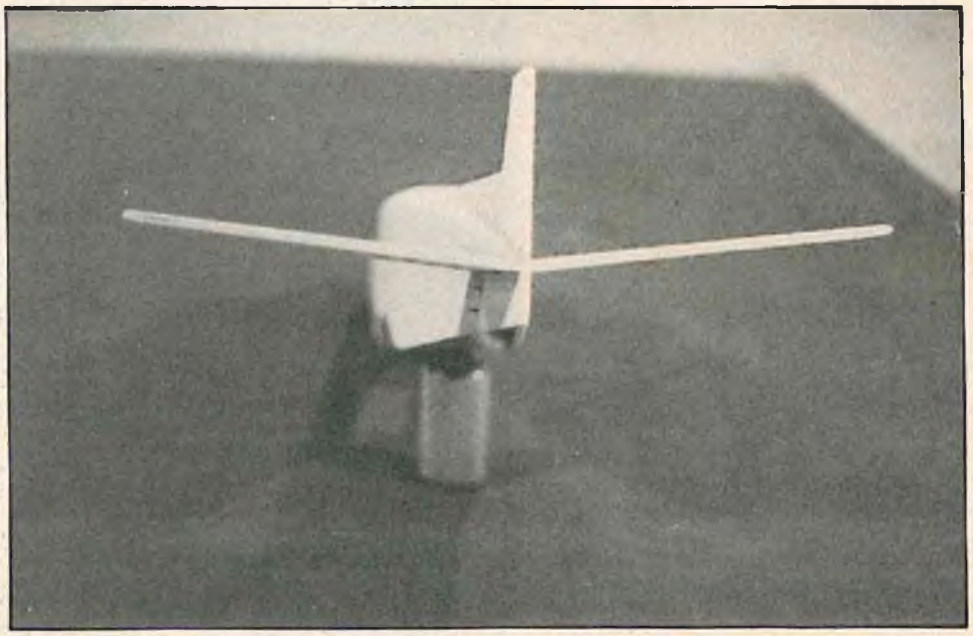












support the bolt holes and aileron linkages. (You may want to reinforce the seam by rubbing in Hobbypoxy II a quarter inch or so on each side.) Otherwise, wrap the whole center section with glass cloth as shown on the plans. I've built one each way and they're both plenty strong.

Add the 3/4" wing tip blocks and carve them to shape. The ailerons are made from 1" wide tapered or trailing edge stock. Trial fit the ailerons and hinges, making sure that they move freely and that the control rods do not bind.

The cutouts for the landing gear blocks and aileron servo are made by melting the foam with a soldering iron. Complete the wing by installing the landing gear blocks with lots of epoxy. I like the Gas Model Products 6-minute epoxy for this because of its stiff consistency which makes it fill gaps well. After covering the wing with your favorite finishing material, add the ailerons using Titebond on the hinges and epoxy on the control rods. Now set the finished wing someplace where you can see it, so as to make the fuselage construction go more quickly.

Fuselage

Begin by making two fuselage sides from 1/8" sheet balsa. Each side requires one full 3" x 36" sheet (bottom half) plus part of a 4" x 48" sheet (top half). In this way you can get two fuselage sides from three sheets of balsa instead of four. Neat, eh? Cut the doublers from 3/16" sheet and glue them to the fuselage sides. Again, make sure you have one right and one left. Add the triangular stock and the spruce braces, trimming where necessary to clear the bulkhead and stabilizer slots. If the triangular stock is reluctant to bend, soak it in water or make small saw cuts part way through as shown on the plans. Glue the spacer F1A to firewall F1 then glue all the bulkheads to one fuselage side. They should all be perpendicular except F4, which is angled slightly. Join the fuselage sides and clamp as necessary to keep them straight. When dry, trim the spruce and triangular stock at the tail and pull the tail together. Do this over the plan to check the alignment.

LI'L SWIFT
Designed By: Duane Gall

TYPE AIRCRAFT
General Sport
WINGSPAN
48¼ Inches
WING CHORD
Root 10" — Tip 7¼"
TOTAL WING AREA
420 Square Inches
WING LOCATION
Low Wing
AIRFOIL
17% Semi-Symmetrical
WING PLANFORM
Double Taper
DIHEDRAL, Each Tip
1⅜ Inches
O.A. FUSELAGE LENGTH
35¼ Inches
RADIO COMPARTMENT AREA
(L) 8" X (W) 3½" X (H) 4½"
STABILIZER SPAN
19 Inches
STABILIZER CHORD (incl. elev.)
5⅝ Inches (Avg.)
STABILIZER AREA
105 Square Inches
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Mid-Fuselage
STABILIZER DIHEDRAL
1" (each tip)
VERTICAL FIN HEIGHT
8 Inches
VERTICAL FIN WIDTH (incl. rudder)
6¼ Inches (Max.)
REC. ENGINE SIZE
.29-.35 cu. in.
FUEL TANK SIZE
6 or 8 ounces
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
Four
CONTROL FUNCTIONS
Rudder, Elevator, Ailerons, Throttle
BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa and Ply
Wing	Foam and Balsa
Empennage	Balsa
Weight Ready-To-Fly	64 Ozs.
Wing Loading	21 Oz./Sq. Ft.

Sheet the top aft portion of the fuselage with 1/8" balsa (crossgrain). Add also the 1/4" cabin top block and the 3/16" sheeting under the tank compartment. Drill the necessary holes in the firewall for your engine and tank installation. Fuelproof F1A and the back of the firewall with a light film of Hobbypoxy II. Bolt on the engine mount.

Now attach the 3/8" sheet front blocks, front end triangular stock, and 3/8" bottom block. Fuelproof inside the tank compartment with Hobbypoxy II. While the epoxy is still wet, coat the inside of the 1/4" sheet top block and epoxy it on. Start cutting out the tail surfaces while all this is drying.

The next step on the fuselage is to cut the windshield block to the right dimensions, hollow it out a bit, and glue it on. Now roll up your sleeves and grab that knife for about a half hour of carving. Rough in the forms of the cabin, rear deck, bottom front and side blocks, and cowl area. The only tricky spot is where the windshield meets the forward portion of the fuselage. Proceed carefully and use the visible seams to judge depth and curvature. Somewhere in here, after the cowl area begins to take shape, sand the front end flat and glue on the nose block. (This is so you can see inside to avoid carving away too much at first.) Carve the nose block to shape, final sand everything, and make the cutouts for the engine and muffler. Fuelproof the engine compartment with epoxy and you're ready to install the tail surfaces.

Trial fit the wing on the fuselage and slip the stabilizer into its slot. Eyeball things carefully to make sure that neither the wing nor the stab is tilted. You may have to sand the wing seat a bit. When everything looks good, glue on the stab and the vertical fin, cut the holes for the pushrods, (knock a hole in F4 while you're at it) and sheet the bottom with 1/8" balsa. Epoxy in the plywood wing hold-down plate and, using the wing as a guide, drill and tap for the 1/4-20 nylon bolts. Double the wing hold-down plate if you don't land so good! Now check everything one more time, sand lightly and cover.

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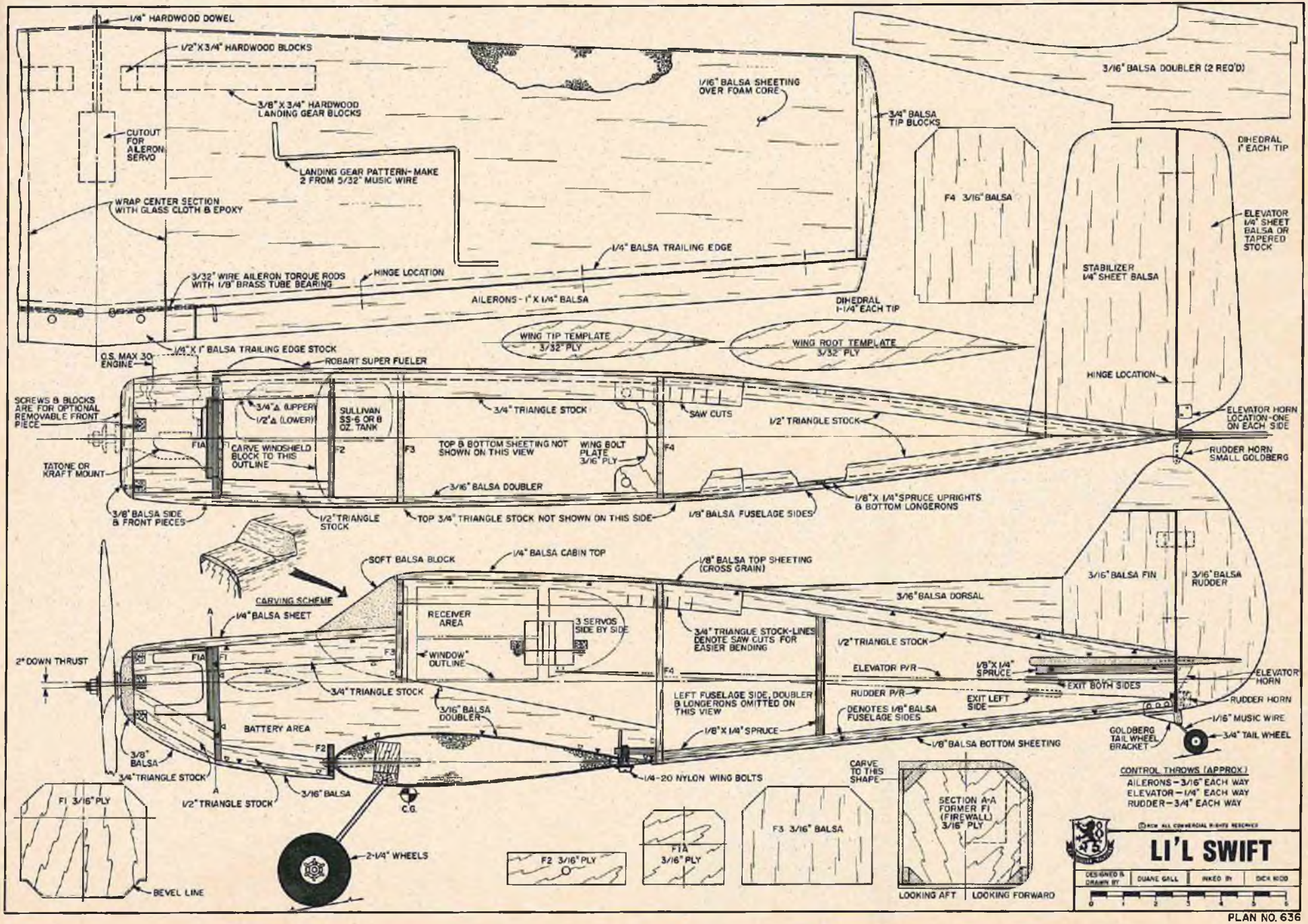
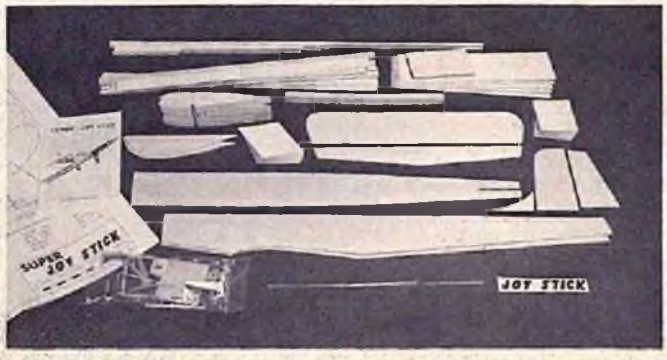

1/4" HARDWOOD DOWEL
1/2"X3/4" HARDWOOD BLOCKS
3/8"X3/4" HARDWOOD LANDING GEAR BLOCKS
CUTOUT FOR AILERON SERVO
LANDING GEAR PATTERN-MAKE 2 FROM 5/32" MUSIC WIRE
WRAP CENTER SECTION WITH GLASS CLOTH & EPOXY
1/16" BALSA SHEETING OVER FOAM CORE
3/4" BALSA TIP BLOCKS
3/16" BALSA DOUBLER (2 REQ'D)
DIHEDRAL 1" EACH TIP
F4 3/16" BALSA
ELEVATOR 1/4" SHEET BALSA OR TAPERED STOCK
1/4" BALSA TRAILING EDGE
3/32" WIRE AILERON TORQUE RODS WITH 1/8" BRASS TUBE BEARING
HINGE LOCATION
AILERONS - 1" X 1/4" BALSA
DIHEDRAL 1-1/4" EACH TIP
STABILIZER 1/4" SHEET BALSA
WING TIP TEMPLATE - 3/32" PLY
WING ROOT TEMPLATE 3/32" PLY
1/4" X 1" BALSA TRAILING EDGE STOCK
O.S. MAX 30 ENGINE
ROBART SUPER FUELER
HINGE LOCATION
SCREWS & BLOCKS ARE FOR OPTIONAL REMOVABLE FRONT PIECE
3/4"Δ (UPPER) 1/2"Δ (LOWER)
SULLIVAN SS-6 OR 8 OZ. TANK
3/4" TRIANGLE STOCK
SAW CUTS
1/2" TRIANGLE STOCK
ELEVATOR HORN LOCATION-ONE ON EACH SIDE
F1A
CARVE WINDSHIELD BLOCK TO THIS OUTLINE
F2
F3
TOP & BOTTOM SHEETING NOT SHOWN ON THIS VIEW
WING BOLT PLATE 3/16" PLY
F4
RUDDER HORN SMALL GOLDBERG
TATONE OR KRAFT MOUNT
3/16" BALSA DOUBLER
1/8"X 1/4" SPRUCE UPRIGHTS & BOTTOM LONGERONS
3/8" BALSA SIDE & FRONT PIECES
1/2" TRIANGLE STOCK
TOP 3/4" TRIANGLE STOCK NOT SHOWN ON THIS SIDE
1/8" BALSA FUSELAGE SIDES
SOFT BALSA BLOCK
1/4" BALSA CABIN TOP
1/8" BALSA TOP SHEETING (CROSS GRAIN)
3/16" BALSA FIN
3/16" BALSA RUDDER
CARVING SCHEME
A
1/4" BALSA SHEET
RECEIVER AREA
3 SERVOS SIDE BY SIDE
3/16" BALSA DORSAL
3/4" TRIANGLE STOCK-LINES DENOTE SAW CUTS FOR EASIER BENDING
1/2" TRIANGLE STOCK
2° DOWN THRUST
F1A
F1
F3
WINDOW OUTLINE
F4
ELEVATOR P/R
1/8"X 1/4" SPRUCE
EXIT BOTH SIDES
ELEVATOR HORN
3/4" TRIANGLE STOCK
LEFT FUSELAGE SIDE, DOUBLER & LONGERONS OMITTED ON THIS VIEW
RUDDER P/R
EXIT LEFT SIDE
RUDDER HORN
3/16" BALSA DOUBLER
DENOTES 1/8" BALSA FUSELAGE SIDES
1/16" MUSIC WIRE
BATTERY AREA
1/8"X 1/4" SPRUCE
GOLDBERG TAIL WHEEL BRACKET
3/4" TAIL WHEEL
F2
3/8" BALSA
1/8" BALSA BOTTOM SHEETING
3/4" TRIANGLE STOCK
1/4-20 NYLON WING BOLTS
CARVE TO THIS SHAPE
A
1/2" TRIANGLE STOCK
3/16" BALSA
C.G.
F1 3/16" PLY
SECTION A-A FORMER F1 (FIREWALL) 3/16" PLY
CONTROL THROWS (APPROX.)
AILERONS - 3/16" EACH WAY
ELEVATOR - 1/4" EACH WAY
RUDDER - 3/4" EACH WAY
2-1/4" WHEELS
F2 3/16" PLY
F1A 3/16" PLY
F3 3/16" BALSA
BEVEL LINE
LOOKING AFT
LOOKING FORWARD
LI'L SWIFT
DESIGNED & DRAWN BY
DUANE GALL
INKED BY
DICK KOOD
PLAN NO. 636

RCM PRODUCT TEST

MILE HIGH MODELS
SUPER JOY STICK



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

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

● The Super Joy Stick is manufactured by Mile High Models, 4805 Baja Court NE, Albuquerque, New Mexico 87111. Designed as a one-design club racer (as featured in the article "Slow It Down!" — March 1976 RCM) it also doubles as an excellent .15 to .25 sport aircraft. With a wingspan of 45½" the total wing area of the Super Joy Stick is 405 square inches. Construction used is balsa and plywood and included in the kit are hinges, control horns, pre-bent steerable nosegear, main gear, engine mount, nosegear tiller arm, two pushrods, two clevises, two aileron wires with nylon bearings, eight bolts and blind nuts for the nosegear plus 1/16" diameter music wire. The plan size is 25" by 37", printed on both sides with a 6 page construction manual included. One unusual feature of the kit is the one piece hardwood dihedral brace which also is the main landing gear mount. In addition, it is a nice touch to include a universal engine mount in the kit.

RCM's prototype weighed 44 ounces ready to fly for a wing loading of 15.6 ounces per square foot. Our prototype was finished in light blue Flite-Kote on the fuselage; red, aluminum and metallic gold on the wings; trimmed off with DJ's multistrips in gold and black. An Ace Digital Commander radio was used and the Super Joy Stick was powered by an Enya .19 R/C engine and Enya muffler.

The kit is quick building, all parts fit extremely well, and the plans and instructions are completely logical and easily followed by even a novice builder. With regards to the flight performance, we found that it was necessary to move the balance point forward 1/4" at which time the model flew exceptionally well. Very smooth aileron rolls were accomplished with only a touch of down required. In addition, the Super Joy Stick is a very capable acrobatic aircraft. Due to the tricycle gear set up, a smooth surface is required for take-off although the aircraft can easily be built as a tail dragger by simply moving the main landing gear forward so that the axles are in line with the leading edge of the wing.

All in all, the Super Joy Stick is an excellent aircraft for general sport flying, as a low wing trainer, or for one design racing as it was primarily intended by the manufacturer. We would rate this kit excellent in all categories. □

SPECIFICATIONS

Name	SUPER JOY STICK
Aircraft Type	General Sport
Manufactured by	Mile High Models 4805 Baja Ct. NE Albuquerque, New Mexico 87111
Mfg. Suggested Retail Price	$36.95
Available From	Both Manufacturer and Retail
Mfg. Recommended Usage	1-Design Club Racer
Wingspan	45½ inches
Wing Chord	9 inches
Total Wing Area	405 sq. in.
Fuselage Length	32 inches
Radio Compartment Dimensions	(L) 9" x (W) 2"x (H) 2½"
Wing Location	Low Wing
Dihedral	3/4 inches
Airfoil	Symmetrical
Wing Planform	Constant Chord
Stabilizer Span	16 inches
Stabilizer Chord (incl. elev.)	4¾ inches
Total Stab Area	76 sq. in. approx.
Stab Airfoil Section	Flat
Stabilizer Location	Top of Fuselage
Vertical Fin Height	5 inches
Vertical Fin Width (incl. rudder)	4¾ inches (avg.)
Mfg. Rec. Engine Range	.15 - .25
Recommended Fuel Tank Size	4 ounce
Landing Gear	Tricycle
Recommended No. of Channels	4
Recommended Control Functions	Rudder, Elevator, Throttle, Allerons
Basic Materials Used In Construction:	
Fuselage	Balsa and ply
Wing	Balsa and hardwood
Tail Surfaces	Balsa
Hardware Included In Kit	Hinges, cont. horns, engine mount, tiller arm, pushrods, bolts, wires, blindnuts
Plan Size	25" x 37" (1 sheet)
Building Instructions on Plan Sheets	No
Instruction Manual	Yes (6 pages)
Construction Photos	Yes
Kit Includes	Shaped parts
Mfg. rec. flying weight	40-44 ounces
Wing loading based on rec. flying wt.	14.2-15.6 oz./sq. ft.

RCM PROTOTYPE

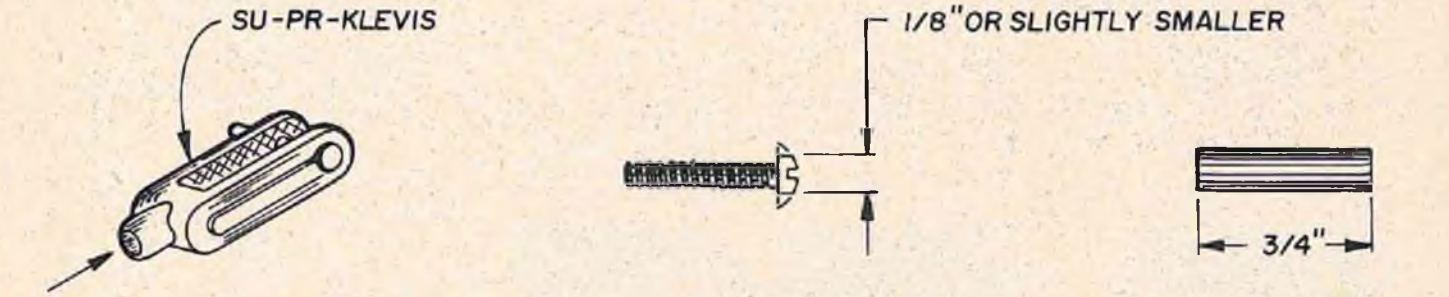
Weight, ready to fly:	44 oz.
Wing Loading	15.6 oz/sq. ft.
Covering and finishing materials used	Flite Kote & DJ's Multi Stripe
Engine Make and Disp.	Enya .19
Muffler Used	Enya
Radio Used	Ace
Tank Size Used	Four ounces

AND HERE'S HOW...

BY JERRY SMITH

HOW WOULD YOU LIKE TO ADJUST UP OR DOWN TRIM IN YOUR CONTROL SURFACES WITHOUT REMOVING THE CLEVIS FROM THE CONTROL HORN? PERHAPS YOU HAVE NEVER CONSIDERED THE POSSIBILITY OF THIS HANDINESS. WELL THEN, ASK YOURSELF THESE QUESTIONS: HAVE I HAD TROUBLE REMOVING A CLEVIS FROM THE CONTROL HORN TO MAKE A TRIM CHANGE? DID I BREAK A FINGERNAIL? DID IT REQUIRE TOOLS? DID I HAVE TROUBLE REMEMBERING WHICH HOLE IN THE CONTROL HORN THE CLEVIS WAS LOCATED IN? IF YOUR ANSWER TO ANY OF THESE QUESTIONS IS YES, THEN THIS NIFTY ADJUSTABLE IS JUST FOR YOU. THE VERY ESSENCE OF SIMPLICITY AND OF COURSE, EASE OF CONSTRUCTION.

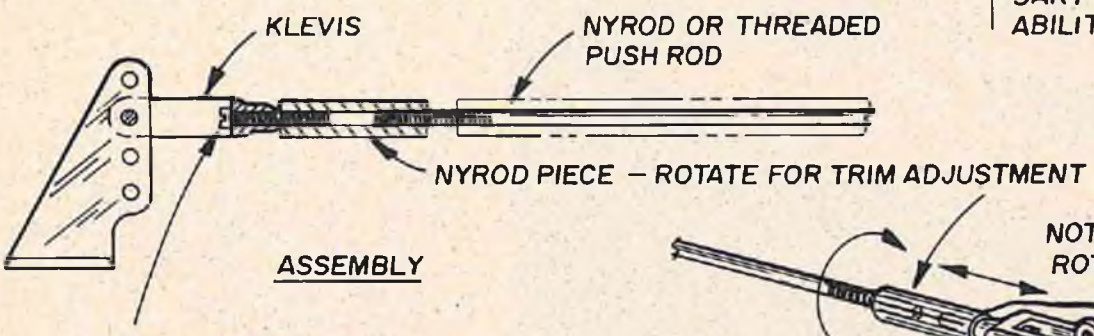
FIRST OFF, YOU'LL NEED A CLEVIS, A #2 X 1/2" MACHINE SCREW AND A SHORT PIECE OF NYROD. THAT'S IT! I RECOMMEND USING THE SU-PR-KLEVIS (KVS-69 SU-PR-LINE PRODUCTS) FOR THIS APPLICATION AS IT ALLOWS MORE ROOM FOR THE MODIFIED SCREW HEAD. ALSO, TO ALLOW FOR EASIER TURNING ADJUSTMENT, DRILL OUT THE NYROD WITH A #46 (.081) DRILL. PERHAPS THIS SOUNDS A LITTLE LARGE FOR A #2 SCREW HOWEVER, THE NYROD MATERIAL HAS A TENDENCY TO "GROW," AFTER DRILLING, MAKING THE HOLE SLIGHTLY SMALLER. FOLLOW THE SKETCHES AND INFORMATION BELOW. AND — THE NEXT TIME YOU MAKE A TRIM ADJUSTMENT, JUST REACH RIGHT DOWN AND GIVE HER A TWIST!



MODIFY KLEVIS BY RUNNING 3/32" DRILL THRU HOLE.

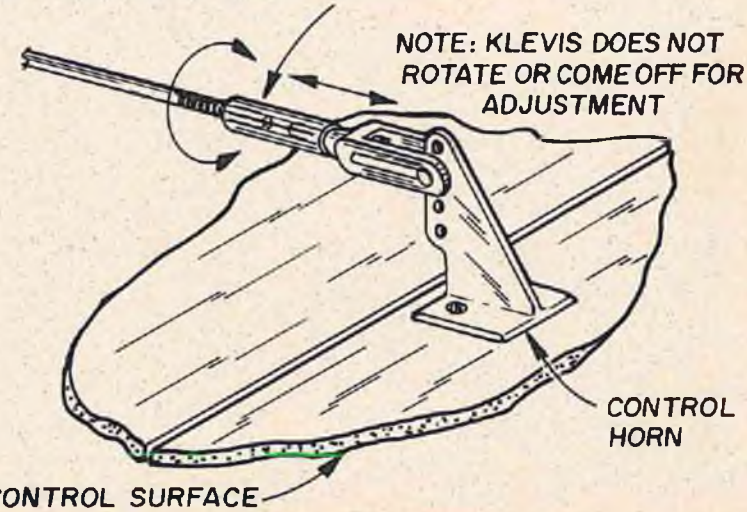
MODIFY SCREW HEAD BY CHUCKING SCREW IN DRILL MOTOR. WITH MOTOR RUNNING CAREFULLY FILE HEAD TO DIMENSION SHOWN.

NYROD INNER TUBING. RUN A #46 DRILL THRU HOLE FOR EASIER THREADING OF SCREW. THIS IS NOT ABSOLUTELY NECESSARY BUT WILL IMPROVE WORKABILITY IN ADJUSTING TRIM.



ASSEMBLY

NOTE:
INSTALL SCREW AND TIGHTEN INTO NYROD PIECE UNTIL THERE IS NO END PLAY YET KLEVIS WILL ROTATE REASONABLY FREE.



1929 HEATH

● The Heath Parasol light monoplane was designed and built for the amateur who wanted something inexpensive and easy to handle. The inspiration for the parasol came from Weston Farmer, a naval architect and magazine writer. Weston Farmer was editor of Flying and Glider Manual published in the late 20's and early 30's by Modern Mechanics and Inventions magazine. His idea was to build an ultra-light airplane using the lower wings of a Thomas Morse biplane and a Henderson motorcycle engine of about 20 horsepower. Weston asked Edward Heath if he would build such an airplane.

Heath was an early-day pioneer, a contemporary of the Wright Brothers and Glenn Martin. He had designed and built his first airplane at age 21 in 1909. In 1913, he opened an aeronautical supply business with an amazing range of parts and supplies offered to the home builder. Everything needed to build or repair an airplane could be found in Heath's catalog. He was a prolific designer and an avid racer. But he never lost interest in airplanes for the average man. Heath liked Weston's idea and finished the first Parasol in November, 1925. The little Parasol flew quite well and soon began to attract considerable attention. Heath did not go into mass production with this model but, rather, let it move along at its own pace.

Continued development of this model resulted in the Super Parasol. The major improvement consisted of replacing the thin-airfoil Thomas Morse wing with a more efficient Clark Y airfoil. This model was eventually mass produced. One Super Parasol was fitted with a 32 horsepower Bristol Cherub engine and entered in the 1927 National Air Races at Spokane, Washington. Heath won $1,000.00 in the light and sport plane classes in his "Spokane Super Parasol" with a top speed of 90 mph.

The design of the Parasol clearly shows that Heath was directing his efforts towards the average home aircraft builder. The fuselage was built up of steel tubes, held together with metal clamp fittings, instead of the more usual and expensive welding. This made for unusually simple construction, enabling anyone to build it without special aircraft experience. The monoplane wing was in two parts, attached to an inverted vee cabane. The wing was braced to the bottom longerons by two steel-tube struts on either side. The undercarriage was light and robust. The tail skid was made from a piece of spring steel. The engine was a 23 horsepower, 4-cylinder air cooled motorcycle motor, but the airplane could be fitted with any engine from 20-30 horsepower. In tests, the Parasol had been flown for long stretches with hands off the controls, and had proved itself to be unusually easy and safe to fly. The Parasol sold for $750.00 and a complete set of parts (minus the engine) could be obtained by those wishing to build their own machine for $188.00.

The model of the Heath Parasol is patterned after its namesake in that it is inexpensive to build, easy to construct and simple to fly. The primary building material is 1/8" corrugated cardboard. The advantages of cardboard as a construction material are numberous. The most important factors are the low cost and availability. In addition to being available from cardboard container manufacturers, cardboard can also be obtained from most grocery and department stores in the form of shipping containers. All that's needed to cut out cardboard pieces is a sharp razor blade. Sharp corners or rounded edges are equally easy to cut, with no worry of cracking or splitting as with balsa wood sheets. In addition, since cardboard comes in large panels, large sections may be made from one continuous piece. The ease of cutting, combined with the large shapes which may be formed from a single piece of cardboard, have resulted in simplified design techniques which reduce building time to an absolute minimum. The weight of cardboard varies considerably, but the lighter weight cardboard can be used to build models which are less, or equal, in weight to models using standard balsa wood construction, while still maintaining adequate strength and durability.

The term cardboard actually refers to corrugated fibreboard and is specified by test strength, facing weight, and flute style. In its usual form, it consists of an outer facing paper, an inner flute paper and an inner facing paper. Test strengths are dependent on the weight of the three components specified in pounds per

PARASOL

Designed By Bob Miller
Article By Chuck Felton
Photos By Lane Mosby

thousand square feet. Flute sizes are B, C or A, which result in an approximate thickness of 1/8", 3/16" and 1/4", respectively. The material used for the Parasol is 1/8", 125 pound test, B flute.

The use of non-cardboard material is kept to an absolute minimum, while still maintaining structural integrity. In addition, the construction methods have been simplified for easy construction. The fuselage cross-section is rectangular. The empennage and control surfaces are single thicknesses of cardboard. The wing is essentially a single-spar upper surface only airfoil with leading edge doublers. Spruce strips have been used on the leading and trailing edges where streamlined shapes or smooth control surface action is required. Plywood has been used for engine and landing gear supports.

CONSTRUCTION HINTS

Glue: We recommend water base glue such as Wilhold Aliphatic Resin, or Titebond. Contact cement is not recommended since parts cannot be re-aligned. When gluing, weight components on a flat surface.

Folding: The scoring of the fold lines is done with a screening tool available at any hardware store. It consists of a handle with a 1¼" diameter radiused wheel at one end which is run along a straight edge on the fold line.

CONSTRUCTION

Cut out all cardboard and wood parts using the template outlines. Be sure to note the direction of the corrugation. Score and fold the cardboard parts as indicated on the plans.

Fin and Rudder:

Glue the 1/8" x 1/4" spruce strips to the trailing edge of the fin and the leading edge of the rudder and round off. Seal the fin leading edge and rudder trailing edge with glue. Hinge the fin to the rudder with cloth hinges.

Stabilizer and Elevator:

Glue 1/8" x 1/4" spruce strips to the leading and trailing edge of the stabilizer and the leading edge of the elevator, then round off. Seal stabilizer tips and elevator trailing edge with glue. Hinge the elevator to the stabilizer with cloth hinges.

Wing:

The left and right wing panels are made separately. Glue 1/8" x 1/4" spruce strips to the bottom of the wing just forward of the fold line from the centerline to the wing tip. Add the 1/8" x 1/4" spruce doubler from the centerline to the position shown on the plans. The inner bottom wing is now glued in place and extends from the wing leading edge, across the spruce spars, to aft of the fold line as shown in wing view A-A.

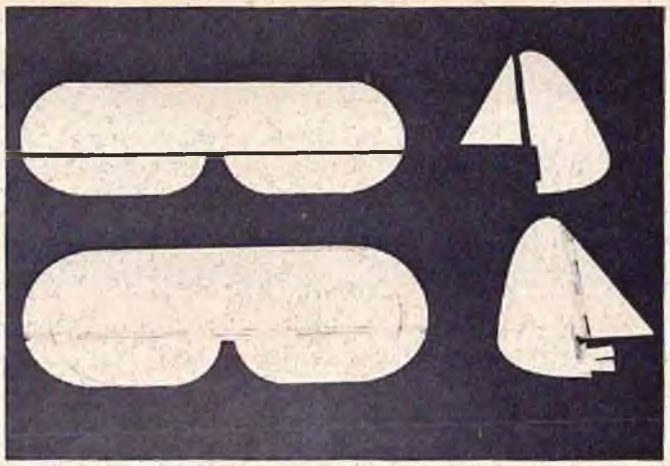
Block up the leading edge of the wing approximately 1¼" when installing the inner bottom wing. The outer bottom wing is then glued to the outer wing leading edge. Glue the 1/4" half-round spruce to the wing leading edge. Glue the 1/4" balsa wing attach piece in one wing half. Slip the other wing half over the wing attach piece and glue the wings together. Glue the 1/8" plywood wing brace to the bottom of the wing. Glue the wing joiner to the bottom of the wing. Reinforce the wing joint with 2" wide tape. Seal the wing tips and trailing edge with glue or with a mixture of polyester resin and micro-balloons.

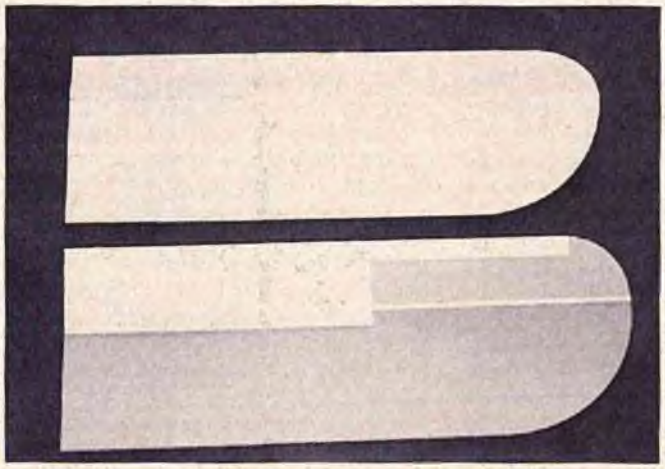
Fuselage:

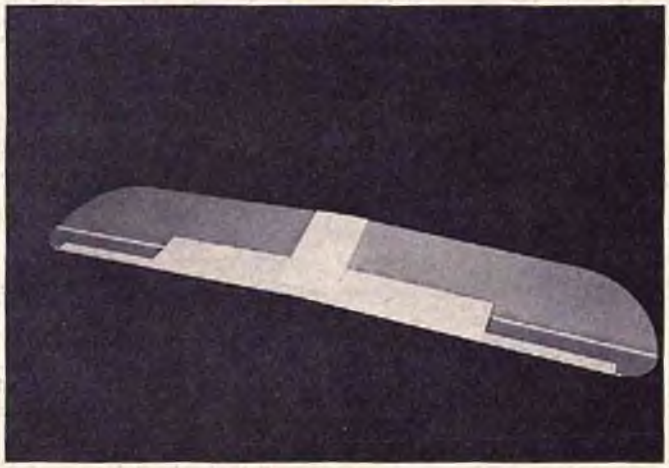
Begin the fuselage by making the wing support struts from spruce stock as shown on the plans. Glue 1/8" x 1/4" balsa strips along the inside edge of both fuselage sides as shown. These strips are recessed 1/8" from the fuselage edges. Cut out sections of the strips at the fuselage top where the struts pass through. Glue the upright struts to each fuselage side. Glue the cardboard servo support to the inside of each fuselage side. Next, glue the left fuselage side, forward bottom piece and 1/4" ply firewall together. Glue the right fuselage side to this assembly. When dry, pull the fuselage sides together at the tail and glue. Now, add the 1/4" x 3/8" servo support rails. Add the 1/8" ply pieces at the fuselage top for the deck hold-down screws. Glue the aft bottom to the fuselage. Make the motor mount assembly consisting of the 1/4" ply mount and the 1/8" ply side doublers. Glue this assembly to the fuselage nose. Glue the horizontal wing support struts to the upright struts. Add the 1/4" square spruce struts near the top of the upright struts. Glue the aft top piece to the fuselage. Assemble the forward deck installation. Now, turn the fuselage upside down.

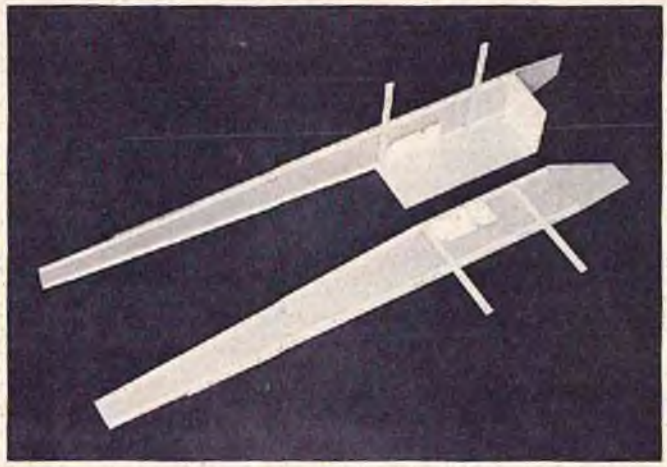
Cut out the cardboard section in the forward fuselage bottom and glue in the 1/8" ply main gear support as shown in the

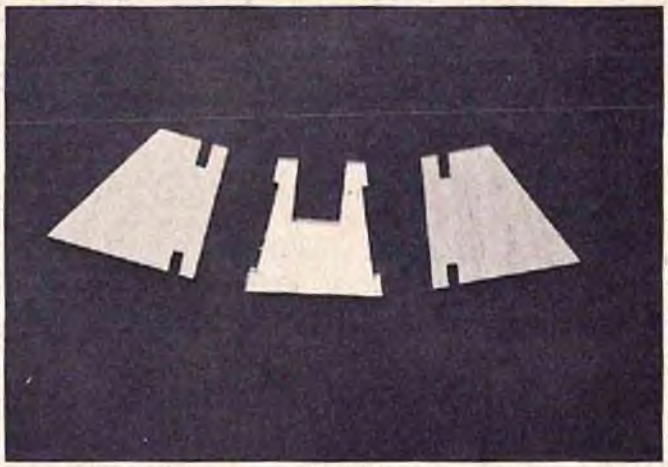
RIGHT: The empennage layout. Spruce strips used to brace cardboard. Strong and light. SECOND ROW (L): The Heath wing halves showing the spruce spar, cardboard inner and outer bottom wing. (R): The joined wing halves with cardboard wing joiner in place. THIRD ROW (L): Fuselage sides with upright struts, servo rail supports, forward bottom, and plywood firewall in place. (R): The ply motor mount assembly pieces. FOURTH ROW (L): Forward deck assembly. (R): Right fuselage side and servo rails installed.

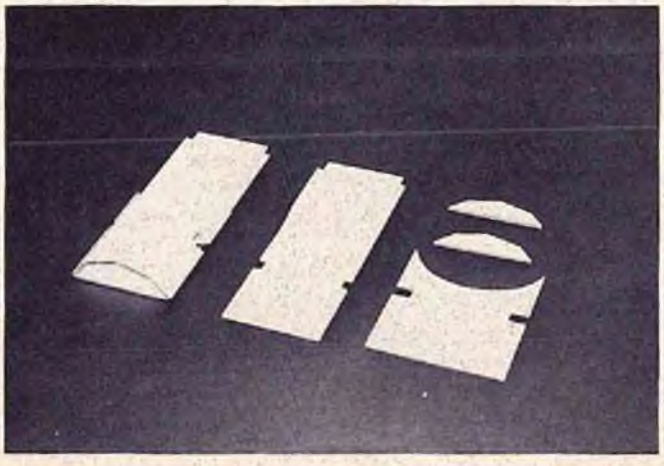


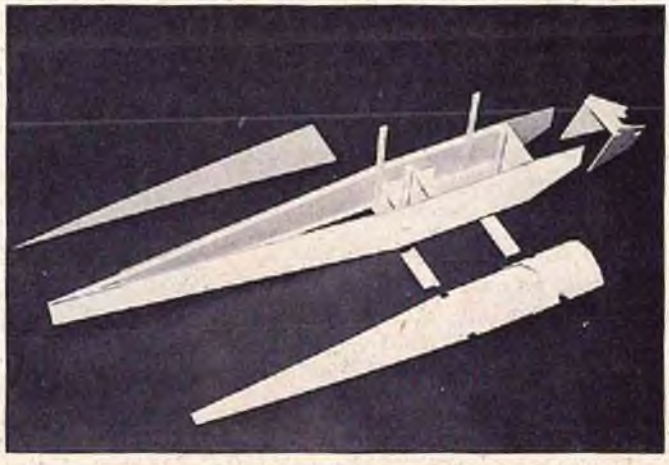


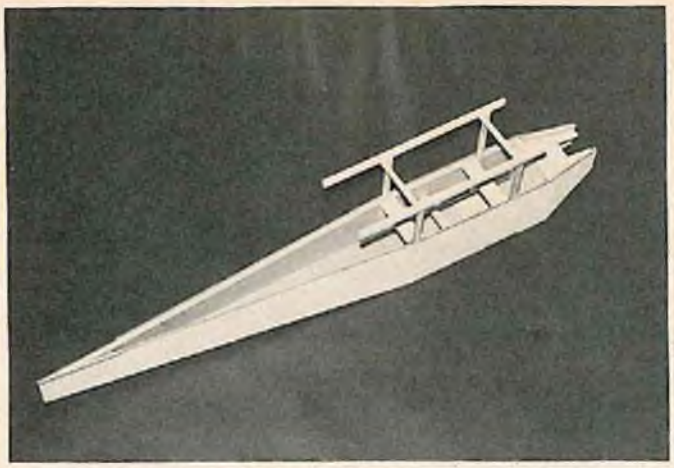


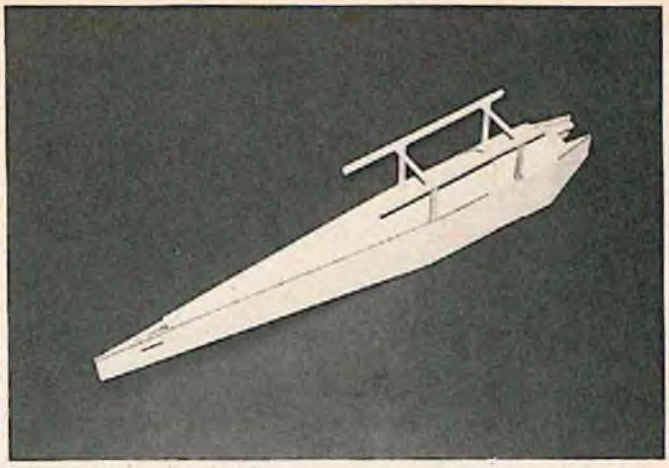


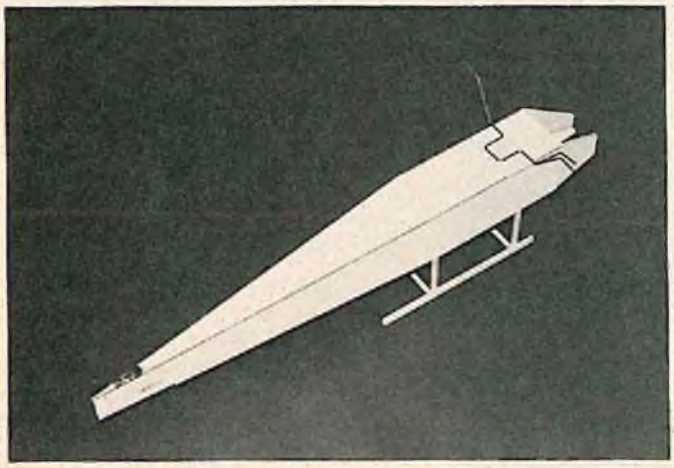


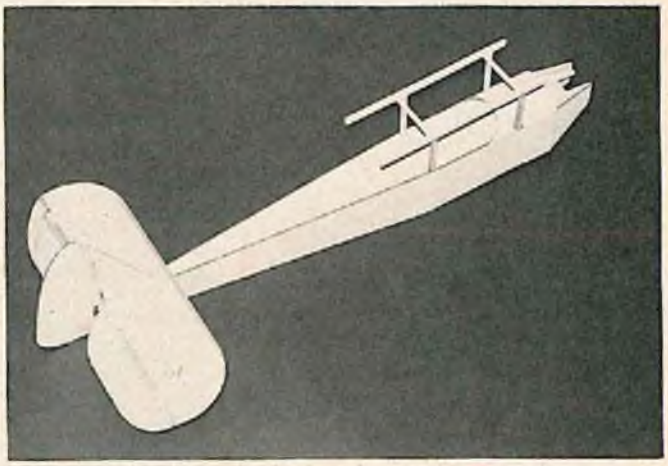


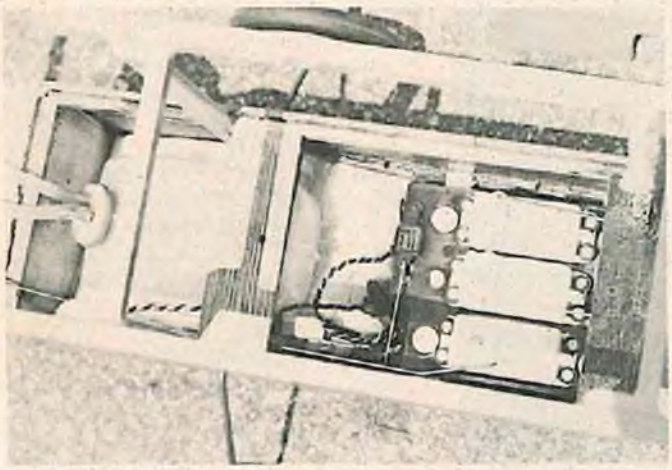


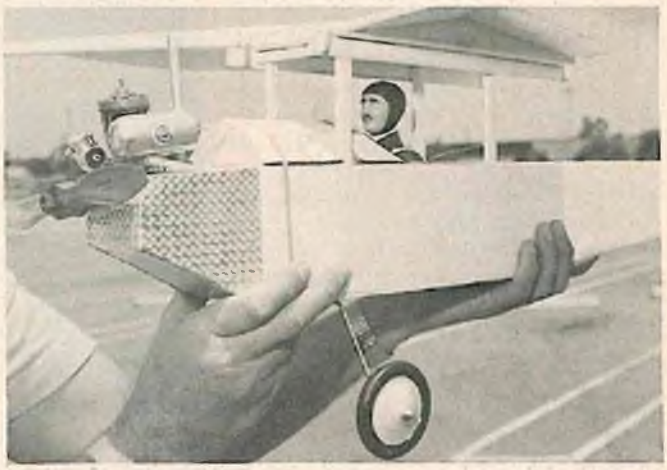












FIRST ROW (L): The motor mount, 1/8" ply pieces, horizontal struts, and aft bottom in place. (R): Top deck and aft top pieces installed. SECOND ROW (L): Placement of the wire landing gear. (R): The completed fuselage assembly ready for the radio installation. THIRD ROW (L): Top removed to show tank and radio installation. Plenty of room for three servos, side-by-side. (R): You can add as many niceties as you like, including burnished aluminum cowl plates. LEFT: One of the Heath Parasol prototypes coming in for a landing.

Three of the many cardboard Heath Parasol prototypes built to date.

side view. Make the 1/8" wire main gear and attach to the ply gear support with gear clips. Make the tail skid from 1/16" wire and attach to the 1/8" ply support with thread and glue to the aft fuselage. Seal all fuselage exposed raw cardboard edges with paper gummed tape. Glue the stabilizer and fin assemblies to the fuselage.

Cardboard gives a solid surface with no open areas to cover and is non-porous. The lightest, simplest, and most inexpensive method is to give two coats of clear dope and two coats of color dope. However, a wide variety of finishing material can be used on cardboard. Coverings such as Solarfilm, MonoKote and vinyl paper can be used. With any of these, it is recommended that the surface not be doped, which will result in a better bond. Vinyl shelf paper is least expensive but incurrs an additional weight penalty.

Final Assembly:

Install your servos, battery, receiver, pushrods, bellcranks and fuel tank. We recommend a Veco .19 engine with a 9/4 propeller. Attach 3⅛" diameter Williams Bros. vintage wheels to the main gear.

FLIGHT CHARACTERISTICS

As with any airplane design, the handling qualities of the Parasol are a trade-off of stability versus maneuverability. The Parasol was designed to be a stable, slow flying model with realistic flight characteristics. It is ideal as a trainer for the beginner. Yet its Stand-Off Scale appearance and nostalgic appeal make it a welcome change of pace for the experienced flyer.

As with all tail dragger configurations, the throttle should be advanced slowly on take-off to avoid ground looping. However, the long tail moment of the Parasol provides adequate directional stability during the take-off run. In addition, the model can easily be hand launched, due to its low stall speed, making it ideal for use from fields where smooth taxi areas are not available.

The Parasol is equally easy to land. The shallow glide, combined with the low stall speed, make landings routine. It should also be mentioned that the take-off distance is short for a model this size, due to its high lift-to-weight ratio. The large wheels make take-offs and landings on grass a pleasure.

In flight, the lateral stability of the model is provided by the wing dihedral and the high center of lift combined with the low center of gravity. Therefore, ailerons are not required. Loops, turns and inverted flight are possible. The model is usually flown at half throttle, making for a more realistic looking flight. The model has even been thermal soared under good conditions with the engine at idle power. Stalls are shallow and gentle.

SUMMARY

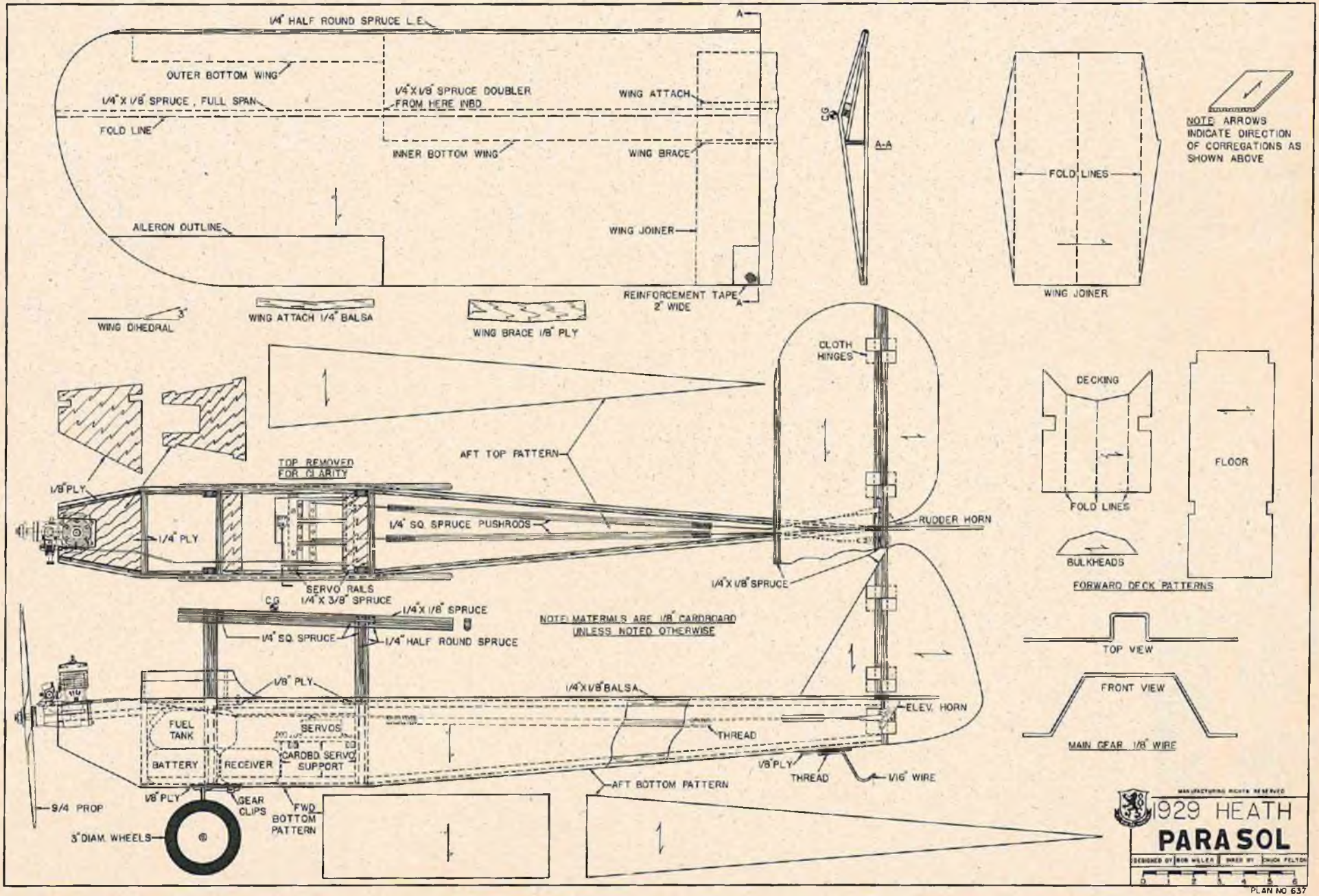
The use of cardboard as a construction material is in its early stages. Its potential has not yet been fully developed. However, its advantages are already quite obvious. It is inexpensive, readily available to everyone, and easy to work with. Large sections can be made from a single piece of cardboard which simplifies building and reduces construction time. A high strength-to-weight ratio can be obtained. The larger the model, the greater the weight and cost savings. No additional covering material is required. Cardboard is easily repaired and damage is usually very localized, since there is no splintering or cracking as with other building materials.

So, try your hand at building the Parasol. We think you will be pleased with the model. We are sure you will derive satisfaction from knowing you have built it more economically, easier and faster than any other model this size. □

1929 HEATH PARASOL
Designed By: Bob Miller

TYPE AIRCRAFT
Sport/Stand-Off Scale
WINGSPAN
56 Inches
WING CHORD
10⅛ Inches
TOTAL WING AREA
526 Square Inches
WING LOCATION
Parasol
AIRFOIL
Undercamber
WING PLANFORM
Constant Chord
DIHEDRAL, EACH TIP
1½ Inches
O.A. FUSELAGE LENGTH
36⅞ Inches
RADIO COMPARTMENT AREA
(L) 8¼" X (W) 3" X (H) 3"
STABILIZER SPAN
18 Inches
STABILIZER CHORD (incl. elev.)
6½ Inches
STABILIZER AREA
95 Square Inches
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
6 Inches
VERTICAL FIN WIDTH (incl. rudder)
5" (Avg.)
REC. ENGINE SIZE
.19 cu. in.
FUEL TANK SIZE
4-6 ounce
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
3
CONTROL FUNCTIONS
Rudder, Elevator, & Throttle
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Balsa, Ply, Spruce, Cardboard
Wing ..... Spruce, Ply, Cardboard
Empennage ..... Cardboard & Spruce
Weight Ready-To-Fly ..... 57 Oz.
Wing Loading ..... 15.9 Oz./Sq. Ft.

FULL SIZE PLANS AVAILABLE — SEE PAGE 173



ON THE LINE!

the soaring scene
by lee renaud

Support Your National R/C Soaring Organizations

LEAGUE OF SILENT FLIGHT
P.O. Box 39068 R
Chicago, Illinois 60639

NATIONAL SOARING SOCIETY
210 Venetian Way
Winter Park, Florida 32789 R

LSF ELECTION RESULTS

The election returns for the LSF Officers have been counted and verified. 46% of the members sent in ballots, which is outstanding participation. The following have been elected for a two year term:
President: Dan Pruss
Vice Pres.: Barbara Henon
Secretary: John Nielsen
Treasurer: Frank Deis

☆

The South Bay Soaring Society (SBSS) Newsletter, Silent Flyer, outlines the 1976 competition program for this 120 member soaring club. Located just south of San Francisco, this is a very active group of Northern California flyers, whose membership roster includes many top-level competition pilots. Their program has many very worthwhile ideas which may help other clubs in setting up similar programs.

The group has scheduled 11 contests during the year which will count toward the season championship standings. Scoring is based on 20 points for 1st, 19 pts. for 2nd, etc. Any FAI legal sailplane with unrestricted controls may be flown. Different members of the club act as C.D. for these contests, and detailed guidelines have been established to ensure consistent procedures.

The most significant idea in this program is the adoption of proficiency classes to segregate skill levels. This will allow the less experienced fliers to compete against their peers, while still providing the experts a challenge. We think that this concept should be picked up and used by other soaring groups and, eventually, become part of a national program. There is nothing more discouraging to a novice than to enter his first contest and go head-to-head with several expert fliers. While some persevere until they acquire sufficient skill to compete, many more are turned off and abandon competition flying. Most other sports have adopted some sort of level, or handicap, system, and we think that R/C soaring should do likewise.

CLASS GUIDELINES

Expert Class: Placed in the top 10 for 1975 Season Championships in either Standard or Open class or placed 1st, 2nd or 3rd in a 1975 SBSS contest.

Sportsman Class: Placed higher than 15th in one or more SBSS contest in 1975, but never more than once in the top 3 places. Also not among top 10 in either class for Season Championship.

Fledgling Class: Did not place higher than 15th in any 1975 SBSS contest.

Exception: An experienced pilot who has not previously competed in an SBSS contest should probably compete in Sportsman class.

For more information write: Editor, Bob De Matte, SBSS, P.O. Box 2012, Sunnyvale, California 94087.

☆

Recently we've received several letters and calls requesting advice on choosing the best model for FAI competition. At the risk of being deluged with opposing viewpoints we offer the following thoughts.

(1) The major difference between this type of contest and the typical American soaring meet is the launch limitation. The maximum winch line length of 200 meters (656 feet) is one-third less than that normally used in this country. The line lengths at the 1975 Soar Nats were shortened somewhat to 800 feet, which many felt affected the contest results. The use of hi-starts or hand towing is also permitted, and much experimentation will be required to determine the optimum combination of launch method and model.

Assuming that weather conditions are normal and that winds are less that 20 m.p.h., we think that models larger than 10-11 ft. span are at a disadvantage during launch. The extra power required to lift the larger and heavier ships just isn't available, and 50-100 feet of altitude is worth a lot of aerodynamic efficiency.

(2) The multi-task competition, including speed and distance rounds, influences the general design of the model. L/D is the name of the game — not minimum sink rate! The six minute thermal flight presents enough difficulty to keep everyone honest — you've got to find some lift to max out. And, since this is a precision duration event with time over and under the maximum time equally penalized, a premium is placed on glide path control. Remember, this is a spot landing contest!

(3) Stability and controlability are very important. The model must respond precisely to the pilot's command, but not be overly touchy during the speed course. Easily accessible ballast compartments will be required, plus a lot of practice is choosing the right amount of ballast for each task. It is, of course, vital that the flier knows his aircraft and feels totally confident under all conditions.

(4) In view of the throw-away round, luck is an important factor in these contests. In fact, since the distance task is too often dependent on the lift present during the flight, tactics and timing become critical. The difference between 8 and 16 laps isn't due to aircraft design or pilot skill, it's who got a thermal! We expect the distance task will be where the contest is won or lost.

(5) Speed is really only a test of nerve and air frame strength — assuming a smooth hand on the sticks. The one lap FAI course is much easier than the usual US 2 lap event, and becomes a controlled dive with one pylon turn. Even an Olympic will turn in good times if you add enough ballast and reduce decalage. (Not that we are recommending this approach.)

(6) Launching methods deserve a close look. We think that a good towing ship with 750 plus square inches of area and 3-4 pounds flying weight, combined with a heavy duty hi-start, is the best approach. We know that an aft hook location combined with down trim will stretch the surgical tubing hi-starts 50-75 feet at launch over the unstretched length on the ground. Fifty meters of rubber is a lot longer than the usual 100 ft. and will require larger tubing for the normal launch velocity.

Summary: As we see it the ideal model would be 100-135 inch span, have 750-1100 square inches of area, and weigh 2½-4 pounds unballasted. We would favor a 4-10% thick flat-bottom section, but 12-13% sections and ballast are also satisfactory. Polyhedral is an advantage, and spoilers are worth having. A clean design with low drag characteristics is definitely important. There are many suitable kit designs that meet these criteria — just check the spec's and contest results. We think that a Windfree is a little small for good launches, but this never seems to bother Mark or Rod Smith! On a hand tow this combo could be very competitive. Astro-Jeff's are going to suffer on launch, but if the wind is strong, watch out!

Performance Targets: At this time I have no direct knowledge of European contest results, so the following are educated guesses:

Distance: Look for 12-15 laps in average good conditions, with 10 as a minimum goal. Expect someone to turn 16-18 laps with the right ship and a strong thermal.

Speed: Expect total times from launch in the 14-18 second range. A real smoker would be 11-12 seconds, and anything over

20 is definitely not competitive. Note that trap times on the course should be 4-7 seconds for the top fliers.

Closing Thoughts: The U.S. team selection finals will be held in Denver, Colorado, to simulate the high altitude at the World Championship site. High altitude means lower air density and reduced lift. A stretched span from 100 to 120 inches looks like a good idea for the Standard Class ships.

✲

Clubs For Soaring: We've received several new club newsletters and are including the club name and secretary for anyone who wishes to contact these groups.

Colorado:
Rocky Mountain Soaring Assoc.
c/o R.T. Crowley, Editor
16413 E. Stanford Place
Denver, Colorado 80232

Indiana:
League of Flight by Thermal (LOFT)
c/o Frank Wren, Pres.
6416 Covington Rd TH41-D
Fort Wayne, Indiana 46804

Ohio:
Mid-Ohio Soaring Soc. (MOSS)
c/o Bill Duemmel, Sec'y.
7766 Candlewood Lane
Worthington, Ohio 43085

Ohio:
Rocky River Soaring Society
4289 Wooster Rd.
Fairview Park, Ohio 44126
c/o Jack Whitaker, Sec'y.

Jack also sent a letter on their success in finding a site in an urban area — perhaps other clubs will profit from their experience.

The members of the Society have enjoyed the articles you are producing and we thought we might pass on something from us as you have requested.

The Society is the only purely soaring club in the Cleveland area and was AMA chartered (1305) in 1975. We have a site in the Metropark system that we obtained through the fine cooperation of a Mr. L. Tsipis of the park board. We found that the third party insurance by the AMA is a very good item to allay any fears by such agencies of potential dangers and their related lawsuits. Our first year saw a large membership growth from the spectator ranks and we were able to inform the general public about the sport.

We feel that the readers who are interested in obtaining more convenient flying sites will find public officials cooperative if they can be assured that the liability and no-noise aspect is fully explained and that an interesting activity will be provided for the taxpaying public.

If you wish to include the address for the Rocky River Soaring Society, we will gladly offer our experience to those who might wish to form a similar arrangement.

✲

New Soaring Products:

If you are trying to clean up your sailplane for minimum drag the Shove-It antenna connector is worth looking at. This is a high quality gold-plated male and female in-line connector for concealed antenna installation. Included is shrink tubing and 36" of stranded wire. The connector is of excellent quality and

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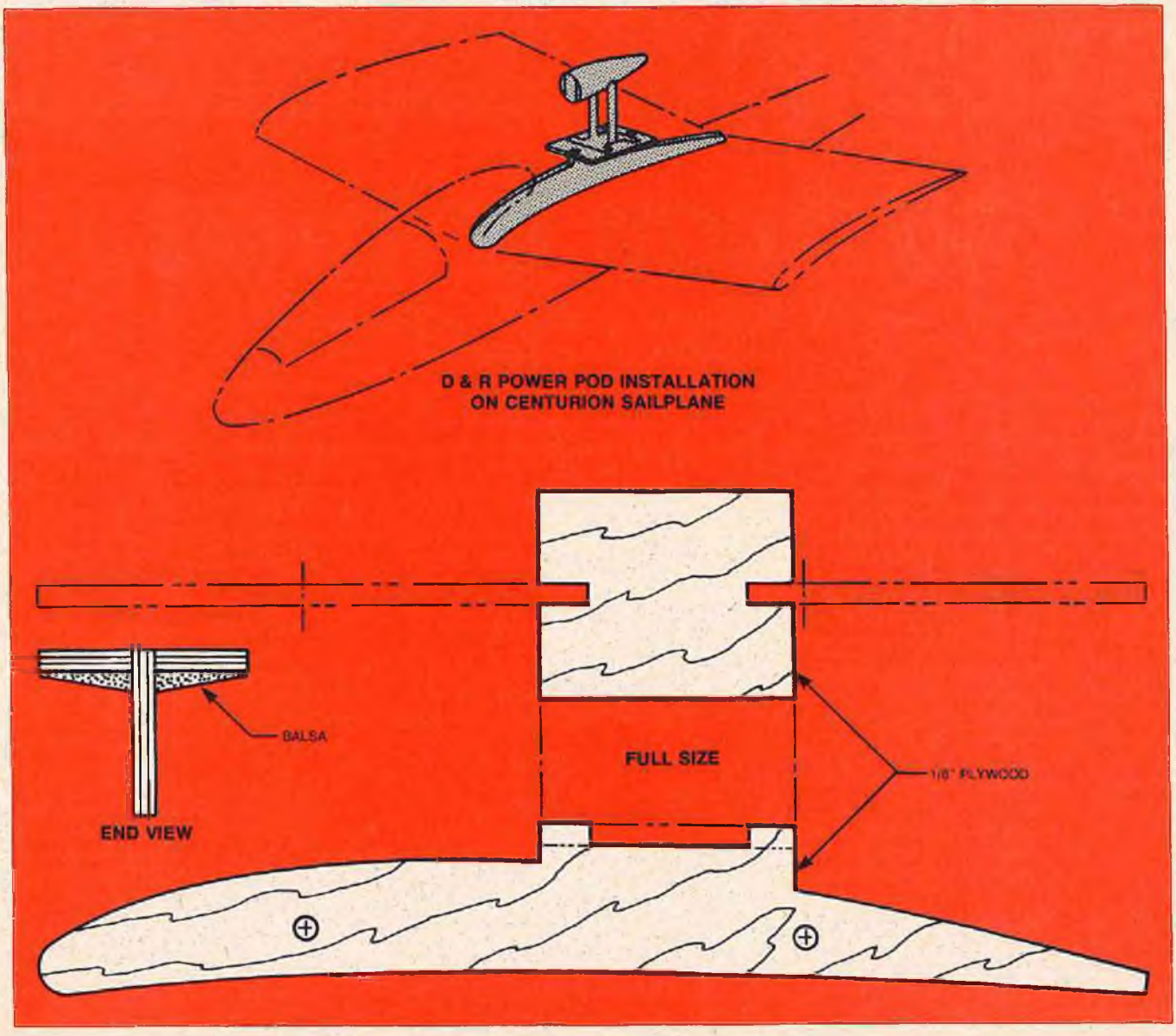


Author Jack Immelman with 'baby'.

THE BIRTH OF TWINS

Revealed! The intimate details of a Twin-motor model

BY JACK IMMELMAN

It was a most convenient party that Pat and Bob Botha threw for the Redair Club last year. Convenient for me, that is, because they invited Harry Allan, designer of that great little .19 powered pattern flyer "Bokkie" (RCM, Feb. 1971). As the party warmed up, I drew Harry and a bottle of Bob's best Scotch into a corner for a casual chat and some serious swallowing.

About six fluid inches later I threw the challenge.

"Harry, I've an idea for something that maybe has never been done before. You are **the** builder of light airplanes on the South African scene . . . I bet you can't build me a twin that will stunt on one motor."

"Now, Jack," explained Harry patiently, "if you want aerobatic performance with one motor you don't tack on another dead one to hold it back. The reason it has never been done before is because no one else has dumb ideas like that."

It was too early; I tried again about two inches later.

"Look, the new .40's put out power like an old .60. Now two of them in your new pattern design . . . ." I feigned surprise at Harry's negative head shaking and continued, "You mean you can't do it?"

The timing was perfect. Harry said — well, I can't tell you **all** he said about nutty ideas and me giving birth to twins, but certainly the seed was planted, if you know what I mean.

So, Harry made another of his .60 size pattern ships, but smoothed off the nose and tacked two long nacelles on the wing. That's why this is not a construction article, see? It's a "tack-on" article. You don't need any plans — just chop off the nose of your favorite stunt ship, and tack two motors on to the wing. This is how we tackled it.

Into each nacelle went an HP .40F with a Murphy silencer, a 6 oz. tank and a servo. Already the balsa sheeted foam wing felt unusually heavy so Harry thoughtfully added flaps. With aileron control, that made for **another** two servos. The wing felt even heavier and bristled with servo connectors. Weight: over 5 lbs! Not content with building the heaviest stunt wing in the country, Harry added thirteen 2" black letters for luck. They spelled "**Double Trouble.**"

Oh yes, the fuselage. Should be called **"No Trouble."** A tube, a tail and a little bit of radio gear is all. So we screwed the fuselage onto the wing (yeah, that's the way it goes with twins) and lowered it onto the scale. Incredible — only 7½ lbs. all up — with over two horses.

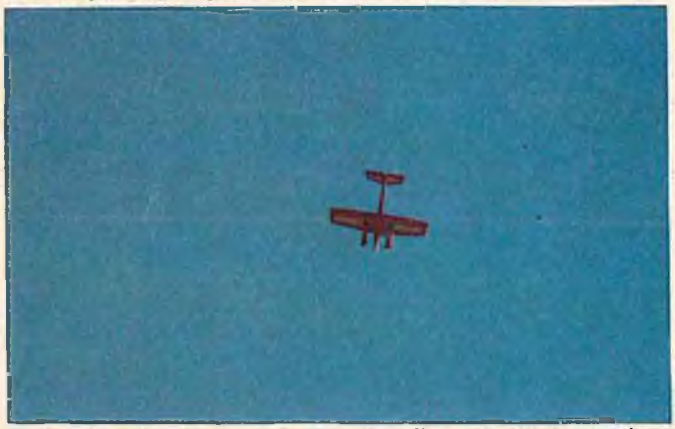
Harry had done it again. And, for sure, those Hirtenberger 'horses' would have to be well trained.

And now, gently — gently, I explored various procedures for controlling the beast. What a fascinating hobby we have: It is 1976 and we can make like Christopher Columbus. This, for you my fellow explorers, is what I discovered about a hot twin.

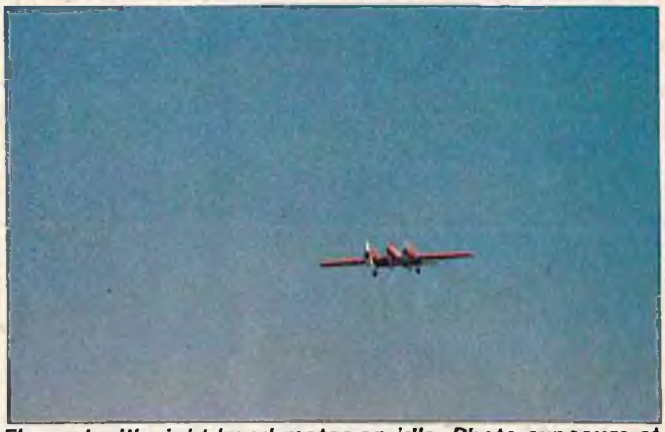
I thought, and still do, that it is essential to have both throttles operated from one Tx stick in the usual way. So I linked the separate motor servos with a Y-harness to the one receiver motor channel. How now to get individual motor control? Well, I discovered by cutting the neutral wire of the 3-wire servo lead that it would just 'stay put,' without apparent ill effect on receiver or batteries (or servo!). How **you** do it, Buster, is your problem. I'm not

The starboard propeller is especially 'made up' for the colour photograhps.

The 'clean' profile with twin Hirtenberger .40's well concealed by the nacelles.



Plan view, in single-motor flight. All flying shots were taken with starboard motor idling or stopped.



Fly-past with right hand motor on idle. Photo exposure at 1/250 sec. blurs prop blade over 90° – works out to 3750 rpm.

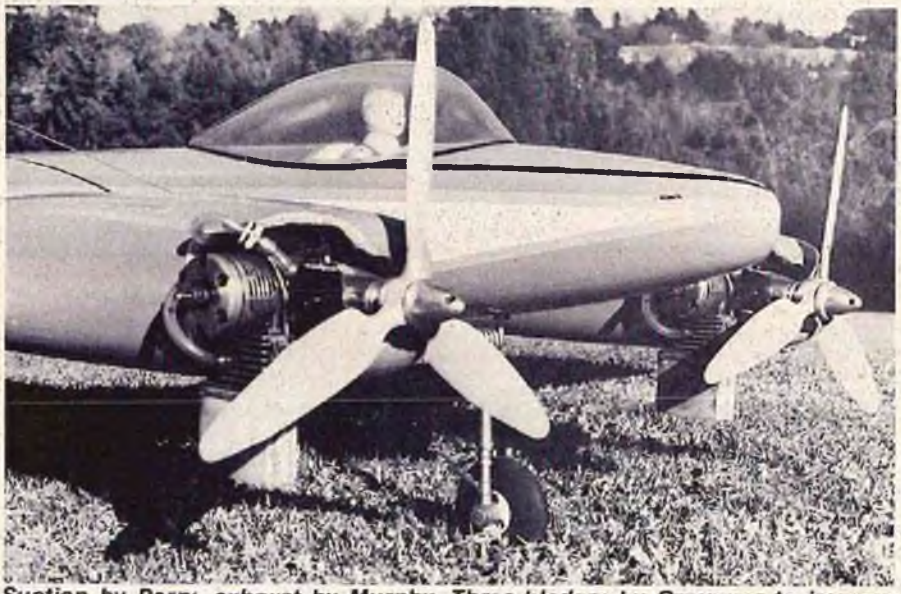
Rolls 'on one' from level flight.

No way can 'Double Trouble' be right side up unless the sun is underfoot.

Flaps down and committed to landing – this is one situation you don't climb away from!

Slow fly-past for the camera, but Jack gets that starboard motor back on full power before climbing out.

Add a feather light fuselage and you've got over two Hirtenberger horses to lift only 7½ lbs.



Suction by Perry, exhaust by Murphy. Three-bladers by Graupner to improve ground clearance but not the drag when stopped in flight.

A little care down on the ground will keep those motors going 'round.

recommending anything in case your set goes up in smoke. Next, I put a micro switch into circuit with the cut wire, tacked the switch onto another servo with silicone goo, plugged the servo into channel 5 and threw the whole mess into the fuselage. Lo and behold, whichever servo was plugged into this circuit could stay in any throttle position merely by operating the channel 5 (retract) control switch, while the other worked as usual. All quite simple until you count up servos. Seven!

I decided that the engine to keep running when I started single motor tests, was the port one. Therefore I would plug the starboard throttle servo into the switched leg of the Y-harness and the set-up should work as follows: With both servos in operation, pull throttle stick back to idle, flick the fifth channel switch to 'off,' then push the throttle stick forward for full throttle on the port motor, with the starboard locked on idle. Alternatively, repeating the procedure but starting from the full throttle position, closing of the throttle would affect only the port motor while the starboard one should roar away at full revs. In theory, at any rate, I was set to 'kill' either motor for test purposes.

My next endeavor was to get both motors to have completely reliable sychronized throttling. It had been difficult to get a non-springy linkage from the servo to the throttle arm in a narrow nacelle full of fuel tank. While a standard HP carb generally works quite adequately the spring loaded barrel was a little jerky in the idle position, and I swapped for lighter action Perry carburetors. My next discovery was that the travel of the twin mini-servos was not exactly the same, although normally you would never notice the difference. A little bending of throttle arms soon had the carb barrels rotating in exact unison.

By this time, I guess, you are getting the message. If you want to experiment with things a little out of the ordinary, why spoil the exploring bit by being over hasty to fly? If you 'ding' your brainchild at an early stage, you'll find yourself gluing things instead of doing things. And remember, even Christopher C. got becalmed at times.

One motor had several dozen flying hours already and the other had been well run-in and test flown. I fitted carefully balanced 10/6 Taipan reinforced nylon props and trotted out to the flying field for some 'rev checks.' A guy has to fuss somewhat to get a single carb behaving well, and 'twice-doubly' so with two. I fiddled happily with Kwik-Links, Perry discs and needle valves, until I achieved a situation whereby each motor would hit 13,200 rpm on a slightly rich peak, 4000 on fast idle trim, about 3000 on center trim, and quit on slow trim. All this had to be combined with pretty well instant pick-up from idle. Oh yes, a little tip: Make a long enough nose on your twin to use as a handle while you are playing with motors.

Finally I fired up both motors together and listened in ecstasy to the sweet burble of those idling Murphies. When I 'opened the

taps,' the thrust was quite staggering. However, intermediate throttling was not exact and I couldn't figure why, until I realized that the glow plugs were not the same. Maybe that should be classified as a "non discovery." I settled for Fox idle bar plugs all around, and at last the twins really started to behave alike.

Harry had figured that, with numerous square inches of wing surface cut up by the engine nacelles, flaps would really be necessary to slow down landing speeds to match my standard of flying ability. (Thanks, Harry, for everything). I set them up on the 6th channel to drop about 45°, hoping for lots of extra lift without too much drag. Then I remembered to check out the CG with full tanks. It was around where the nacelle met the leading edge of the wing, about 4" in front of where it should have been! If it would fly at all, it should be pretty stable this way; so, reluctant to add weight to the tail, I gunned it gently down the runway one fine day to see whether there was any tendency to lift. This there seemed to be, with other less desirable ones like a large amount of swing and a tendency for prop tips to dig in on anything but a dead smooth surface, because of the long overhang from the base of the tricycle undercart. As none of our nearby clubs had dead smooth or even paved runways, it seemed as though short take-off runs would be the only way to get off with the propellers all in one piece. I packed up for the day, and went home for a final check through and think out.

My decided motor setting procedure would be as follows: For the first flight of the day, fill the tanks 1/4 full, start one motor at a time and get the full throttle needle setting with the nose held well up. With Double Trouble back on its wheels, check motor for fast idle, pick-up, then kill it at slow trim. Fill the tanks, start both motors and take rpm readings, richening the faster motor to match the revs of the slower. Recheck fast idles, then full throttle, nose up, both engines running. After all that, kick the tires, and go.

I sneaked out early one afternoon with Bob Botha (after all, it was his party that started the 'Trouble') and we went through the whole pre-flight check out in under five minutes. And so, it came to pass that Bob was holding the beast by the tail at the end of the runway, peering at me though clouds of dust kicked up by the slipstream. Our 'Santa Maria' was ready to set sail. I gave the nod, and Bob let go. Double Trouble ran about 8 feet down the runway, stuck its nose up at 60° and started to disappear into the wide blue yonder. I unfroze, and started working sticks and trims, ending with full down trim and shattered nerves.

After that, it wasn't so much a case of watching the flight as listening to it. The sychronized beat of those two motors was a modeler's 'Rhapsody in Blue.' Eventually we unhypnotized ourselves and tried a loop, which showed adequate elevator response, and a roll to the right which was rather slow,

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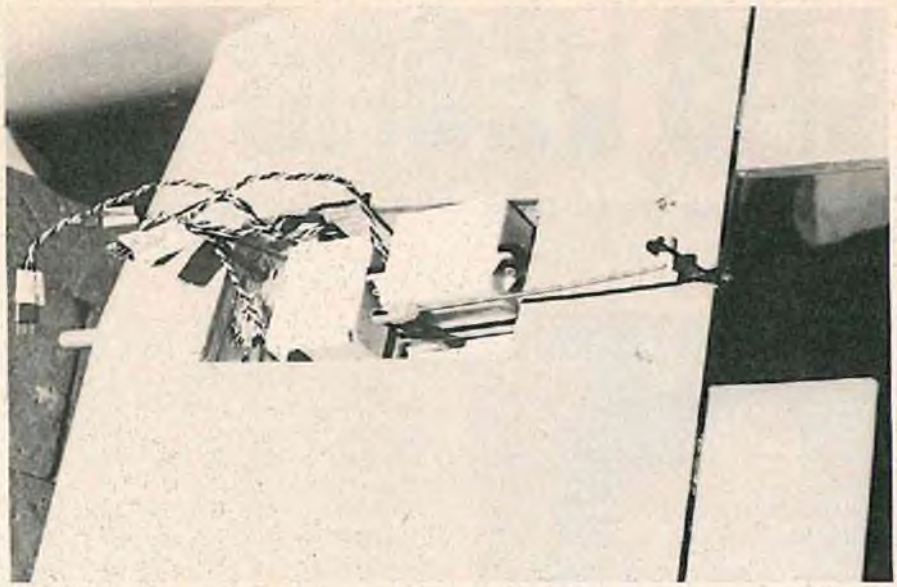
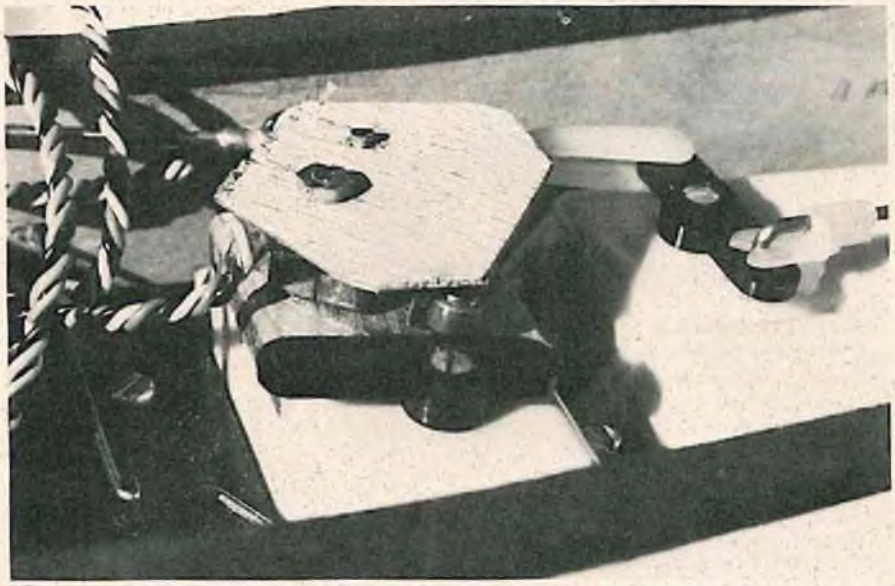
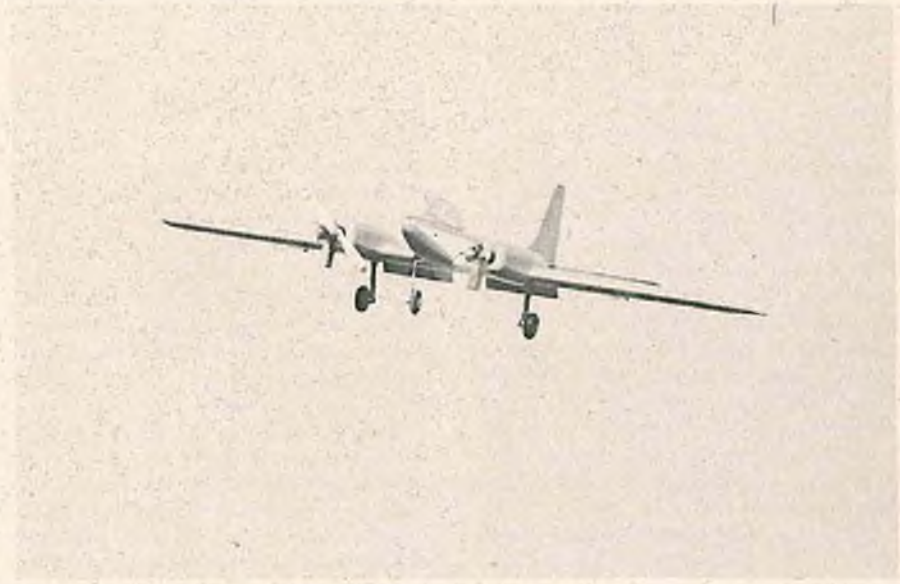


The wing weighs a ton and bristles with servo connectors.



Micro-switch on fifth channel stops one motor servo in any position. Ply cover to keep wires clear of actuator arms.



Coming in on final – and that's final!

LAS VEGAS 'CHOPPER'

Converting World Engines' Two-Axis Single Stick Transmitter To A Three Axis Movement.

BY T.W. BURDIN

● As an aspiring helicopter flyer, I was easily convinced that the only way to fly was with a 3-axis, single stick transmitter. Convincing my wife of the need for a sizable dent in the family budget to satisfy my convictions was significantly more difficult. And, as might be expected, I lost the debate! Therefore, when World Engines began marketing their new Las Vegas Single Stick System, I was elated. So, I bought one — the smaller budgetal dent aiding in my success in financing. Alas and alack — it was a single stick — but with a 2-axis movement. Not that World Engines ever claimed that it was a 3-axis stick — I just assumed! (If you think that I told my wife, you're out of your mind.)

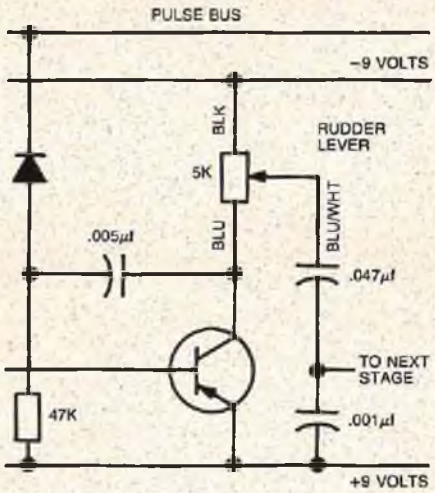
About the same time that my disappointment was reaching its peak, I observed in this very same slick sheet magazine, that World Engines was going to offer a single stick version of their fine Expert system. One of the advantages of living in Cincinnati is that you can talk to World Engines people at the flying site and at the monthly club meetings of the Greater Cincinnati Radio Control Club. They demonstrated the prototype of the new transmitter, and what to my wondering eyes should appear, but the very same stick knob as appeared on my mothballed Las Vegas transmitter — but this one turned. I was able to talk them into selling me just the knob and its innards. Maybe I'll have a Las Vegas 3-axis stick after all!

My wife will claim that I had a wild look in my eye as I disappeared into that maze of sawdust and wires I call my shop. She has other names for it, but most are unprintable and the others are private jokes. Anyhow, after a few false starts, a few mis-sized resistors, and one small additional plastic piece from World Engines, I emerged triumphantly to my wife who asked me to take out the garbage. I, however, was undaunted. I had my Las Vegas 3-axis single stick in my hand.

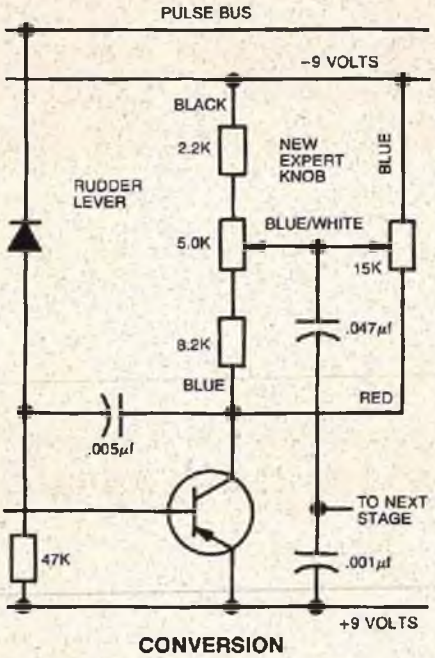
Before I get into the details of how you can convert your Las Vegas transmitter to a true 3-axis single stick and the theory surrounding how it works, I would like to thank the people at World Engines for their technical advice in affecting this conversion. Since my original motive was related to helicopter flying, I have nicknamed the modified system "Las Vegas Chopper". Since the original conversion, I have converted four other Las Vegas systems. Allow me to spend the next few moments discussing the philosophy behind the writing of this article. Over the years, there have been precious few construction articles that encourage the average, non-technical RC modeler to dig into his control equipment and make changes. The Digitrio Series in RCM was an initial stab at letting the average guy build his own digital control system. Mine is still in flying condition after years of faithful service. Other series followed in RCM, MAN, and AAM but the forerunner was the Digitrio, and there was a good feeling in building and flying that first system. This article is written in the same spirit and with the same audience in mind as the Digitrio — the average guy. I've attempted to remove the confusion in construction by using a photo/description format so you can see each key step, and the results of previous steps are usually visible.

World Engines has agreed to supply all the parts in a package. However, this is not a W.E. factory change — it's your change and you can make it. If you do get into a bind and your local tech type can't help, W.E. will complete the work but it won't be free and you'll be handled in a routine manner **after** their warranty customers. They are only the parts supplier. Before you give up read on and take a peek inside your Las Vegas transmitter as your read. I think you will be convinced — it's easy.

Let's first look at how the transmitter works and how our modification fits in. The Las Vegas transmitter has 3 main parts; the clock, 4 pulse generators, and the radio frequency transmitter. The clock is a free running multivibrator which starts the string of 5 pulses, each 16 milliseconds. That first pulse sets off the chain. The time difference between that first pulse and the second is the



ORIGINAL



CONVERSION

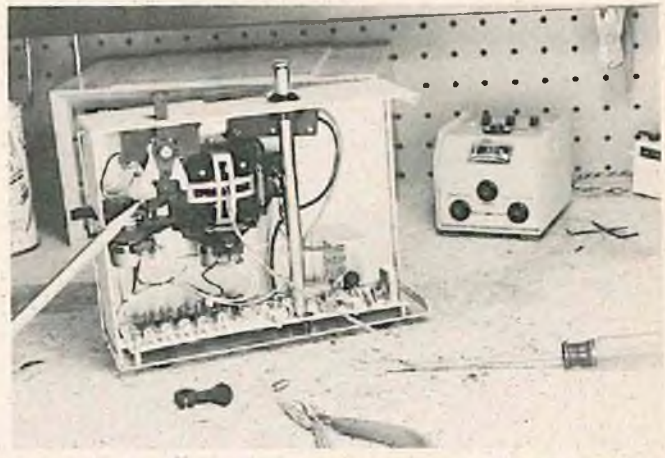
information which controls the servo in the aircraft. When that time is changed by moving a stick or lever, the servo moves accordingly.

The exact details of how that happens will not be discussed, but it suffices to say that the stick potentiometers allow a portion of each pulse to start the next pulse generator. They are essentially voltage dividers. The amount passed on determines the amount of time until the next pulse appears. Ideally, when the servo is centered, the stick

(1) ABOVE: The parts package. (2) RIGHT: Stick knob removed. Both styles of knob are shown.

(3) ABOVE: Transmitter clamped in vice ready for drilling of bushing. (4) RIGHT: Drilling the plastic bushing.

Two of three wires threaded into hollow stick. Plastic bushing in place.



Centering spring has been removed from location indicated.

potentiometers are at center value.

Initially then, it would seem simple to replace the existing rudder potentiometer on the top of the transmitter case with the potentiometer in new knob assembly. Although the voltage dividing function would still be maintained, one problem still exists: How do we handle rudder trim? To solve this problem, two resistors are added in series with the existing 5K rudder potentiometer making the total resistance approximately 15K. This circuit is then placed in parallel with the new 15K Expert knob. By adding the signals from the new Expert knob and the original rudder lever, the original rudder lever can now serve as rudder trim. The voltage change produced by moving the original rudder lever is greatly reduced with the addition of the two resistors and closely approximates the trim movements of the original mechanical trim. Compare the small schematic to the large one and you'll see the change. By adding a ratchet mechanism to the rudder lever in the same manner as the throttle lever, the original rudder lever remains where put. Well enough of that technical mish mash, let's build this thing. The following steps with reference to the accompanying photographs and drawings will keep you busy no more than 1½ hours.

( ) Remove the back of the transmitter taking care not to lose the screws and drop the battery. Disconnect the battery with the snap adapter.

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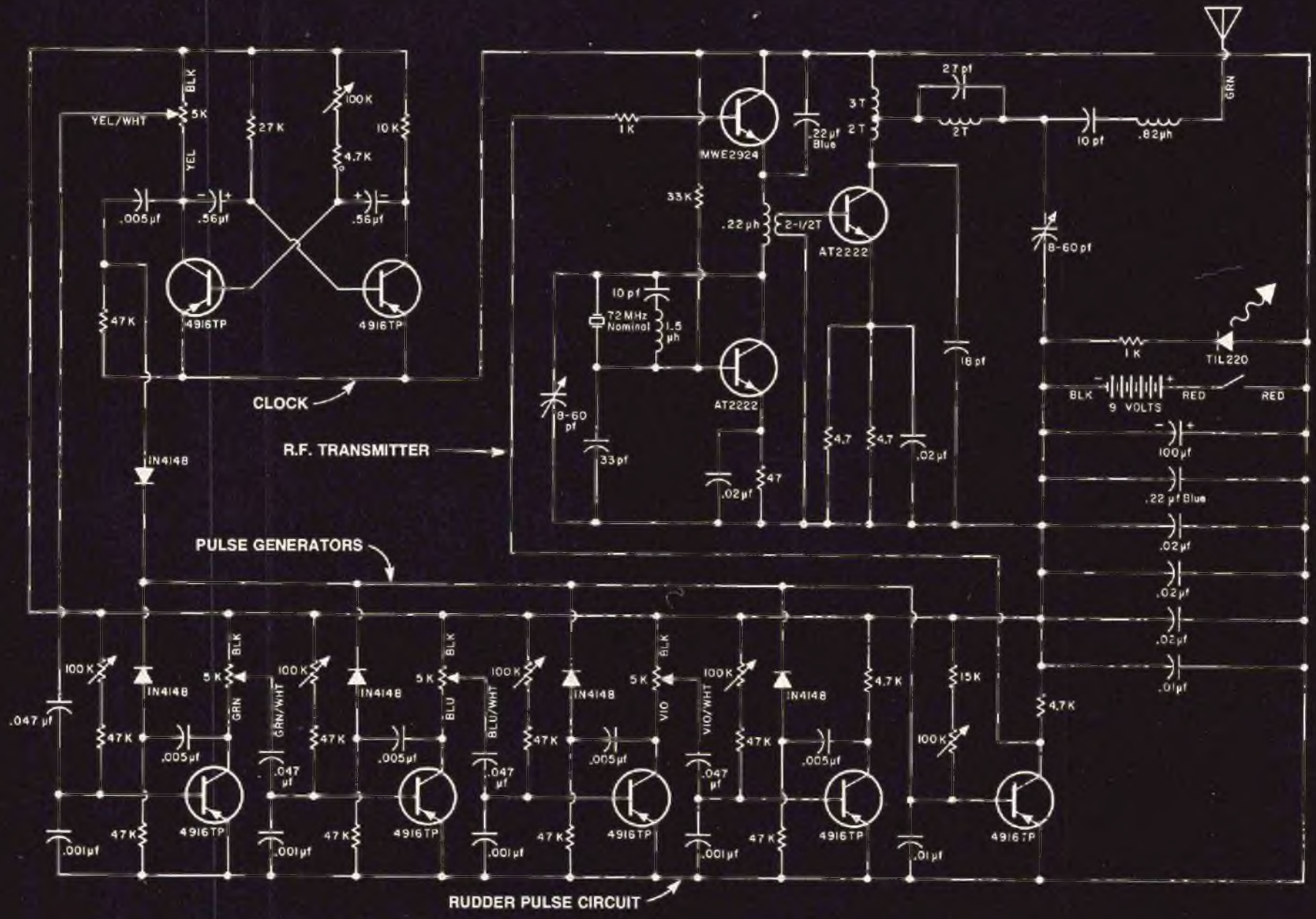
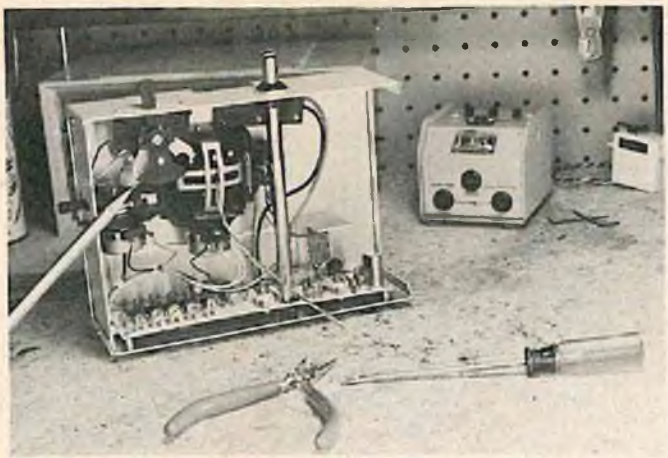


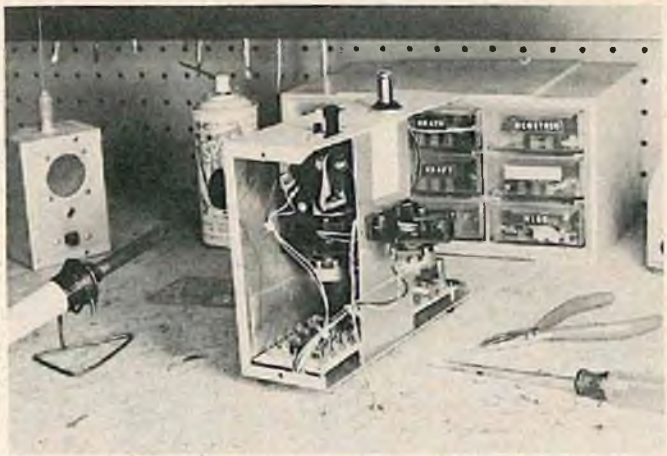
72 MHz 4-CHANNEL LAS VEGAS SINGLE STICK SERIES TRANSMITTER

WORLD ENGINES, CINCINNATI, OHIO

DATE. 11-18-74



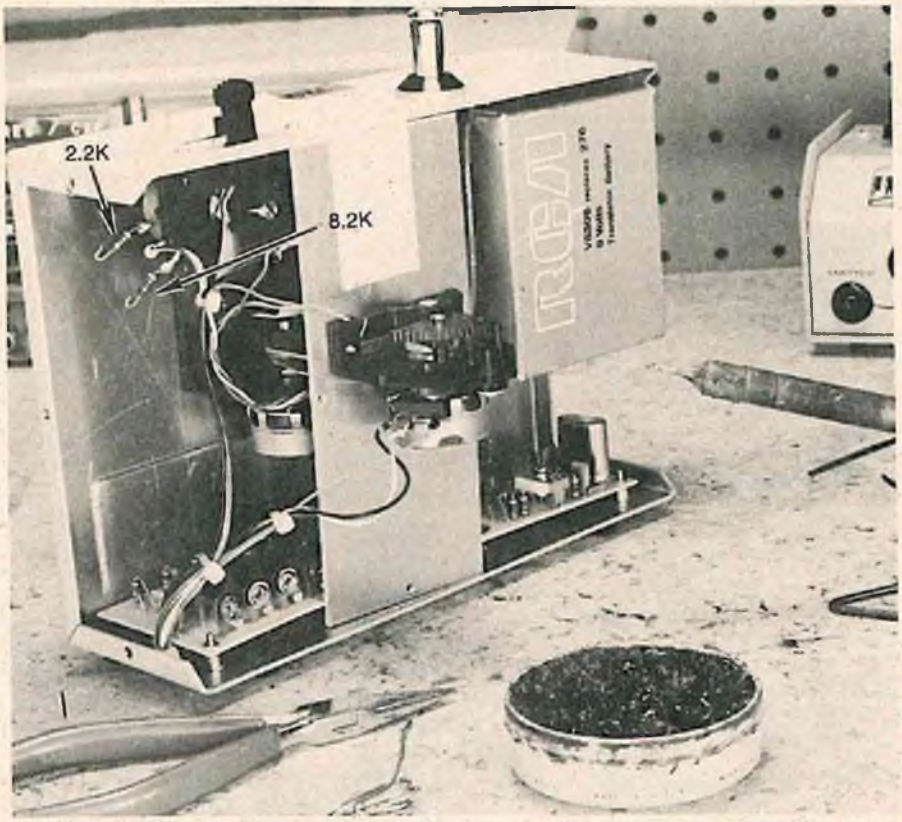
(7) Ratchet plate shown installed on rudder lever.



(8) Side panel folded back and taped on to main case.

(9) Wiring complete for initial system alignment procedure.

(10) Knob plastic cover removed and Allen wrench inserted for adjustment.



(11) ABOVE: The 2.2K ohm and 8.2K ohm resistors shown soldered in place.
(12) RIGHT: Final wiring complete.

The trophies awarded for Sunday's events. The same amounts were awarded on Saturday at the Suds City Soar-In.

SUDS CITY SOAR-IN

BY DON CONDON

Milwaukee's Suds City Soar-In is now history. The Flying Electrons Contest, co-sponsored by Old Milwaukee Beer, was held August 2 and 3, 1975. Perhaps no model contest in recent years has had the widespread publicity this contest enjoyed. Considering the publicity by posters, word of mouth, Old Milwaukee advertising, distributed in all of their selling areas, and the Model Magazine ads, this contest reached large numbers of flyers throughout the whole Mid-West. We can only hope that this association between a model club and a non-related industry in sponsoring a model event, will set a precedent that others will follow. It opens the door for others to go to work on this idea, at least.

The contest got off on the wrong foot Saturday, August 2nd, with rain and fog. This held everything at a stand-still until after noon. The weather didn't improve much after noon, but all contestants put in their three flights, in between showers, and all winners received their trophies — 23 in all — for Saturday's events.

Winners in Saturday events are as follows:

August 2
Standard Class
2 Minute Precision

1 — Jack Hiner
2 — George Louthain
3 — Stewart Sobczynski
4 — Bob Hansing
5 — James Porter

Standard Class
10 Minute Duration

1 — Jack Hiner
2 — Stewart Sobczynski
3 — George Louthain
4 — Larry D'Attilio
5 — Bob Hansing

August 2
Unlimited Class
2 Minute Precision

1 — Jerry Mrlik
2 — Jeff Mrlik
3 — Bob Robinson
4 — Bill Schmidt
5 — Leonard Bywater

Unlimited Class
10 Minute Duration

1 — Jeff Mrlik
2 — Bob Robinson
3 — Chris Erickman
4 — Jerry Mrlik
5 — Leonard Bywater

Overall Winners

1 — Jeff Mrlik
2 — Bob Robinson
3 — Jack Hiner

After Saturday's wet weather, a fun type get together was held at the local pub. Although this writer could not attend, I heard it was even wetter Saturday night, and the Old Milwaukee did flow!

Sunday, August 3rd, dawned a beautiful clear day, light winds, and temperatures in the 80's. Great soaring weather. Forty-two contestants put in their three flights, with a wild card flight thrown in, and everyone enjoyed the perfect flying conditions. The contestants came from eight states in all, Minnesota, Wisconsin, Iowa, Michigan, Illinois, North Dakota, West Virginia, and Missouri.

Among the flyers I talked to were Jack Hiner, of recent thirty-two mile glider distant record fame; Jim McIntyre, winch

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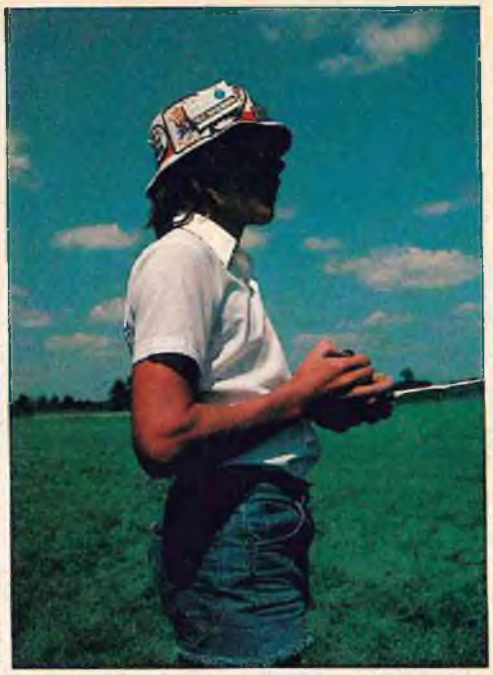

1ST ROW (L): Ken Olsen (rt.), with wife Helen, of Springfield, Illinois, flew an Aquila. (C) Jeff Mrlik, Birmingham, Michigan, flew an Astro-Jeff Jr., designed by dad, Jerry. Jeff won four trophies, Grand Champion, and Best Junior Award in two day meet. (R) Jerry Mrlik, launching his original Astro-Jeff. 2ND ROW: (L) Jim Porter, Jr., Cedar Falls, Iowa, flies his Volant from the launch. (R) Clarence Nuthals, Green Bay, Wisconsin, flying a modified ASW 17. 3RD ROW: (L) Ken Olsen, Springfield, Illinois, guiding his wife, Helen, to the spot landing site. (C) Barbara Robinson, Lansing, Michigan, applying body english to transmitter. Barbara won trophy on Sunday. (R) Jim McIntyre, Plainfield, Illinois, with a winner in each hand! 4TH ROW: (L) Rev. Father Dignan, Scranton, North Dakota, with Olympic 99. (C) NYPUM, the youth group that spent two days returning tow lines to the launch point. (R) Bob Robinson, Lansing, Michigan, with Grand Esprit. BOTTOM, CENTER: A group shot of Sunday's happy winners.

BY
DON DOMBROWSKI
AND FRED REESE

RACING AT RANDOM

● Congratulations to Ron Schorr, the new NMPRA President, and a sincere "thank you" to Glen Spickler for two years of dedicated work on behalf of RC pylon racing. The NMPRA has also been restructured for 1976 to better serve the QM flyers and give that group the representation it deserves. George Zink of Jamaica, New York is now NMPRA-QM President. George wrote, "The NMPRA has rearranged its position concerning Quarter Midget racing and has decided to create a Quarter Midget section within the NMPRA. The QM section will have complete autonomy of policy and is separate from the control of Formula I racers.

Of high priority on its list of goals, is a complete re-examination of the present racing rules for QM. I am asking that anyone connected with QM racing, submit their evaluation of the present rules, operating rules of the local organizations and rules which should be considered for the future.

The deadline set by the AMA for submission of the 1978 rules is June 1 of this year. There is a great amount of work connected with collecting the inputs and turning them into a complete coherent rules package. The sooner we get the inputs, the better chance we have of developing a package acceptable to all. Please send your information and comments to: George Zink, Pres., NMPRA-QM, 80-28 222nd St., Jamaica, New York 11427."

George further stated that, "As a new officer in this new situation, I have the opportunity to make changes which would have been impossible for the old officers. The atmosphere for a change in QM policy has never been better. I have already asked the previous Associate VP's to report on anything in the policy and rules they would like to see changed. We intend to solicit information about QM rules across the country from active racers and racing organizations. We then intend to coalesce this and review all the present AMA rules and combine them into a complete coherent package to present to the AMA by June 1, 1976. I have called on the help of our best MARA brains to put this package together. We are not opposed to having a multi class competition if it is needed."

George Zink has been very active in QM affairs as editor of the MARA (Metropolitin Area Racing Association) newsletter in New York as well as being an active racer. The new NMPRA-QM Executive VP is Leonard Wiederhoeft of 27 Creek Road, Camp Hill, Pennsylvania 17011. Leonard is secretary of the Central Pennsylvania Pylon Racing Association and was active in its conception and formation. Both George and Leonard are currently active and involved in QM affairs and should be given all the support we can muster. We had stated before that we were not happy with the NMPRA and were discussing the formation of a new QM national organization; however, with the reorganization, NMPRA has the best chance of meeting our needs now, as it already is a viable organization. The problem in the past, as we see it, has been communication. When problems or questions arose there was no single person in an official capacity that could readily be called upon to give an answer. That person is now George Zink! There will continue to be district VP's for QM and they will report to George Zink. It will no longer be necessary to try to get action from a non-QM hierarchy. NMPRA-QM has the power and personnel to be an effective voice on behalf of QM flyers.

All clubs with racing events and racing associations should put George Zink and Leonard Wiederhoeft on their mailing lists as current opinions events and problems must be made known. Also it is now our responsibility to show our support from NMPRA-QM by joining the NMPRA. It's extremely important to specify on your application whether you fly QM, FI, or both. Annual dues are $10.00. Send for application to A & L Distributors, Inc., 16509 Saticoy Avenue, Van Nuys, California 91406.

• • •

Dear Don & Fred,

I just read your January column and wish to thank you for the design credit given me for my little, "Nothin' Special" 1/2A pylon racer. It's always a pleasure to see my efforts duplicated in other parts of the country.

I noticed in one of the photographs that Jim Bronowski had apparently modified my design to a standard configuration tail assembly, in place of the original V-tail. Enclosed with this letter, you will find several photos of my second generation, "Nothin' Special", also using a conventional tail. The main purpose in going to the V-tail originally was simply to be different. Nothing is gained by using a V-tail. As I pointed out in my May 1975 Flying Models article, it is quite easy to "screw up" the incidence angle of a V-tail. Be that as it may, I flew my prototype model, with the V-tail for most of this flying season. The one aerodynamic problem I noticed was a tendency for a "Quick-Fli" wiggle in straight away flight. This characteristic has developed in many modern R/C designs. The reasons that cause it are still quite debatable. Towards the end of our flying season here on the East Coast, I decided to try the conventional tail. The resulting modification included a horizontal stab of 42 square inches (21% of the wing area) and a fixed vertical tail of 18 square inches (9% of the wing area). The elevator was made one piece with the control rod exiting directly out the back end of the fuselage, for additional streamlining. Just for information, the horizontal tail volume coefficient for this new stab is **0.44**. *This proved to be about optimum and is very close to the value used by the "high performance boys" in the Seattle, Washington area. I might add that Ken Willard ought to use this type of calculation in his designs. The horizontal tail volume coefficient on his "Hot Dawg" pylon racer (published about 1½ years ago in RCM), works out to something like* **0.65**. *That's a lot more tail than is really necessary.*

My new tail configuration does admittedly fly better than the V-tail version. The "tail wiggle" is completely gone. In general the plane **feels** *more stable during high speed flight. I guess that's progress!*

You will notice also that the landing gear was removed from my plane. With our rough fields on Long Island, we simply gave up on the gears. Not only was it impossible to R.O.G. these little racers, but many suffered landing accidents (overturning on moderately high speed approaches). To keep the interest up, we deleted the landing gear rule for our club competitions. All other rules are as stated in the original 1971 RCM article.

The biggest problem, which still holds

back many from participating in 1/2A racing, is the engine. The Cox TD is a well made engine, for the price, but unfortunately, is tricky to operate on a regular basis. One of the best additions to the basic Cox engine was the Kirn/Kraft needle valve assembly. Unfortunately with Jim Clary/Kirn now out of business, the source of supply is quite doubtful. Many fellows are now drifting away from the Kirn pressure backplate covers because it causes such easy flooding of the engine. The fellows in the Seattle area, now use Tatone medium size pen bladders for a pressure fuel supply. The pen bladder, in conjunction with the Kirn needle valve, is about optimum. These engines must, of course, be electric started (which can also be a problem). The exact details of all this will be presented shortly by Mr. Vince Caluori of the Boeing (Seattle) Hawks Club, in a Model Aviation construction article. Vince's new design and techniques have been producing consistent 1 min. 28 to 30 sec. flight times.

I was also surprised to note on your contest results chart that none of the winners used the truly "correct" prop. Surprisingly enough, the very best prop for the TD .049/.051 is the **Cox Black Plastic 5/4.** *You have to try it to believe it! In addition, these props don't break like the grey Cox props. I've had the same prop on my plane* **all** *season.*

A few words on fuel. My experience has indicated that the best all around fuel is the Fox 40/40. Especially so when it employs synthetic oil instead of castor oil for lubrication (usually stamped on the top of the cap). My glow plugs last several dozen flights on the 40/40 fuel. I also like the fact that the fuel is sold in quart cans. You don't need gallons of fuel with these little engines. I did try K & B Speed Fuel (50% nitro) and found that I needed a new glow plug every third flight. In our present economy, this is ridiculous. When you get about 50% nitro, you can expect a new plug on every flight. I might add that I broke two crankshafts (in flight) using high nitro fuel. Conclusion: no more than 40/40 fuel should be used.

One final comment concerns our radios. These little pylon racers are probably the most responsive of all R/C planes. Your servos must be in **top** *operating condition. I experienced a lot of trim problems and what appeared to be tail flutter during the course of the year. Never anything bad enough to cause an accident, but enough to put me out of several races. My problem turned out to be a bad servo. Or I should say a servo that is good in any application* **except** *a 1/2A plylon racer. On a new plane, I would suggest that the servos be exchanged several times until the optimum performance is obtained. The key control is the elevator. It is the least forgiving.*

Sincerely,
Bob Aberle
Hauppauge, New York

• •

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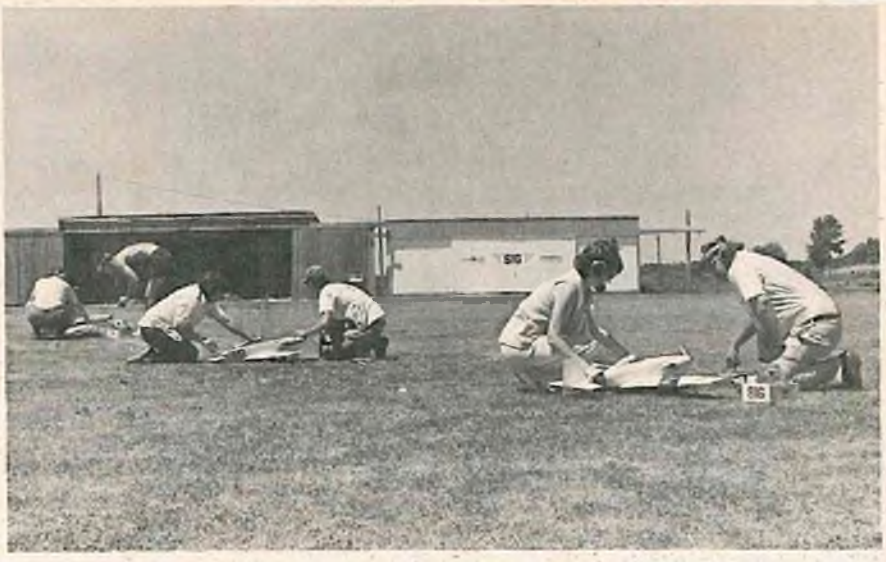

The start of a Formula I heat at the Sig Pylon Race last Summer. Alice and Bill Price, Dan Kane and Dan Santich, and Jim Duda.

Floyd Fitzgerald and Leroy Webb with QM Deja Vu at Sig Pylon Race.

Updated 'Nothing Special' by Bob Aberle with conventional tail surfaces. Airplane is more stable than V-tailed version. Bob says the black plastic Cox 5/4 props work best.

SOARING FROM THE GROUND UP

BY TONY ESTEP

PART II

● Last month, we left our hero (you) with a fully bench-trimmed plane, all neatly balanced and ready to launch with its properly located towhook. This month we'll go over flight trim, launch systems, and the promised special Hobie Hawk session.

Many descriptions of hi-start launchers have appeared before in my columns and others. The basic layout is shown in Figure I, below.

Lay the whole works out with the ground stake at the upwind end of the field. Allow for about 250 feet of stretch in the rubber.

Now before you hi-start your bird, let's make a couple of hand glides. Hold the plane with the nose and wing level, and throw it **forward** (not up), and not too hard. Be ready on the controls so that, if the nose comes up, you can quickly punch down elevator and get the plane under control. When the plane glides reasonably straight without stalling, you are ready for the hi-start. Naturally, before attempting any flying, you will have gone through the elaborate ground-checking procedure described in Part I, so you know that everything is straight and ready to go. I might mention that most Olympics require a lot of down trim to fly without stalling, and it is standard practice with experienced Olympic flyers to reshape the stab saddle so as to reduce the decalage by about 2 — 3° (the decalage is the incidence difference between wing and stab).

To use the hi-start, pull the chute back until you have 200 feet of stretch in the rubber, hook the ring to the towhook on your plane, and hold the plane with nose up about 30°. Be sure that all trims are neutral and the radio is on, and give the plane a good straight heave. Don't just let go of it, as it may well stall and crash if it isn't given flying speed.

There is quite an art to maximum-height launches, but we'll get into that later. For now, let's just get the plane neatly trimmed out. When it comes off the line, let it obtain flying speed. Then experiment with the elevator trim. When you feed in full up trim at the transmitter, the plane should mush and nearly stall. If it doesn't, you don't have enough trim range, or you need some up trim in the elevator clevis. This adjustment is important, because you want to be able to fly as slowly as conditions will permit. However, this speed is not the glider's most efficient speed. Returning the trim to neutral should cause the plane to speed up and cover more ground without appearing to dive. Full down trim should put the plane in a shallow dive, moving fairly fast and sinking faster than normal.

If your elevator trim doesn't produce these results, make a careful mental note of what it does do and what you think it needs. If, for example, the trim lever produces no noticeable effect, you need more throw in the elevator, or you may have backlash in the controls which you didn't get out during ground checks (remember?). If the plane is sensitive to the elevator stick, but not to the trim lever, your radio is at fault, because the ratio of trim throws to stick throws is inadequate. This problem is not common with newer radios.

After a few flights, the elevator trim range should be reasonably well established for the C.G. you are using. However, you have no way of knowing whether that C.G. is proper unless you experiment around a bit.

There is a simple rule which governs sailplane C.G. If the C.G. is forward of the center of lift, the stab must produce a **downward** lifting effect in order to stabilize the plane. This has no beneficial effect, and causes the plane to sink like a rock.

Even though this lesson is simple and easy to comprehend, there is no general rule to state where that dropping-off point is located. The size and shape of the wing and its airfoil are the determining factors. So you must move the C.G. forward and aft until you are satisfied that you have established a useful working range. For most planes, this will range from 30 to 42% of the mean aerodynamic chord. The aft positions produce better performance, at the expense of penetration and responsiveness. In gusty weather, the forward positions work better. It helps to keep a written log of your experiments, and to know exactly what effect each additional washer in the nose is going to have.

Remember to judge each C.G. test by the plane's flight characteristics, **not** by its launch characteristics. For every C.G. position you should be able to get a good launch, except when the C.G. is too far forward. The rule for towhook location is simple; move it back as far as you dare. Many flyers locate their towhooks so far aft that an occasional tap of down elevator is required during launch. Remember that many guys are giving up as much as 1/3 of their potential launch height because of weak wings, poor towhook location, poor trim, or unaggressive technique. That extra few feet is often the difference between a two minute wipeout or a ten-minute max, so practice and trim.

Now I promised you a Hobie Hawk section, so here it comes. The Hawk is an airplane which is sensitive to small imperfections in trim, and has frustrated many beginners as a result. Here are some common-sense observations, based on a

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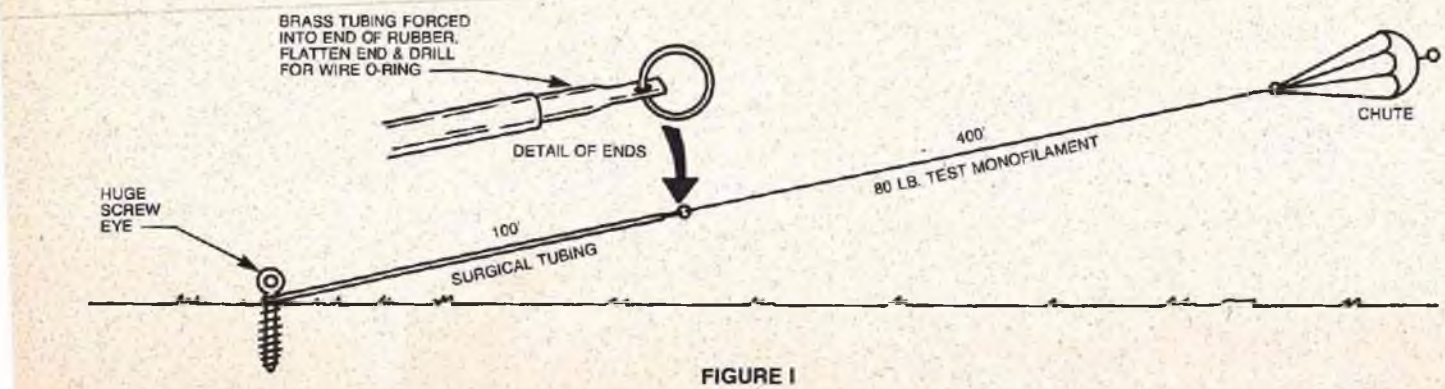
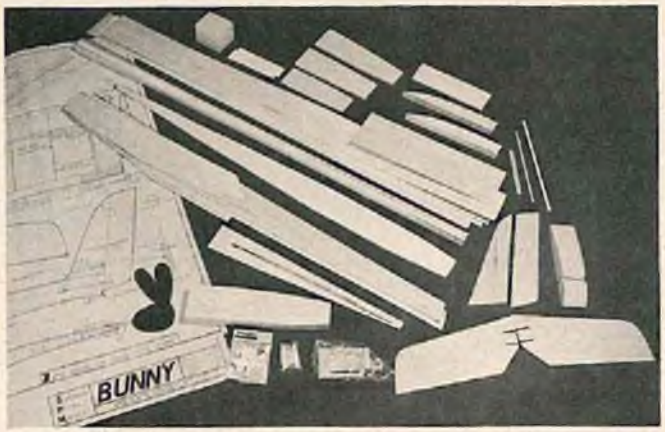


FIGURE I

RCM PRODUCT TEST

SUPERIOR FLYING MODELS BUNNY



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

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

● The Bunny is a 73" span sailplane designed for both thermal and slope soaring manufactured by Superior Flying Models, 4027 South 275th Place, Auburn, Washington 98002. Priced at $25.00, this Standard Class glider has a total wing area of 580 square inches and a recommended flying weight of 24-48 ounces, depending upon ballast used.

The materials used in construction are balsa and plywood with hardware including two control horns, two snap links, brass elevon bearing, four self-tapping screws for the control horns, EK Logictrol adjustable tow hook and mounting hardware, two threaded pushrods, one piece of nylon fabric, 12 inches of 1/16" music wire, a 4 inch length of plastic tubing (1/16" I.D.), 7 inches of 1/4" diameter dowel and mounting hardware for the servo mount. The plans consist of two sheets measuring 42" by 30" with building instructions included on the plans sheet. Some unusual features of the kit include the 1/8" wing leading edges as well as the nylon stabilizer mount tubes and the fact that only 3 degrees of dihedral is used due to the swept wings. In addition, there is an excellent booklet on thermal and slope soaring techniques included in the Bunny kit from Superior Flying Models.

RCM's prototype of the SFM Bunny weighed 25 ounces ready to fly for a wing loading of 6.2 ounces per square foot. Metallic gold Solarfilm was used on the fuselage and transparent blue Super MonoKote on the wings and empennage. An Ace Digital Commander radio was used for guidance. We found that the kit was extremely easy to construct and the laminated balsa fuselage is quite strong. The recommended balance point and tow hook locations were positioned right on target as shown on the plans. The Bunny has a very flat glide with smooth flat turns. In addition to being a general competition and sport machine, we will also say that the Bunny is quite suitable for beginners. On the slope the machine

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SPECIFICATIONS

Name ..... Bunny
Aircraft Type ..... Sailplane
Manufactured by ..... Superior Flying Models
4027 S. 275th Place
Auburn, Washington 98002
Mfg. Suggested Retail Price $25.00
Available From ..... Both Manufacturer and Retail
Mfg. Recommended Usage ..... Sport & Competition
Wingspan ..... 73 inches
Wing Chord ..... 8 inches
Total Wing Area ..... 580 sq. in.
Fuselage Length ..... 34 inches
Radio Compartment Dimensions ..... (L) 14¾" x (W) 2"x (D) 2⅝"
Wing Location ..... High Wing
Dihedral ..... 2½"
Airfoil ..... Flat Bottom
Wing Planform ..... Constant Chord
Stabilizer Span ..... 18 inches
Stabilizer Chord (incl. elev.) ..... 3½"
Total Stab Area ..... 62 sq. in. approx.
Stab Airfoil Section ..... Flat
Stabilizer Location ..... 1" above base of fin
Vertical Fin Height ..... 6½ inches
Vertical Fin Width (incl. rudder) ..... 3½" average
Mfg. Rec. Engine Range ..... NA
Recommended Fuel Tank Size ..... NA
Landing Gear ..... Skid
Recommended No. of Channels 2
Recommended Control Functions ..... Rudder and Elevator
Basic Materials Used In Construction:
Fuselage ..... Balsa
Wing ..... Balsa & 1/8" dowel
Tail Surfaces ..... Balsa and Ply
Hardware Included In Kit ..... Control horns, links, bolts, tow hook nylon fabric, wire, tubing, etc.
Plan Size ..... 42" x 30" (rolled) (2 sheets)
Building Instructions on Plan Sheets ..... Yes
Instruction Manual ..... No
Construction Photos ..... No
Kit Includes ..... Shaped parts
Mfg. rec. flying weight ..... 24 - 48 ounces
Wing loading based on rec. flying weight ..... 6-12 oz./sq. ft.

RCM PROTOTYPE

Weight, ready to fly: ..... 25 oz.
Wing Loading ..... 6.2 oz/sq. ft.
Covering and finishing materials used ..... Solarfilm and MonoKote
Engine Make and Disp. ..... NA
Muffler Used ..... NA
Radio Used ..... Ace
Tank Size Used ..... NA

PEORIA RC CLUB SNOW SKI

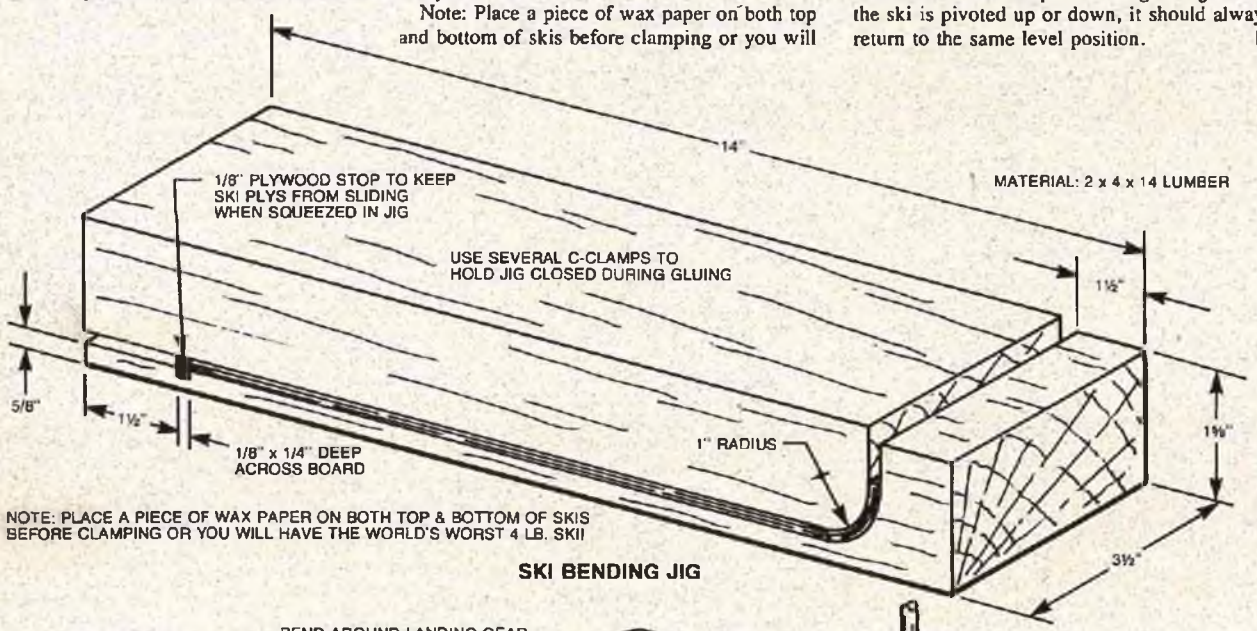
(Reprinted from the Peoria R/C Modelers Club Newsletter)

Every year plans are published for snow skis, but they are either difficult to rig to a plane or require a machine shop to build. For many years the older members of the Peoria RC Modelers Club have been using a design that is light, easy to build, and durable.

The first step in building the set of three skis is to build the bending jig. This can be made as shown below. If you don't have a band saw, a lumber yard will usually make the cuts pictured for a small charge. (Assuming you buy the 2" x 4" from them.) After you have completed the jig you can bend each ski by spreading epoxy on one of your 1/32" ply pieces and laminating it to another piece. Be sure to put wax paper over the top and bottom of the ski before squeezing it in the jig! Carefully place the ski in the jig with the end of the ski against the 1/8" ply stop that protrudes from the jig 1/16". Leave the pressure on overnight and the next day you will have a ski that will stay bent. Repeat this procedure for as many skis as needed.

Note: Place a piece of wax paper on both top and bottom of skis before clamping or you will have the world's worst 4lb. ski!

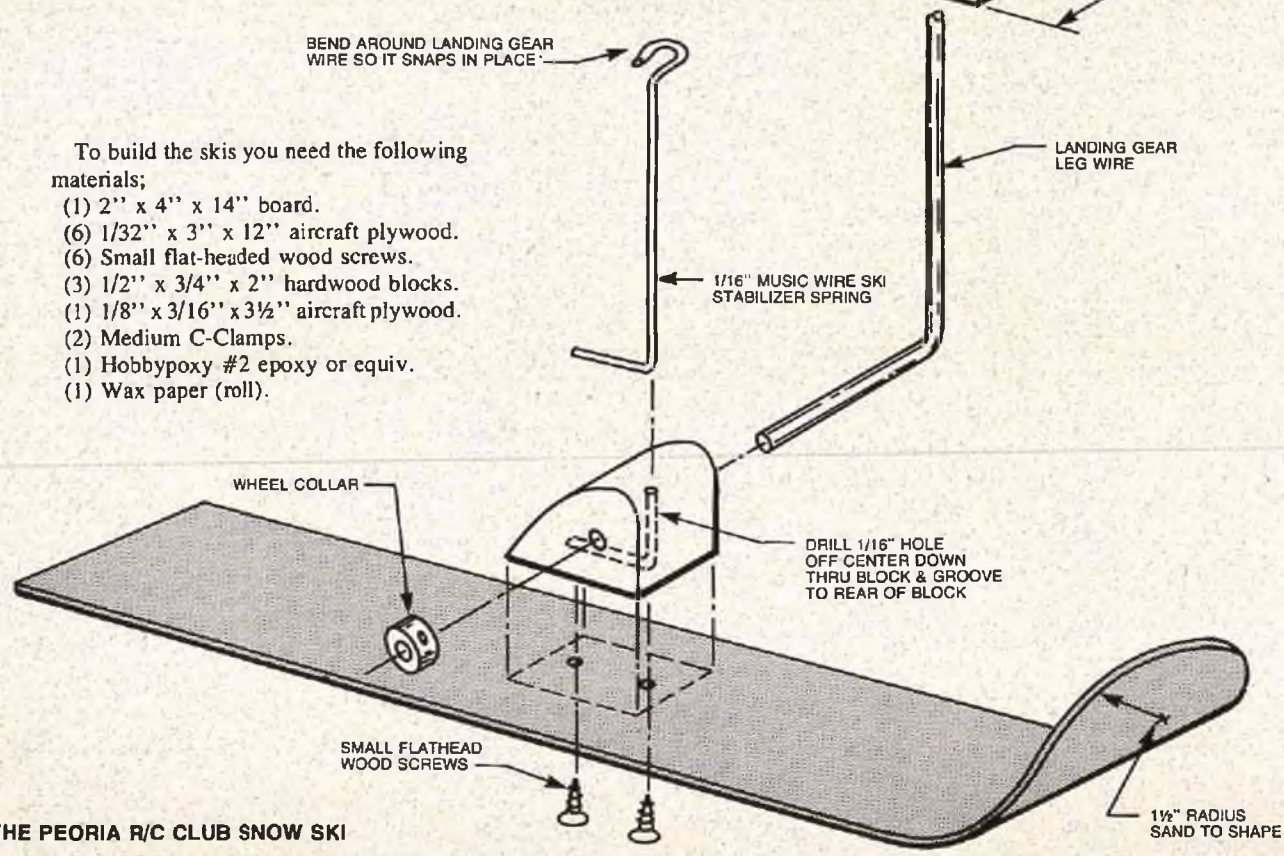
While you are waiting for the glue to dry in your ski jig, you can be making the other parts for the ski. The gear leg block can be almost any shape, but try to keep the gear hole at least 5/8" above the ski or you may stub your prop. The two wood screws come up from the bottom on center, but the 1/16" music wire retainer is drilled off center so that the wood screws won't hit it. When installed on the airplane, the 1/16" music wire should be bent to snap on to the gear leg. When the ski is pivoted up or down, it should always return to the same level position. □



SKI BENDING JIG

To build the skis you need the following materials;

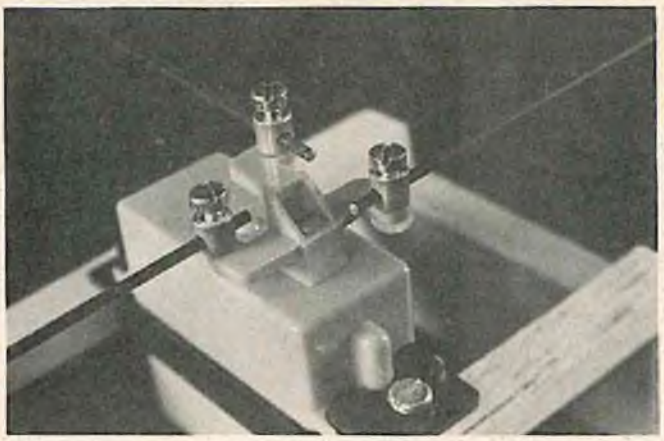
(1) 2" x 4" x 14" board.
(6) 1/32" x 3" x 12" aircraft plywood.
(6) Small flat-headed wood screws.
(3) 1/2" x 3/4" x 2" hardwood blocks.
(1) 1/8" x 3/16" x 3½" aircraft plywood.
(2) Medium C-Clamps.
(1) Hobbypoxy #2 epoxy or equiv.
(1) Wax paper (roll).



THE PEORIA R/C CLUB SNOW SKI

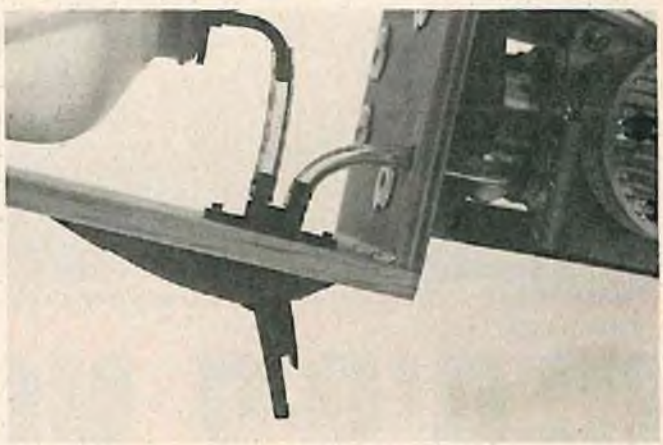
DICK'S DISCOVERIES

PRODUCT APPLICATIONS BY RCM'S PHOTO EDITOR, DICK TICHENOR



Goldberg pushrod connectors take the misery out of installing and adjusting pushrods. The nylon snap-on retainers are easy to install and hold securely.

Robart Fueler is a convenient gadget for filling the fuel tank. It eliminates removing the fuel line from the engine or the need for a third line to the tank.



X-Acto's loop blade is most helpful for carving concave curves such as Hoerner-type wing tips.

A putty for filling those dings, bench rash, or fillets, can be made with K & B materials. Pour a small amount of polyester into micro-balloon filler, mix well, stir in a few drops of catalyst, and apply. This mixture sets fast, is light in weight and sands easily. It is compatible with any finish.

Francis Plessier's Flying Flat Iron, popular at airshows throughout Europe. Shown below is the easy-to-build and stable Flying Saucer.

UFO'S ? NOT REALLY...

. . . They're probably Francis Plessier's Flying Flat Iron and Flying Saucers

● Each year, over 10,000 spectators turn out for France's largest R/C Air Show on the main runway of the Flight Test Center of Bretigny, twenty miles south of Paris. Every kind of models are shown — large sailplanes, pylon racing, dog fights and so on, as well as special and unusual models. Last year, the high point of the Cirque des Cigones (Storks' Circus) was a crazy balloon bursting race with a model in each frequency slot — sixteen R/C aircraft in the air — at the beginning.

However, one of the most notable features of the Cirque des Cigones was the introduction of unusual novelty R/C aircraft. For example, ten years ago they flew the first radio controlled wheelbarrow and every year brings new and special models. The wheelbarrow was followed by a flying dog house, an "outhouse" door and, once, they flew the big "Whale," the largest model ever flown. The following year at the Storks' Circus, they blew the Whale up in the air with a charge of firecrackers!

Then, in 1974, flying saucers appeared in the skies of Bretigny. This model, designed by Francis Plessier, is amazingly easy to build and fly and, in fact, is as docile as a trainer. In the 1975 Circus, the author proved that his wife's household iron could fly beautifully! Actually, the model is somewhat enlarged (12:1 scale) and, in fact, is 7 feet 6 inches long. This "model" flies beautiful, is very stable and "groovy," and the engine was quite sufficient to fly it at a rather rapid rate of speed. Since the 1975 Cirque des Cigones, Francis Plessier has done loops and inverted flight with his Flying Iron, although he admits the rolls are not too good. The sight of this huge "thing" in the sky is quite unbelievable to say the least.

If you're looking for something "different" to fly, you may be interested in either the Flying Saucer or the Flying Iron by Francis Plessier. Both have been thoroughly field proven and are, despite their appearance, extremely airworthy and maneuverable. In addition, they have the added advantage of being exceptionally easy to construct. We'll start with the Flying

Saucer.

Quite simply, the Flying Saucer is a disc of styrofoam which is one metre in diameter, and 3cm thick with squared off edges (no rounding and no sanding). This measures 39.37 inches in diameter by 1 inch thick. Up front is a small fuselage pod which holds the .40 cubic inch engine as well as the radio while, at the rear, are the two elevons and a fin. Three channels are used to operate elevator and aileron control functions (coupled elevon) as well as throttle command. The fin is a profile of a pilot sitting on a bench which is simply cut from 1" thick styrofoam.

Start construction by simply cutting a 40" disc with a sharp knife from a sheet of 1" thick styrofoam. The two elevons are also cut, 6½" wide, with all edges left square. A 1" wide strip of 1/16" thick balsa is glued around the edges of the "wing" and elevons using white glue. Both the wings and elevons are then covered in brown paper using contact cement or water base glue.

The small forward fuselage is assembled next and can be built rather heavy and strong in order to aid in achieving the correct Center of Gravity. Cut the 1/8" plywood sides as shown in the accompanying sketch so that a portion of it keys into the styrofoam "disc." The fuselage is glued to the wing with Wilhold Aliphatic Resin with the side supported with triangular balsa fillets to provide reinforcements as well as gluing area. As you can see from the sketch, this detail also applies to the fin.

The elevons are hinged using Solarfilm strips, as shown, while the control horns are made from 1/8" plywood, and inserted into the styrofoam and fixed with Wilhold Aliphatic Resin.

When it comes to the matter of radio installation, this is quite simple and requires no elaborate installation notes. However, the elevon control does require some discussion. Plessier employed a favorite gimmick of his own in which the transmitter is tilted or inclined through 45 degrees and each servo controls the dual axis stick unit and linked up to one of the elevons. By inclining the transmitter 45 degrees, the corners of the stick unit bezel become the extreme movements for one control function, while the other function remains neutral. The arrangement achieves the required control "mix" without recourse to extreme mechanical gadgetry. Alternatively, you may apply your own mechanical mixer system or use a commercial one such as the Kraft, E.K., or Airtronics unit as examples.

If you wish to make your own, you might consider the classical system in which the aileron servo is attached to a "slide" connected to the elevator servo. The pushrods are made from 3/8" aluminum tube with some kind of bearer in the middle of the run to prevent vibration. The correct neutral position of the control surfaces is as shown in the sketch.

The Center of Gravity location is not especially critical, but should be between 10 and 12" rearward from the root leading edge. It may be necessary to add quite a lot of ballast to achieve the correct balance so that a flying weight of 4-4½ pounds is achieved. If you take the time to calculate the wing loading, you'll find it's absolutely ridiculous!

Flying the Saucer is extremely simple. First you'll need an assistant to launch your

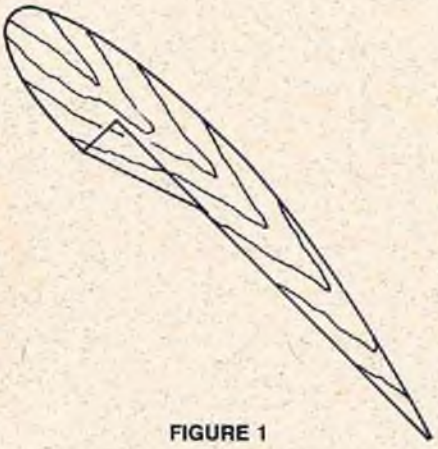


FIGURE 1

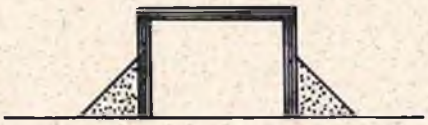


FIGURE 2

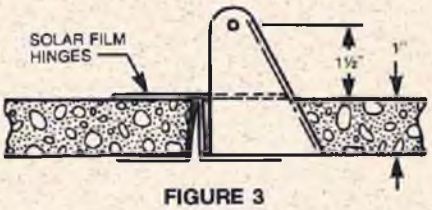


FIGURE 3

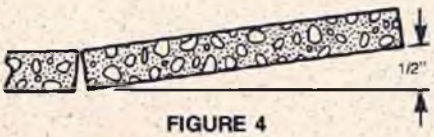
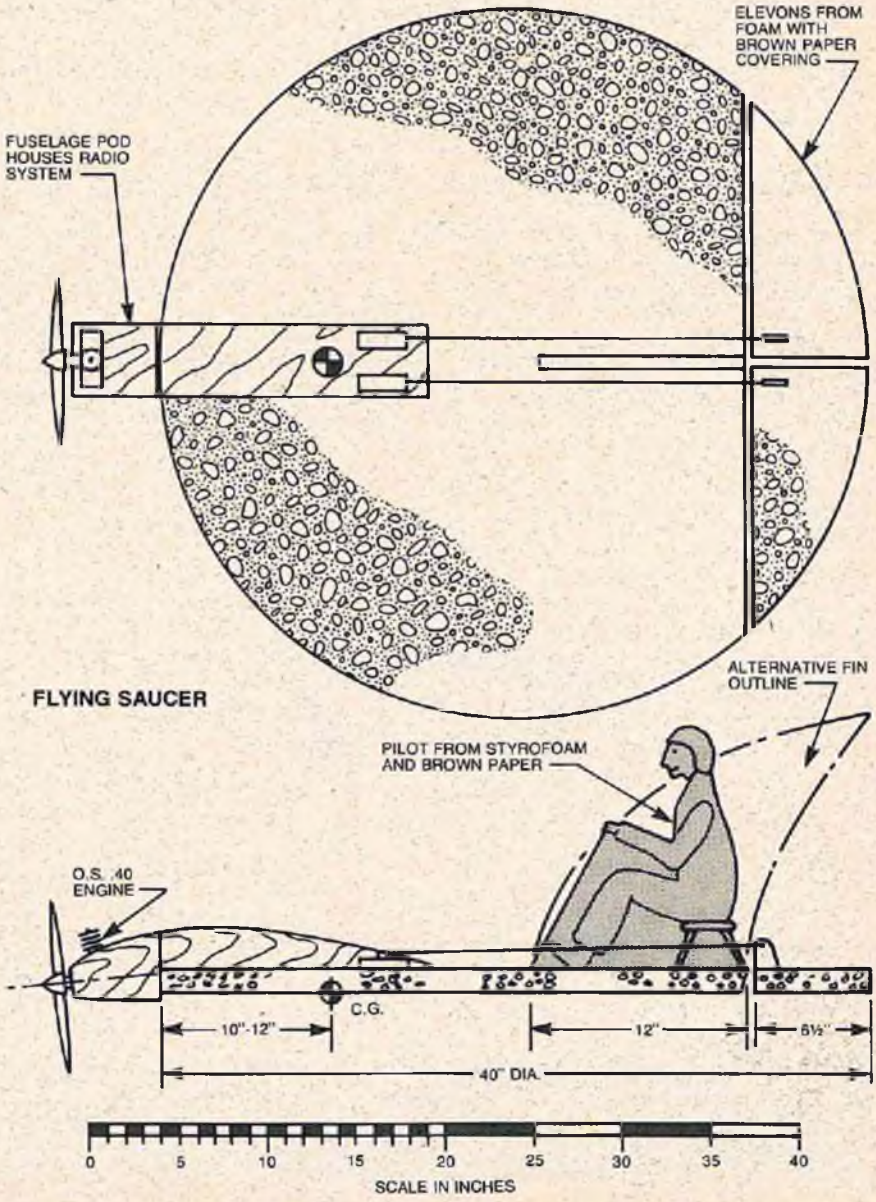


FIGURE 4



FLYING SAUCER

Francis Plessier and his mammoth Flying Iron!

creation. Have him hold it above head height with a hand gripping the edge of each side and just give it a good heave forward. Aileron command is rather sluggish and rolls are difficult, but elevator control is very powerful and will produce loops of 10' diameter. Speed is good and the saucer's response in the wind is no problem whatsoever. After a little practice, aerobatics present no problem and this includes even low inverted passes.

Perhaps the most amusing factor is the models low speed characteristics — by reducing power and increasing the angle of attack, the saucer can be flown very slowly, almost motionless relative to the ground, or even flown backwards in a light wind. Landing is great fun, descending from heights without forward speed for a super accurate spot landing. Since there is no landing gear, landing on grass is at least advisable as you don't want to break a prop every time!

If your choice is the Flying Iron, you'll find that this is very quickly built from a large board of styrofoam 80" x 50" x 1½". It is cut according to the shape shown in the drawings with the edges perfectly straight (not rounded) and reinforced by a strip of 1/16" thick x 1½" wide balsa all around. The elevons are similarly faced with 1/16" balsa sheet. The cut for the elevons is beveled to give some down elevator possibility for inverted flight.

The "fuselage" is a box for the engine, radio, servos, and elevon mixer. This "fuselage" is made of 3/16" thick plywood glued to the styrofoam base with Wilhold Aliphatic Resin.

The "handle" is also cut from styrofoam and cemented in slots in the "body." The rear of the handle is the rudder. Balsa reinforcements are necessary at the joint between the handle and body, and in the body between the engine box and the handle.

After the basic construction is completed, the entire model is covered with brown paper, glued with contact cement such as Scotch 3M77. When finishing, your paint must be very thin because the weight will build up quickly.

Radio installation in the Flying Iron is a problem because of the size of the model coupled with the fact that the Center of Gravity must be kept well forward. In my Iron, the rudder servo is in the handle and the two elevator and aileron servos are in the front box with a home-made "mixer" for the elevons, with extra long nylon pushrods. Needless to say, long wire harness cables must be used as extensions between the servos and the receiver.

The hinges for the elevons are made of MonoKote with rather long plywood control horns. The weight of the elevons is a problem for the servos and you may have to add springs for balancing them.

Insofar as power is concerned, the engine has to be a good and reliable .60 mill. Francis Plessier's prototype used a Merco .61 which proved quite adequate. However, for aerobatics, one of the hotter racing .60's will be necessary.

As previously mentioned, the C.G. must be well forward, and it will present a problem insofar as weight must be added to the nose. This is a "problem" only insofar as construction is concerned since the all-up flying weight is only 3.8 kilograms which is extremely light and one of the reasons for the excellent flying qualities of the Iron.

The initial trim is 0-0 for the elevons. Flying the Iron is quite simple. You have to find somebody to hand launch the thing — preferably a man with long arms! Your assistant will push the Iron gently above his head, quite flat into the wind, and **not upwards**. Flying is quite easy and, with full throttle, the Iron flies rather fast and flat without any visible angle of attack. Low passes and wing-overs are easy as are stall turns. With a good engine it is possible to gain some altitude and try loops and rolls as well as inverted flight.

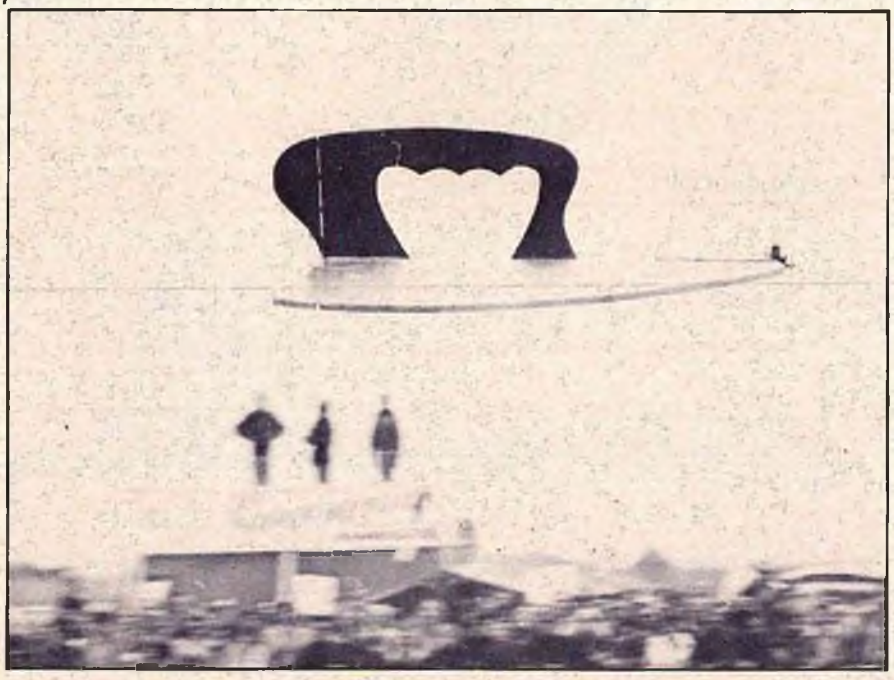
Slow speed characteristics, like the saucer, are amazing, due to the very light wing loading of this unusual flying apparatus. As a matter of fact, you can stop the Flying Iron in the sky and fly backwards in a light wind!

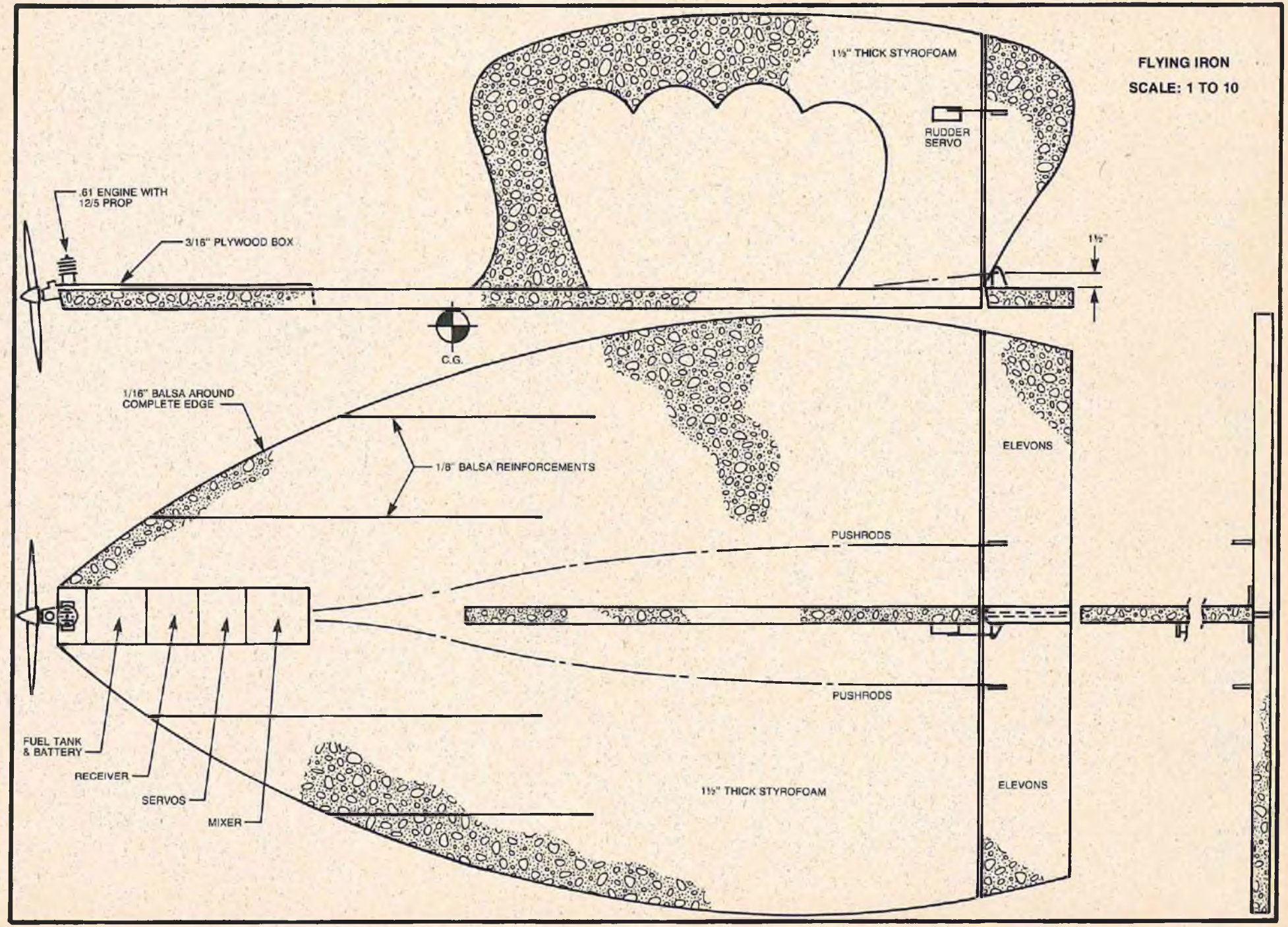
Landing is no problem at all and you can make very accurate spot landings, coming in at low speeds and high angles of attack. Be sure to land your Iron on a flat surface, either grass or concrete, but avoid rocks — they spoil the sole of the Iron!

In a few evenings, you can build either the Saucer or this Flying Iron. They are faster and cheaper to build than any multi-aircraft and you may be sure that you will attract a very large crowd wherever you fly these apparitions.

The only problem is in transportation — it simply won't fit in a Volkswagon, no matter how hard you try! □

It not only flies, but is capable of stall turns, wing-overs, loops, rolls, and inverted passes!




FLYING IRON
SCALE: 1 TO 10
1½" THICK STYROFOAM
RUDDER SERVO
.61 ENGINE WITH 12/5 PROP
3/16" PLYWOOD BOX
1½"
C.G.
1/16" BALSA AROUND COMPLETE EDGE
1/8" BALSA REINFORCEMENTS
ELEVONS
PUSHRODS
PUSHRODS
FUEL TANK & BATTERY
RECEIVER
SERVOS
MIXER
1½" THICK STYROFOAM
ELEVONS

THE ANSWER TO TOWLINE BREAKAGE

BY CHET TUTHILL AND JIM ROBINSON

REPRINTED FROM THE AIR FOILER

● One problem that plagues the R/C soaring community is the problem of towline breakage. It forces the contest director to rule in favor of a re-flight for a contestant, even though he knows in his own mind that the contestant involved will routinely be the only one at the contest that will consistently break the line. It worries the other contestants when line breakage occurs because when they follow a launch where the line broke they are afraid of a weakened line. Also, line breakage always seems to occur at the wrong time; sometimes resulting in a rapid re-kitting of the model on the tow; and nearly always results in a few hairy moments of pilot spasms during recovery.

The "answer" will not prevent line breakage, but it will place the cause definitely as being a fault of the line and not the contestants. It will take all decision making away from the C.D. because a contestant will get an automatic re-flight if a line breaks. The answer lies in a maximum available line force which is set below the line's breaking strength. If a contestant floor-boards the winch he will get the maximum force available. But, by using the usual pulsing action, known around here as the "Tennessee Toe-Tap", he can obtain the desired tow in the regular manner. Thus, the system functions as all winches do up to the allowable maximum load without fear of breaking the line. The system will work with any winch; 12-volt, 6-volt, 2-inch drum, 4-inch drum or whatever. The system requires no modification to any winch. It can be calibrated (if required) very easily.

The system, devised by Jim Robinson of the Coffee Airfoilers is shown in the sketch. The heart of the system is the mount on which the winch is placed. The mount is held down by the weight of the winch but can be further restrained as deemed necessary. The platform which supports the winch is attached to the base by way of a pivot rod. Rotation of the platform about

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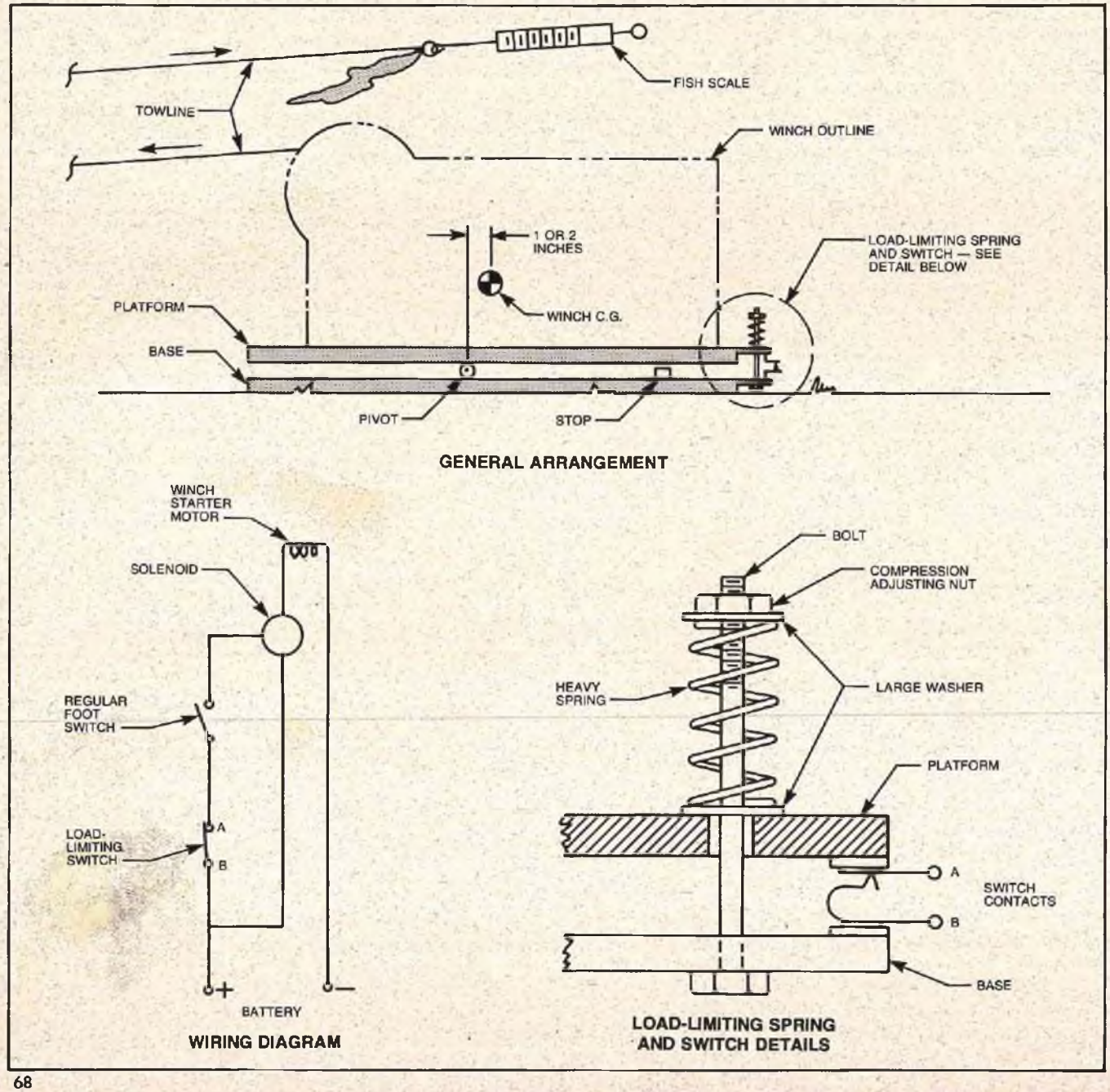


RCM PRODUCT TEST

ACE R/C, INC.
MACH-NONE

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											

● The Ace Mach-None is a 1/2-A low wing .049 to .051 aircraft with a fuselage of conventional balsa and plywood construction and utilizing the popular three section Ace foam wing. The tail surfaces are of sheet balsa. In addition to the three sectioned Ace foam wing, a molded plastic canopy, aileron hook-up wire and plastic tubing, blind nuts, sheet metal screws and landing gear wire are included in the kit. A 1/8" square spruce main spar is embedded in the foam wing for additional strength, giving a cleaner wing after cover, and a definite improvement over the conventional use of fiberglass strapping tape normally used on the popular Ace wings. The belly wheel is superior to the skid normally used on this type of aircraft. In addition, plywood tip skids are used to protect the wing tips. Our prototype, ready to fly weighed 25 ounces for a wing loading of 15 ounces per square foot. The wings were covered with metallic Solarfilm with the fuselage covered with white and black Solarfilm with all trim also cut from Solarfilm. The engine used was a Cox TD .051 while the radio was a Kraft single stick. A one ounce Sullivan tank was used for the fuel supply. There was no split wood in the kit, the plywood formers were clean cut. However, before installing Former F2, cut the center section approximately 1¾" by 1" for the cables and receiver.

The flight performance of the Mach-None is superb. We used a Cox TD .051 with Cox high performance head and a Williams Bros. spinner and Cox Gray 6/3 prop. The airplane tracked true either upright or inverted. The turns were extremely tight while one half of a Split-S makes a very eye-catching turn. Control surfaces were kept to bare minimum throws but were still very effective in the glide after the engine quit. The landing speed is much slower than its counterpart, the Ace Pacer. As an added note, RCM's reviewer removed the propeller and added one ounce inside the spinner and had a great time slope soaring the Mach-None! No changes were made to the control surface travel. The only flight characteristic change was the tendency to stall, so keep the nose down when slope soaring.

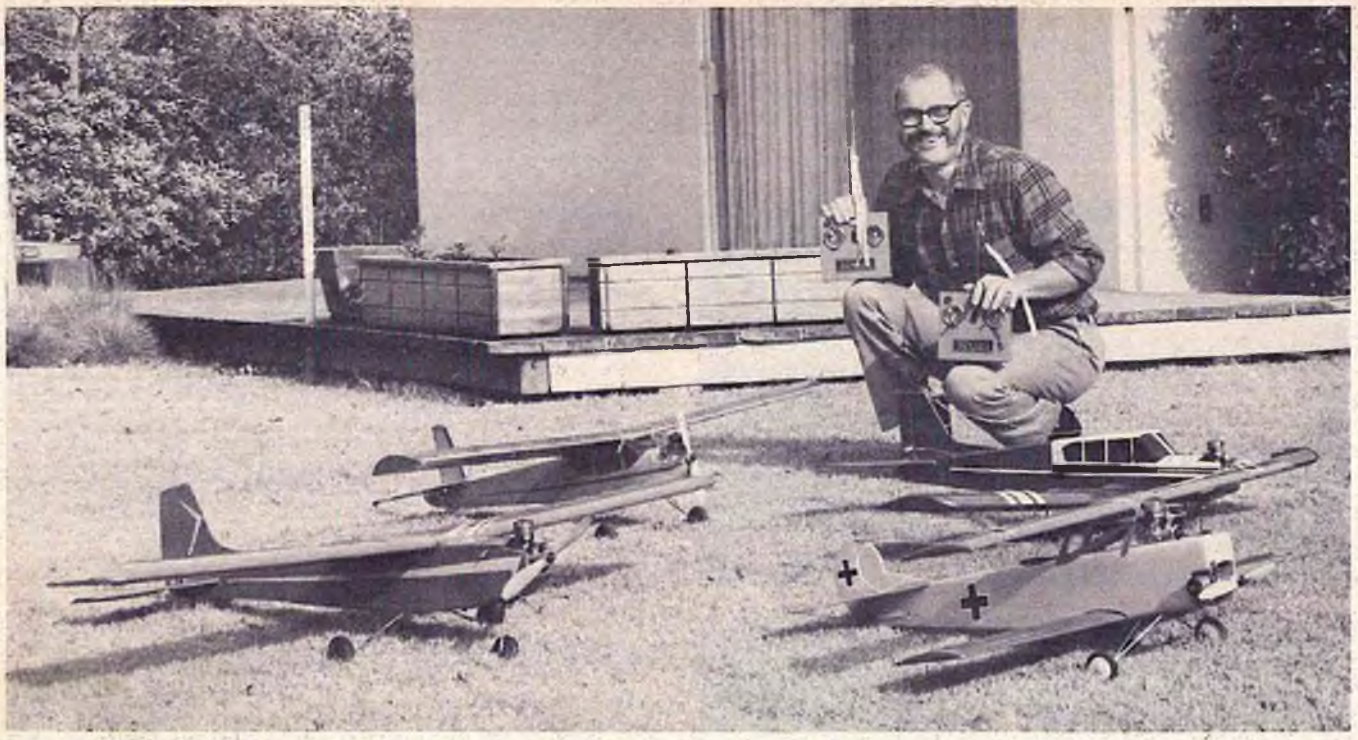
This model, if flown in 1/2A competition, would fly with the best, since it is fast, quick in the turns, easy on landings and flys all afternoon on one-half pint of fuel. The only suggestion we could make is to possibly include a small spinner with 1/2A kits since these small spinners are not easily found in many hobby shops. □

SPECIFICATIONS

Name	Mach-None
Aircraft Type	One-Half A Racer
Manufactured by	Ace RC Inc. P.O. Box 511 Higginsville, Missouri 64037
Mfg. Suggested Retail Price	$19.95
Available from	Retail Outlets and Manufacturer
Mfg. Recommended Usage	Competition Racer
Wingspan	40 inches
Wing Chord	6 inches
Total Wing Area	240 sq. in.
Fuselage Length	30 inches
Radio Compartment Dimensions	(L) 8" x (W) 2"x (H) 2"
Wing Location	Low Wing
Airfoil	Semi Symmetrical
Wing Planform	Swept L.E.
Dihedral (each tip)	0
Stabilizer Span	14 inches
Stabilizer Chord (incl. elev.)	3.5 inches
Total Stab Area	49 sq. in.
Stab Airfoil Section	Flat
Stabilizer Location	Top of Fuselage
Vertical Fin Height	3.5 inches
Vertical Fin Width (incl. rudder)	5 inches
Recommended Engine Size	.049-.051 cu. in. disp.
Recommended Fuel Tank Size	1 ounces
Landing Gear	Belly Wheel
Recommended No. of Channels	Two
Recommended Control Functions	Elevator, Ailerons
Basic Materials Used in Construction:	
Fuselage	Balsa, Plywood
Wing	Foam — Ace
Tail Surfaces	Sheet balsa
Hardware included in Kit	Ace foam, plastic canopy, hook-up wire, nuts, screws, etc.
Plan Size	20" x 28"
Building Instructions on Plan Sheets	Yes
Instruction Manual	Yes (1 page)
Construction Photos	Yes
Kit Includes	Shaped & Die-Cut Parts
Mfg. Rec. Flying Weight	22 ounces
Wing loading based on rec. flying weight	13.25 oz./sq. ft.

RCM PROTOTYPE

Weight, ready to fly	25 ounces
Wing Loading	15.06 oz./sq. ft.
Covering and finishing materials used	Solarfilm, Aerogloss
Engine Make & Disp.	Tee Dee .051
Muffler Used	No
Radio Used	Kraft
Tank Size Used	1 ounce



Official Air Force Photo: General Kitchen poses with his 5 engine, 4 plane, 2 transmitter Air Force.

BUILDING YOUR FIRST MODEL FROM PLANS

By Jim Kitchen

A modeling project can be broken down into four phases: First, the inspiration; Second, logistics; Third, construction, including building, finishing, and installation of equipment; and Fourth, flight test and certification.

THE INSPIRATION

Having completed my Mini Comanche in late summer of 1973, I was temporarily at a loss as to what my next modeling project should be. Most modelers have several planes in their minds that they would like to model someday. These are usually scale type planes that have caught our fancy sometime in the past. Let's face it, some airplanes must have caught our fancy, or we wouldn't be in this hobby! A Piper Cub and an AT-6 Texan are at the top of my "someday list." However, when you are an average builder, and an advanced beginner flyer you hesitate to tackle these projects for fear that after all that work the model may (1) be too much to handle or (2) fly like a dog.

This was the state of my mind on the day that the September '73 issue of R/C Modeler arrived. I picked up the magazine, and as if by providence, it fell open to page 18. There was a full color picture of a semi-scale Fokker DVII. "Biplane" immediately sent my imagination soaring. I forgot to mention that a Stearman and a Great Lakes are high on my "someday list." The next thing noted was the designer, Chuck Cunningham, and that this model was designed for the RCM World War I Scramble Contest proposed in the July RCM.

The seed of the inspiration for R/C model #6 had been implanted. This model had going for it, my fascination with biplanes, simple construction, and the fact that it was a smaller model by a well known and respected R/C'er. On the 'con' side was the question of whether my building ability had progressed to the point where I was ready to tackle my first plan building project. And, were my flying skills equal to the demands of a biplane? I am a Civil Engineer whose R/C experience at this writing amounts to one year and nine months. Whether by nature or training, we engineers are a methodical bunch. I have developed my R/C experience on the theory that each model selected should provide an added challenge in both construction and flying techniques.

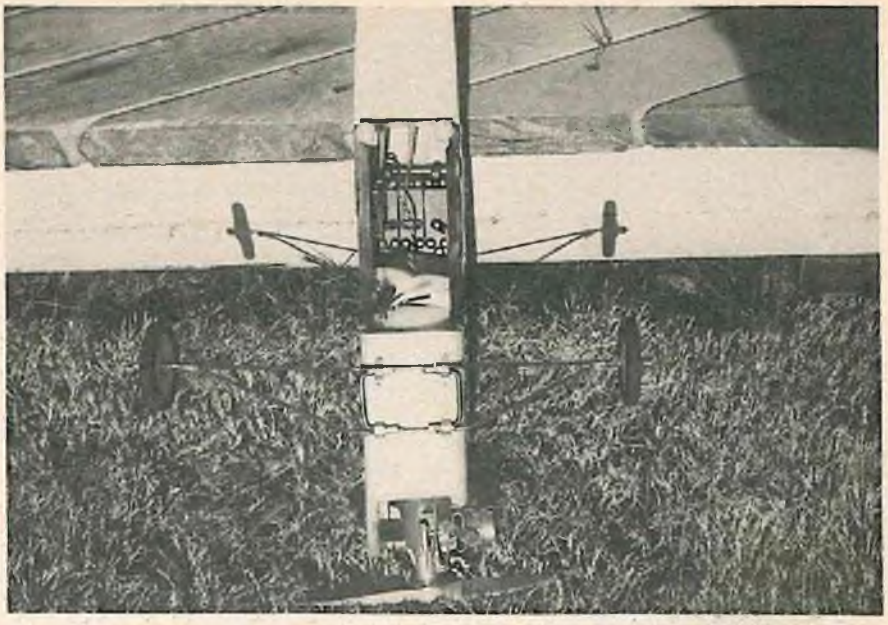
I have built and flown five models as shown in the lead photo. You will notice that all the models are kits, and that I am partial to smaller models because of their savings in construction and fuel costs plus convenience in storage and transportation. You will also note my preference for O.S. Max engines. I like their reliability, and find their easy starting an especially appealing feature. My roster of O.S. engines consists of a .19, .20, .25, and two .35's. I make it a practice to have at least two interchangeable engines for each model. This reduces the problem of AOCP (Aircraft Out of Commission for Parts) because of a sick engine or a missing carburetor screw. Another advantage is that you can break in a new engine on an existing model.

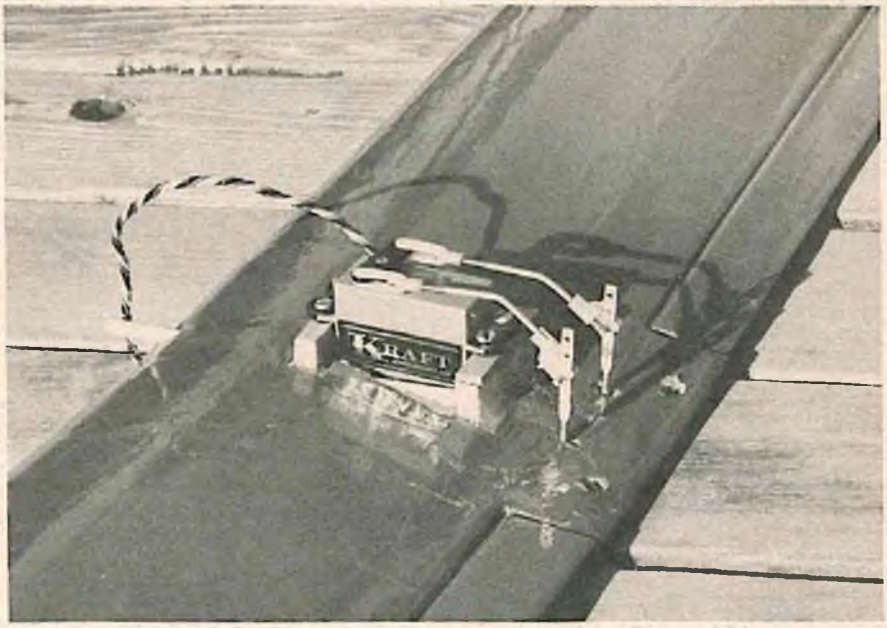
The inspiration continued to simmer for several weeks and, at last, I decided to send for the full scale plans. A few weeks later the local toy-hobby store celebrated their anniversary by offering 20% off everything during a sale. I decided this was good opportunity to lay in a supply of materials suitable for the DVII model.

LOGISTICS

This is the phase in which you determine the resources necessary to make your inspiration a reality. This involves decisions as to the power, finish, and R/C equipment to be used. More specifically you need to know: (1) Materials needed, (2) Where

Photos at right show the author's equipment installation on his first model built from magazine plans. Note engine offset. Aileron installation was complicated by the short coupling between servo and control horns. Jim used a large servo arm to increase throw. Fully assembled model is conveniently transported in the back of authors VW Squareback. Old pillow prevents model from rolling about





they may be obtained. (3) Their prices, and (4) How soon you want them. Items 3 and 4 are interrelated in that the most competitive prices are usually available through mail order, but there is some delay in receiving your order and the possibility that some items may not be in stock. I believe in stretching my hobby dollar, and I try to minimize time problems by planning ahead.

A kit purchase provides you with the plans, wood, and some miscellaneous hardware. Your first action should be to review the plans and materials provided in the kit, and make a materials list for the remaining items necessary to complete the model. You may already have some of these items in your salvage pile, surplus from previous construction, or in your materials on hand inventory.

The logistics of plan building are similiar to those of kit building except that, in plan building, you begin with the plans and **everything** else is needed to complete the model. I have mixed emotions about including a materials list as a part of the plans. It certainly would be more convenient, but on the other hand, there is something to be said for the familiarity with the plans which results from deriving your own materials list.

Armed with my materials list taken from the RCM construction article and reduced plan, I rushed over to the hobby store to take advantage of their 20% off sale. Wouldn't you know that their balsa sheet and plywood were "on order." However, I was able to get the other balsa stock that I needed including 1" aileron stock. I also took the opportunity to stock up on Titebond, epoxy, and other miscellaneous items that I thought I could use.

I decided to order the balsa by mail. My order consisted of 1/16" x 3" sheeting for the wings, and 3/16" x 4" sheeting for the fuselage sides and tail surfaces. 3/16" x 4" was not listed in the catalog. I interpolated the cost of 3/16" from other 4" sheeting listed, and specified that 3" width would be an acceptable substitute. My order arrived several days later with the acceptable substitute. Before the plans arrived, I was able to visit a full line model store in Sacramento where I found 3/16" x 4" sheeting and all remaining items on my list except two. I also took advantage of a special mail order price and ordered two rolls of MonoKote at $5.00 each.

The primary advantage of plan building is that you can carefully select all your wood. So far, I have had no complaints about the

Author holds model while Tom Vincent pre-flights controls.

R/C MODELS BUILT AND FLOWN

May 1972 — December 1973

Model #	Type	Power	Controls	Purpose	Active Service	Disposition
1	Topflite Headmaster	O.S. .19	3	Primary Trainer	6 mos.	Totaled: Equip. Failure
2	Topflite Headmaster	O.S. .20	3	Backup Trainer	10 mos.	Given to Flight Instr.
3	Sterling Fledgling	O.S. .35	4	Ailerons & Breezy Weather	14 mos.	Backup Model
4	Bridi-RCM Balsic Trainer	O.S. .25	4	Ailerons & Tail Dragger	9 mos.	Inactive Reserve
5	Hotlines Mini-Comanche	O.S. .35	4	Advanced Trainer Low Wing	3 mos.	Primary Model

In-flight photo of author's first scratch-built aircraft.

quality of kit wood. I always make a big show out of inspecting balsa for obvious flaws such as uneven cuts, warpage, knots or rotten spots, etc., and try to select the best from the available lot. An inspection of the mail order balsa revealed no such flaws. Which leads me to believe that the mail order shippers must be good balsa pickers.

CONSTRUCTION

A hobby provides relaxation from the pressures of job and everyday living. Each of us satisfies our individual needs by participating at our own pace. I am a slow constructor with most of my work taking place on weekends. An average model takes two to three months to complete. My construction surface consists of a 2' x 4' piece of fiberboard placed on a card table which is set up in the family room.

Building: You don't really appreciate all those pre-cut or die cut parts until you have to make them yourself. I followed Chuck's directions and laid out the parts using a felt tip pen. Some items were scaled from the plans. Curved parts were transferred via tracings. I made use of a friend's hobby jig saw to cut out the parts. This was my first experience with a jig saw. I soon discovered the difficulty of sawing a straight line. I sawed both plywood and balsa parts. An X-Acto knife and a straight edge would have done a better job on the larger balsa parts, but the jig saw really made easy work of the plywood parts.

I made a mistake in not cutting the wing ribs oversized. I had enough presence of mind to pin all ribs together for uniform sanding. There were some low spots after most of the ribs were smoothly shaped. This didn't seem to be a serious problem with sheeted wings, so I used them anyway making certain that ribs with low spots were not placed adjacent to each other — shudder, you perfectionists.

There is really very little that I can add to Chuck's excellent construction procedures. I made one minor modification that seemed like a good idea. I cut approximately 1" pieces off of the bottom of the rudder and the inside of the left elevator half. 3/16" plywood pieces of similar shape were epoxied in their place. This provides a better foundation for control horns, and tail wheel bracket in the case of the rudder. It is also advisable to mount the gas tank for easy removal through the forward bulkhead.

I had fun bending the 1/8" piano wire to form the landing gear. A pattern is shown on the plans. After several false starts, I managed to get some semblance of a landing gear to the soldering stage. The article mentioned that I.M. makes a wire landing gear suitable for this model. I was unable to find such an animal, and also could not find the Midwest Landing Gear Clips referred to in the plans. I ended up making my own clips from brass shim stock, and getting the wood screws from a Du-Bro Gear Strap-On set.

Finishing: I tried MonoKote on my first R/C model and have been using it since. I especially like MonoKote hinges because they make easy work out of attaching the

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SUREFLITE FLOATS

A HOW-TO FOR WATER FLYING

● Sureflite Floats are molded from expanded polystyrene foam and require no waterproofing, painting or any other surface preparation. A 3/8" x 1/4" stiffener is epoxied into the groove along the top of each float to provide a flexible backbone and a convenient place for landing gear attachment. The installation of this stiffener and landing gear fittings is all that is required to get you "out on the water". Be sure to use epoxy only during construction. Before we discuss the installation of these floats on your model, here are some points to remember:

(1) The step on the float bottom must be placed below or 1/2" behind the Center of Gravity (CG) of the model.

(2) The rear landing gear is attached above to 1" behind the step in the float.

(3) The floats must be parallel to each other.

(4) The floats should be mounted to fly straight ahead. No droop or drag.

(5) A wide placement is better than a narrow one.

ATTACHMENTS AND FITTINGS

There are two basic ways to attach landing gears and braces to the floats. These are referred to as the Tongue and the Plate methods, and are illustrated in Figures 1 and 2. Which of these you will use depends on the type of landing gear that you selected.

Tongue (Figure 1):

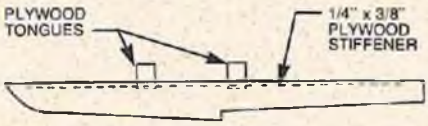

FIGURE 1
SIDE VIEW TONGUE METHOD

The tongue is used to provide a vertical mount suitable for attaching aluminum landing gear to the float. The tongue will provide a 1" x 1/8" plywood tab which is bolted to the vertical portion of the aluminum gear through the axle hole. This provides an excellent mount and, if possible, should be adapted to your model.

Before the stiffener is installed, determine the location for the tongue (s) and drill two 1/8" holes, one inch apart, through the stiffener. Then cut away the material between these holes to form a slot. Place the stiffener in the groove in the float (remembering not to turn it the wrong way) and mark the foam below the slot. Now cut a one inch deep slot in the foam.

When all tongue slots are cut, install the stiffener into the float groove and the 1" x 2½" x 1/8" tongues into the slots with epoxy. Be sure to get the epoxy to the bottom of the slot in the foam.

Brush or rub a thin coat of epoxy onto the exposed part of the stiffener to waterproof it.

The Plate (Figure 2):

The plate is made of 1" x 1" x 1/8" plywood, and is mounted as a platform horizontally on top of the float and is used to attach wire landing gears and horizontal braces. It is installed after the stiffener has been epoxied into the groove on top of the float.

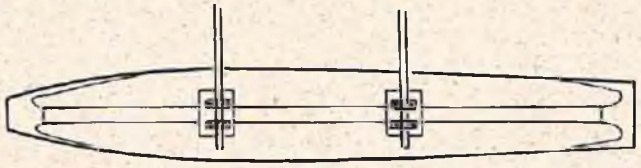

FIGURE 2
TOP VIEW PLATE METHOD

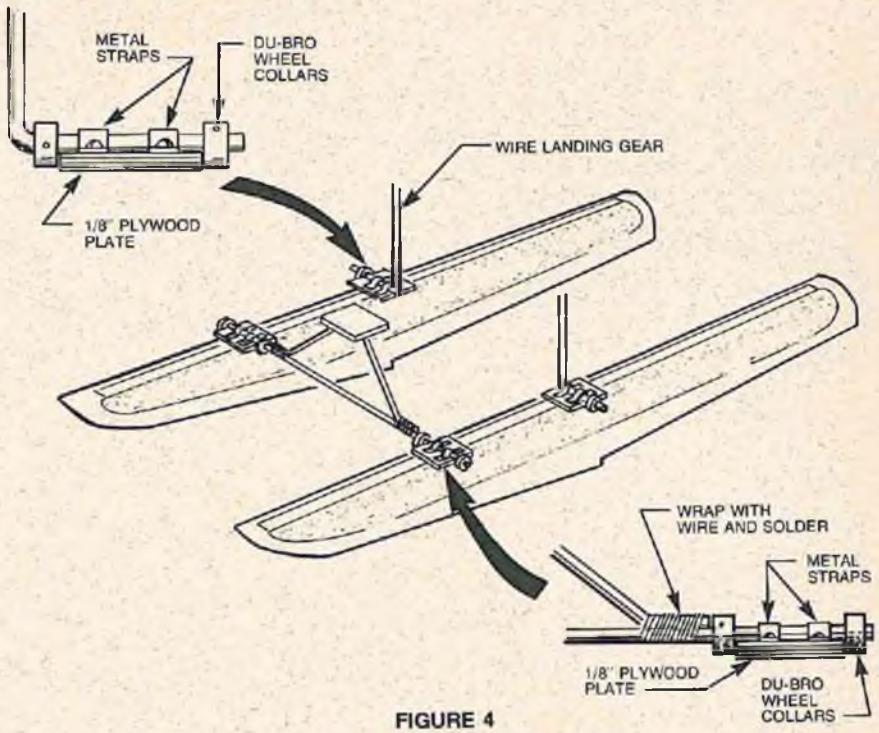

FIGURE 4

Locate and mark the desired position of the plate and cut a 1/8" deep notch into both the stiffener and the foam. Epoxy the plate into the notch and brush, or rub, a thin coat of epoxy on to the plate and stiffener to provide waterproofing.

The wire gear or brace is attached to the plate with metal formed landing gear straps. Wheel collars or soldered washers are used to keep the wire from slipping through the straps.

FLOAT INSTALLATION

Placement:

The height and width of the float installation depends on the type of landing gear used on your model. If the model tends to drag a wing when taxied cross wind with wheels, it will continue to drag that wing in the water. A solution to this is to replace the current landing gear with a wider one. If this

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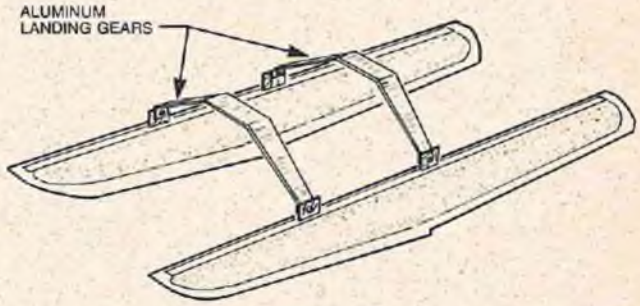


FIGURE 3

FLY-IN AT ALBUQUERQUE

BY BILL LASKAR

Some of the more than 1200 people and many RC models which show up for the Annual Fly-In held on Rattlesnake Airdrome in Albuquerque, New Mexico.

It was a great day for flying, and the 18th annual Fun Fly-In, sponsored by the Albuquerque Radio Control Club and held the last weekend in October, was about to begin. The fun started at Rattlesnake Airport, located high on a flat mesa near some extinct volcanos some 10 miles southwest of downtown Albuquerque, and named for the original inhabitants of the area. The paved field was built by the city several years ago to provide the RC modelers with a safe place to fly their planes and is a perfect place to have a contest — away from power lines, houses, and Sunday late sleepers.

Jim Baremore, club president, spent the preceeding day painting the runway boundries, spot landing circle and bomb drop targets, so everything was ready when the first spectators and contestants, some from as far away as Colorado, Arizona and Texas, began arriving about 9:00 A.M.

The first event was a timed spot landing. Other events included balloon bomb drops on a large 5 card poker hand outlined on the runway, with each contestant allowed 5 drops, hopefully all on the high card; pylon racing (with Ugly Stiks yet); carrier landings, and limbo.

To keep things simple, no overall entry fee was charged and no trophies or other awards were given. Instead, the contestant could enter any event of his choice by merely paying a small amount which was put in a kitty with the winner-take-all. Simple. And you could tell who the winners were by the big smile on their face. And young Randy Wright, no relation to Wilber, seemed to be doing most of the smiling!

The Saturday night banquet, held at the plush Four Seasons Motel, was followed by hanger flying sessions and other nocturnal activities. Those still able to fly the next day arrived back at the field somewhat subdued but still eager to have another go at the remaining events. And by noon everything was in full swing again and the 1200 spectators crowded the rope to get a better look at the 33 planes lined up in front of them and to watch C.G. Hoover, resident Ace, perform precision flying maneuvers while Rick Davey, TV Announcer, added a professional touch with his explanations over the PA system. Hoover did 4 point rolls ten feet above the runway and high speed fly-bys inverted and at waist level! Another crowd pleaser was the Powder Puff event, where women spectators, ranging in age from 11 to 56 were given the chance to fly an RC model with an experienced pilot and buddy box.

The limbo event, where the flyers had to fly under a crepe paper ribbon stretched between two wing shattering poles, drew cheers from the crowd every time a plane flew under. But those who didn't make it after three attempts were eliminated and the ribbon was lowered to the next notch. By the time it was lowered to a scant 24" above the runway, only three stout hearted men were still competing and, finally, with a steady hand and shaking knees Rick Davey zipped under the ribbon with barely an inch of light showing beneath his wheels — the undisputed winners.

By five o'clock the last airplane was packed away, the last broken prop was picked up, and a tired contest crew headed back down the mesa for home. And the rattlesnakes could relax again.

Until next weekend. □

ABOVE: Ed Killian, with his 6 foot wing span O.S. .80 powered "Big John" bipe. RIGHT: Jim Baremore scoots under the tape in the limbo event.

LEFT: Eutena Vanlandingham, age 16, gets a helping hand from Jim Baremore and Rick Davey on the buddy box. The gals were given an opportunity to fly an RC model during the Powder Puff event. ABOVE: Rick Davey eases .60 powered FB-100 under the ribbon with an inch to spare during the limbo event.

Gene Johnson loads balloon cup with water filled balloon for bomb drop event.

Rick Davey handled the PA chores and kept an eye on the transmitters and frequency flags.

A Big John from RCM plans, flys across the desert.

Carl Longfellow checks the gear on his scratch-built ME-109. This plane was a winner in the RCM Model of the Month Contest.

Randy Wright, winner of the carrier event, snags the first line with his Ugly Stik.

ABOVE: "Doc" Savage adjusts needle valve on .60 powered Top Flite P-40. RIGHT: Alan Chaulk with S.T. .60 powered Top Flite P-51.

What it's all about at a Fun Fly-In - - - Al Casey of Phoenix, Arizona, flies his Ugly Stik under the bar in the Limbo Event.

QUICKIE 500 RACES

Two Quickie 500's turning number three pylon.

BY DICK SONHEIM

● The Quickie 500 racing is turning into one of the greatest pylon racing events in the country. At the beginning of this year there was scheduled about five times more Quickie 500 races than Formula I races.

Glen Spickler, who has been the Official Starter for all the big Formula I races including the Nationals, saw the need for an event that could be flown by the novice or would be a fun event for the expert.

In order to fill this need, Glen designed the Quickie 500, for a One Design type racing event. All entrants would be required to use the same engine that would be equipped with a carburetor and must idle, and the fuel would be supplied by the Contest Director. The main idea of this event is that all the airplanes would be flying at about the same speed, thus putting the emphasis on pilot skill in getting around the pylons.

The Quickie 500 kit, as designed by Glen Spickler, is quick to build, very easy to fly, and can be used as a pylon racer as well as an everyday sport model. To give you an idea how quickly this kit goes together, I started mine on Monday, painted it Saturday, test flew it Saturday evening and raced on Sunday. Now I thought that was pretty good time until I met a flier from Bakersfield at the race who started his the day before, covered it with MonoKote, and flew in the race on Sunday!

Without using a wing jig, Glen makes it easy to build a straight wing. You simply glue the 1/8" x 1/4" tapered trailing edge to the bottom rib sheet and a 1/8" x 1/4" spruce spar to the bottom of the front sheet. Then pin down the front and rear sheets over the plans and install the center rib. After you fit the webs between the first two spaces, between the ribs, the remainder are cut to fit perfectly. A rib is glued in place and then the webbing on the leading and trailing edge, and then another rib, and so on. The webbing acts as a spacing guide for the ribs and there is no cutting and fitting.

The wing panels and fuselage can easily be framed up in one evening. Except for adding the capstrips on the bottom of the wing it is best to leave both wing panels pinned down to the board to dry overnight.

The man - - - Glen Spickler.

Since this airplane will be flying at speeds of 100 mph it is, therefore, very important that the center section of the wing be glassed with four or six ounce glass cloth that should be extended to the outside edge of the fuselage.

Whether you use MonoKote or silk, the Quickie will not weigh more than 3½ pounds. Because of the location of the landing gear, the aircraft tracks very well on take-off and does not have any ground looping tendencies. The Quickie is a relatively easy airplane to fly and, when slowed down for a landing, will not tend to stall or snap.

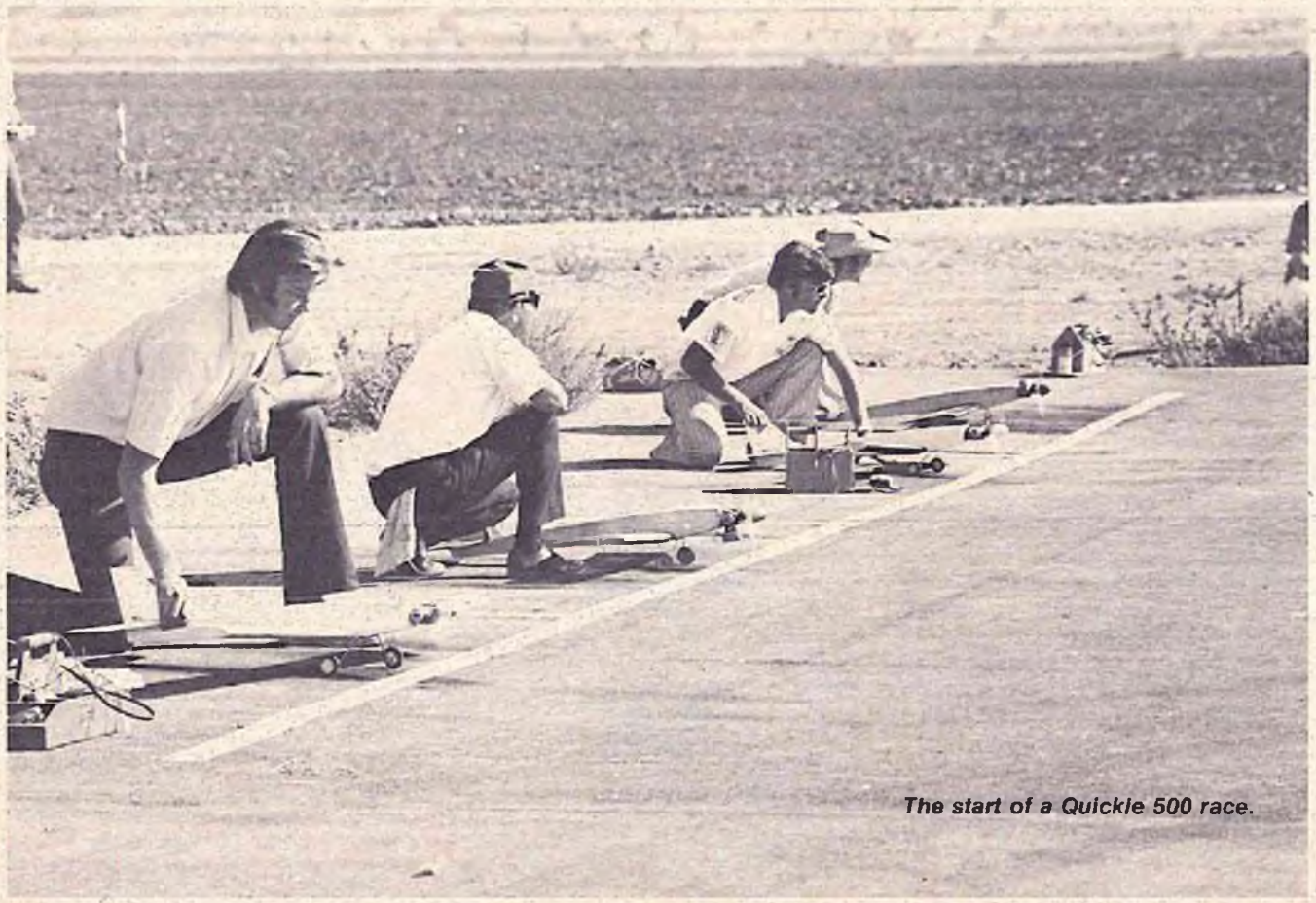
The following are the rules for Quickie 500 racing, often referred to as the 'Bakersfield Rules':

Wing Span: 50 inches minimum; Thickness: 1.2"; leading edge radius as per plan; ailerons may be modified to box type; Fuselage: Maximum radius on all corners 1/8"; may be enlarged in height or width to accomodate all the radio gear, may not be reduced from sizes shown on plans. Stabilizers: Minimum thickness 1/4". Vertical fin may be moved to the rear to allow full height rudder in conjunction with split elevator. No major change in plan shape or any reduction in area is allowed. Landing gear: 2¼" minimum diameter wheels any type, 5/32" wire struts any length, no sheet aluminum landing gear. Gear must be fixed, conventional type, and attached to the fuselage in the location shown on the plans. Weight: 3 pounds minimum. Propellers: Stunt type, may be

At right, Jay Replogle and his "Evil, Wicked, Mean & Nasty" Quickie 500. One of the main reasons for the popularity of this event is the speed with which a Quickie kit can be built. Glen demonstrated this by building one during the course of a Valley Flyers club meeting!

modified. (No racing tooth-pick props allowed.) Engine: K & B Series 70 or 71 front intake with Perry Carburetor and exhaust baffle. No modifications allowed. Spinners allowed, but no cowlings may be used. Any type motor mounts permitted. Pressure fuel systems allowed. Fuel: Furnished by the Contest Director and either K & B 500 or 10% nitro home brew. C.D. may require engine to be torn down at his own discretion to prove stock condition.

As we said in the beginning, this is intended to be a fun event and will bring a lot more fliers into the sport of racing. You can be sure that there will be small groups of people who will attempt to change the rules and attempt to make another Formula I event out of this class, and in so doing, will defeat the purpose of the Quickie 500 event. Let's keep this popular event simple, as originally intended, and abide by the **intent**, as well as the **letter**, of the rules. In so doing, the Quickie 500 races will continue to increase in popularity, providing a sport racing event that will provide both fun and challenge for all participants. □



The start of a Quickie 500 race.

NRCHA

BY DON DEWEY (N1A)

BY DAVE KEATS (N66E)

Although the R.C.H. Jet Ranger Helicopter enjoys the notoriety of being the only mass-produced helicopter to no longer be produced, I find my modified machine to have none of the faults and complaints that put R.C.H. under! I rate my machine's hovering quality equal to, or better, than anything currently available. Although it does have one quirk in forward flight, and although it is of no consequence, it should be mentioned that it has a rather slow recovery from a nose-down attitude, such as coming out of a wing-over or recovery from a race horse start. I've found proper trim on fore-aft cyclic to be that, in the hover mode, the helicopter should have a tendency to back up. When you break out into fast forward flight, that trim setting will convert itself into proper flight trim. Due to poor gear selection for the transmission ratio to main rotor, the R.C.H. machine has rather poor vertical rise capability. However, due to its slim shape, I would qualify its flat out forward flight speed as better than anything currently on the market.

For some reason (probably the offset fin), tail rotor yaw is almost non-existent in forward flight with good control both in right and left hand turns. A mild wing-over is about the limit of its acrobatic capabilities, and I've yet to do continuous spin arounds in vertical ascension without it squirming out before completing its second 360°. Mechanically, I have had no failures as the mods are presented here. Currently, the machine has a log time of over 50 hours, so some of my changes must have been worthwhile.

I've had several crashes with this machine, all involving the right-left cyclic servo. Every time I checked the servo, I couldn't find anything wrong; this included vibration checking, high temperature operation, and replacing both feedback pot and motor twice. After my last crash, I decided to check back in the wiring harness and the extension cord I had made — well, lo and behold! I found a cold solder joint on the extension plug. As I have built virtually every radio I fly from raw kits, the words "cold solder joint" have never risen its ugly head! It just goes to show no one is infallible and if I hadn't been so bull-headed about my own workmanship, I would have found the problem after the first crash. What this all leads up to is **never presume** anything, especially with choppers! As this really isn't a construction article per se, the mods will be covered by text and pictures.

Rotor Head & Mast

Ref. Pictures 1 through 4.

Disassemble the head and check base plate, if pitch was twisted into the base plate, discard and make a new plate. You only want the coning angle bent into the 1/4" base plate and it should be bent at the pushrod holes and not at the center. Reassemble the base plate with the side pieces, making sure the 5/16" holes are parallel and perpendicular to the base piece — easy so far, right?

Drill and tap the top of the crosspiece (6-32) for the spade bolt. Also bore out the piece so that the new 3/16" flybar is a loose fit. Cut a new flybar from 3/16" cold rolled, or drill rod, 28" long and polish down if necessary for a slip fit through new 3/16" x 5/16" bearings. Wash the yoke, crosspiece, and 4-40 shoulder bolts thoroughly in thinner to remove all oil and Locktite from the pieces. You will have to shorten the 4-40 shoulder bolts so they won't interfere with the new flybar. Reassemble this assembly using only "Sears Filled Epoxy" — Loctite just won't do it. Bore out the Hiller paddles to 3/16".

If there isn't a third set screw on the bottom of the paddles near the outside end, drill and tap an 8-32 hole 1/4" from the end, to give an extra hold on the flybar. Slip one paddle on the flybar, lightly tighten the 8-32 set screw, remove the paddle, and file a flat in the flybar. Re-install that paddle, install the other paddle and line it up parallel with the mounted paddle. Repeat the flat filing operation, re-install that paddle, and make sure both line up when the 8-32's are tightened. Correct the flats as necessary. **Do not** file flats for the set screws on the inboard side of the paddles. You could have a catastrophic failure! Now assemble the rotor head parts and flybar assembly, boring out the control arm collar and using a new 3/16" collar on the other side of the head. NOTE: The vertical spring stand-off on the blade holder is 1" tall with the spring retaining hole 1/8" below the top. Working down the mast, you will note that I have removed the original swashplate driver and pin and installed a flying fork as a pushrod follower. The stand-off tube under the follower is 1¼" long. My swashplate to rotor head pushrod driver pin is 7/8" from the center of the Rocket City ball to the edge of the swashplate.

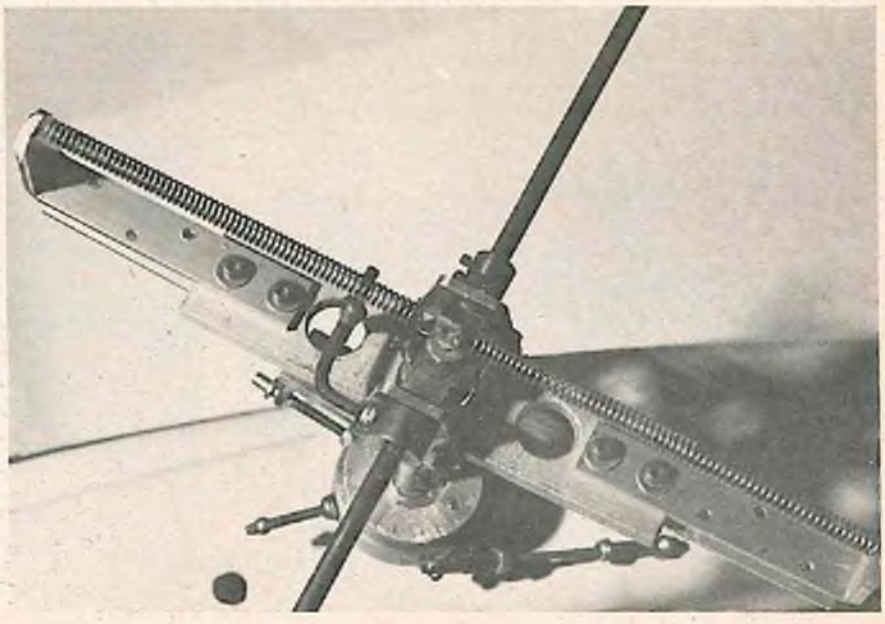
I am also using 4" of 1/4" I.D. tubing up against the underside of the turret bearing with a 1/4" collar for stress relief of the transmission and taper pins (See Pictures 2 and 3). (Rotor blades and pitch setting will be covered at the end of the text.)

Engine Cooling and Pilot Bearing

How can I say cambered impeller blades just won't make it? For our application, flat blades are a must! Take the camber out (Picture 5). Remove the clutch bell from the transmission and shorten the input shaft 1/8". Temporarily re-install the engine and figure out what length to cut the steel prop extension nut down to set the clearance for the 1/8" and 1/4" flange bearing that fits

text to page 90

PHOTO #1: Top view of the rotor head.



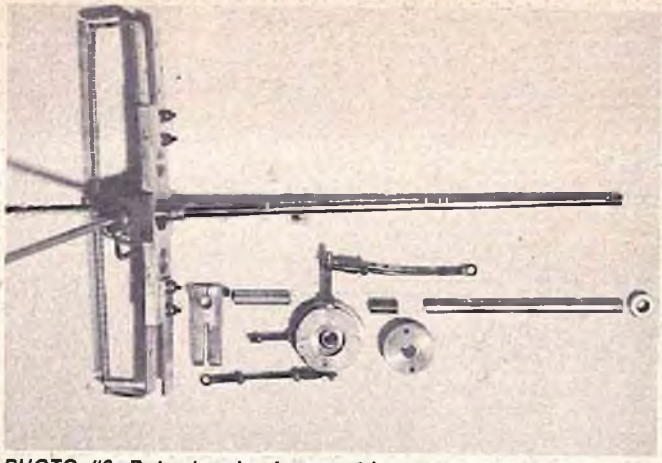


PHOTO #2: Rotor head sub-assembly.

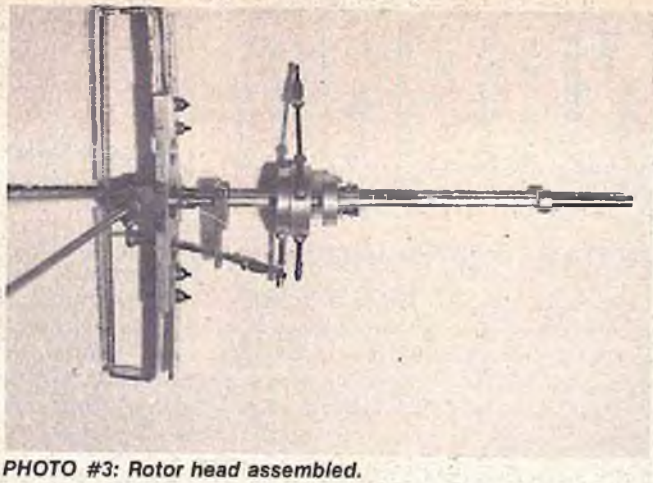


PHOTO #3: Rotor head assembled.

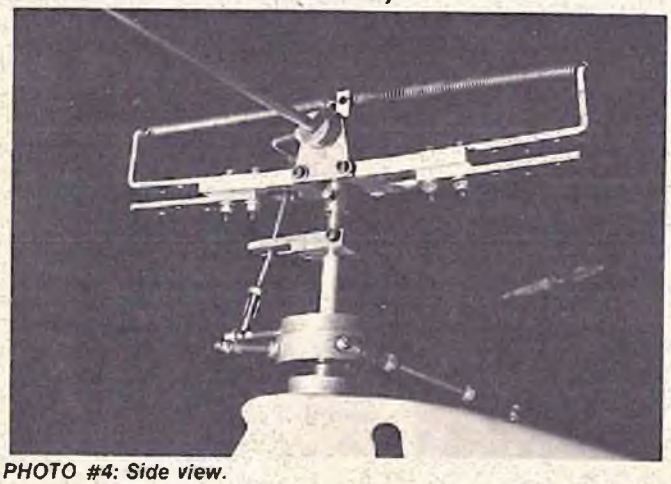


PHOTO #4: Side view.

PHOTO #5: Cooling fan change and pilot bearing.

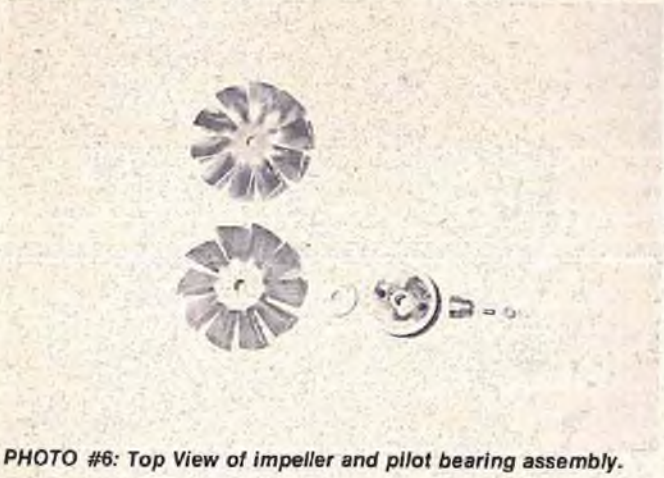


PHOTO #6: Top View of impeller and pilot bearing assembly.

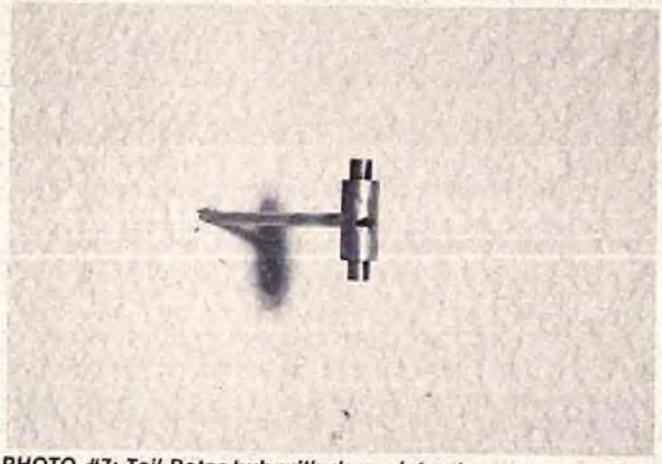


PHOTO #7: Tail Rotor hub with deep slot cut.

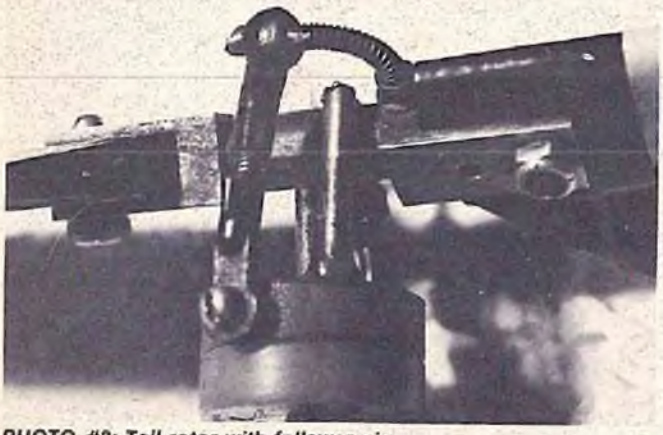
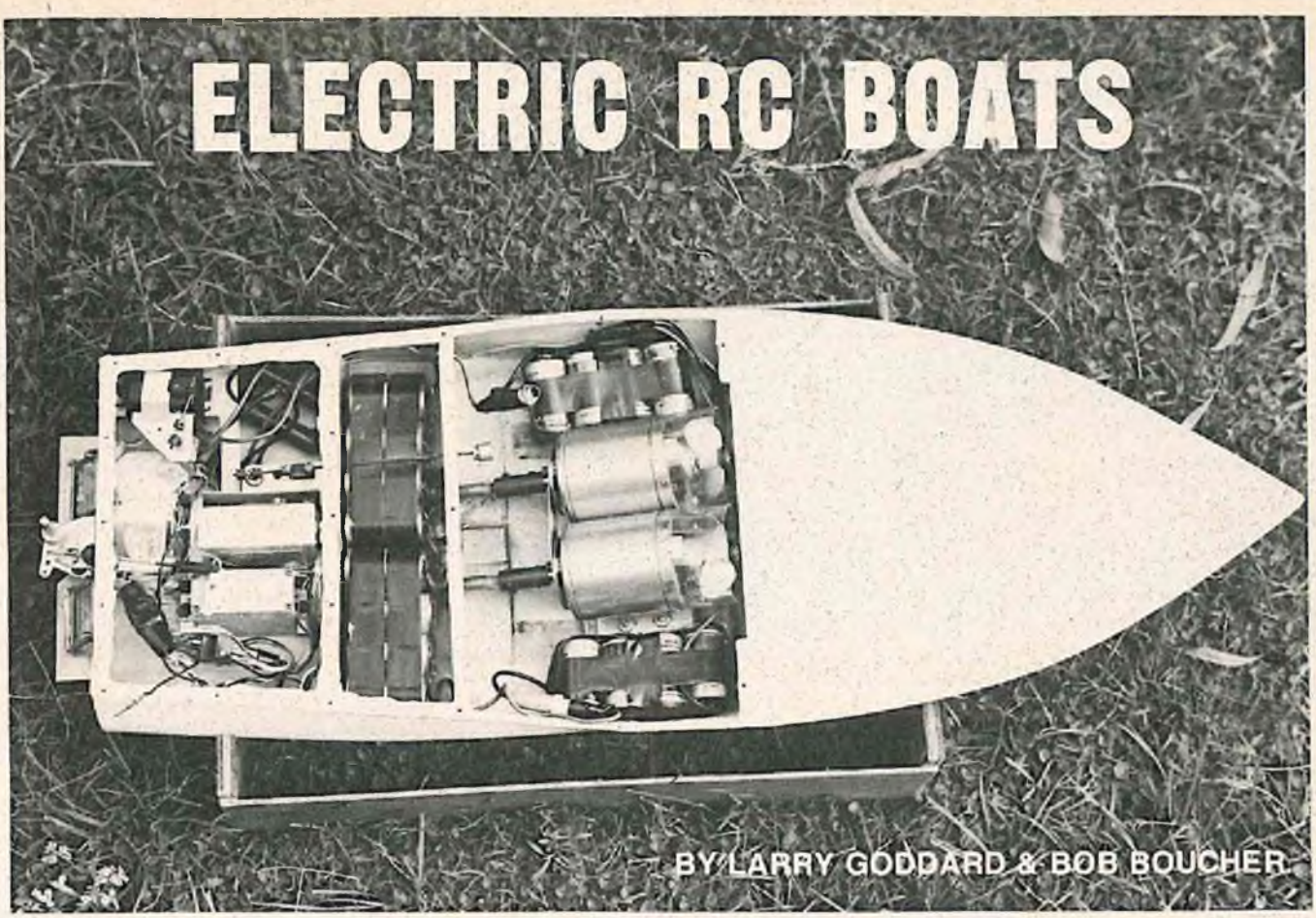


PHOTO #8: Tail rotor with follower pin.

PHOTO #9: Side view of rotor head.

ELECTRIC RC BOATS



BY LARRY GODDARD & BOB BOUCHER

Top view of Larry Goddard's Dumas SK-20 removed to show motor and battery installation.

Dumas SK-20

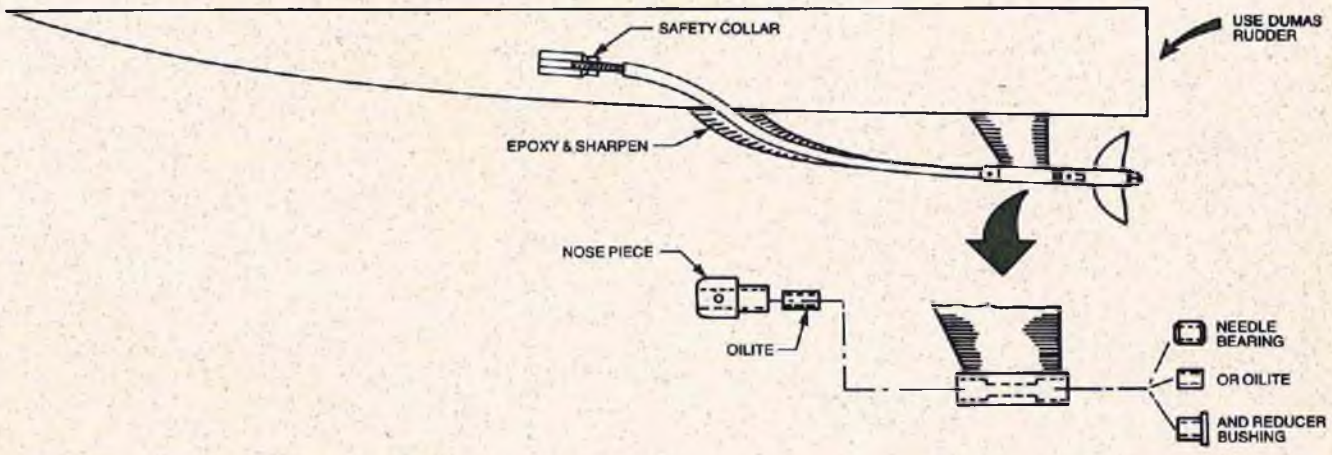
I have been fascinated by electric speed boats for some time now and my first try at a high performance boat used an Astro Flight 25 system in a Dumas SK-20 hull. This combination was a lot of fun and would skim the water at 19 miles per hour. I thought that was pretty fast for an electric, but then I learned about Gary Preusse setting a new US record of 26 miles per hour with the same motor and a hydro of his own design. This was a challenge that just had to be met!

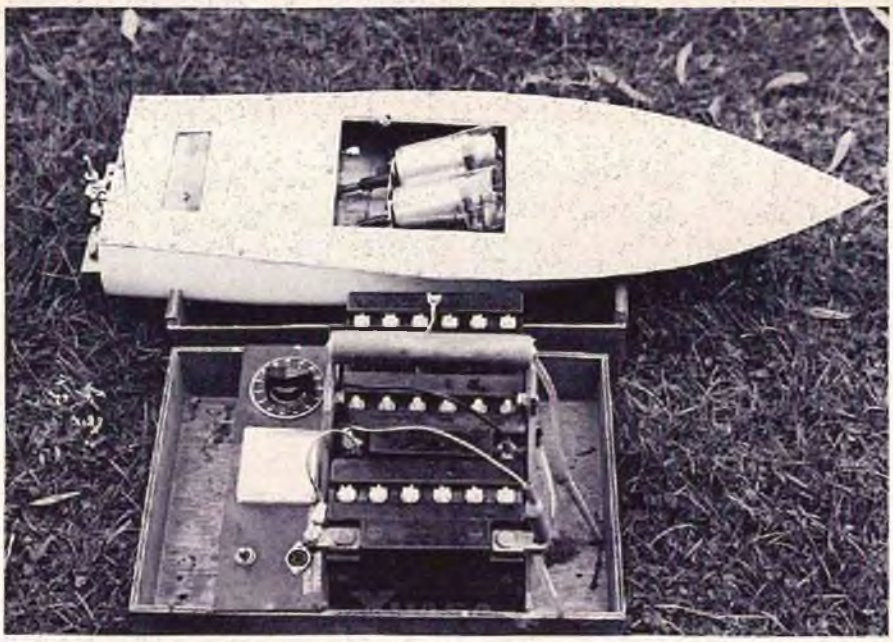
Since I liked the SK-20 design, I wondered if two electric motors would substantially increase its speed, and decided to find out. Since the second motor would make the stock SK-20 overweight, I decided to save a few ounces by substituting a 1/64" plywood deck in place of the fiberglass one provided in the kit.

A couple of weeks later, all was ready for the first trial run. I put the twin electric SK-20 in the water at Legg Lake and hit the throttle. She leaped up out of the water and started to cross the lake. At the far end, I decided to turn her and bring it back for a close pass in front of the camera. Applying full left rudder, there was no response but, with full right rudder, it turned immediately! Due to the torque, left turns were impossible and it was back to the drawing board!

That night I called Steve Muck, the local boat wizard, and he suggested counter rotating props. The result was the elimination of torque. A couple of weeks later, a new prop was installed and we were ready for action. This time it turned

MARINE SPECIALTIES FLEX SET UP (STRUDDER OR STRUT) (BORED FOR OILITES)





The Dumas SK-20 shown with field charger. This unit charges the boat batteries in 15 minutes and has compartments for transmitter and accessories.

beautifully in both directions. As a result, we set up the stop watches and gave her a full charge. The result, was that we clocked in at 24 miles per hour — 2 miles per hour below Gary's record, but good enough for the electric speed record for Legg Lake.

Wait until next year — maybe four props? But enough talk of records — let's get on to construction.

Construction Notes:

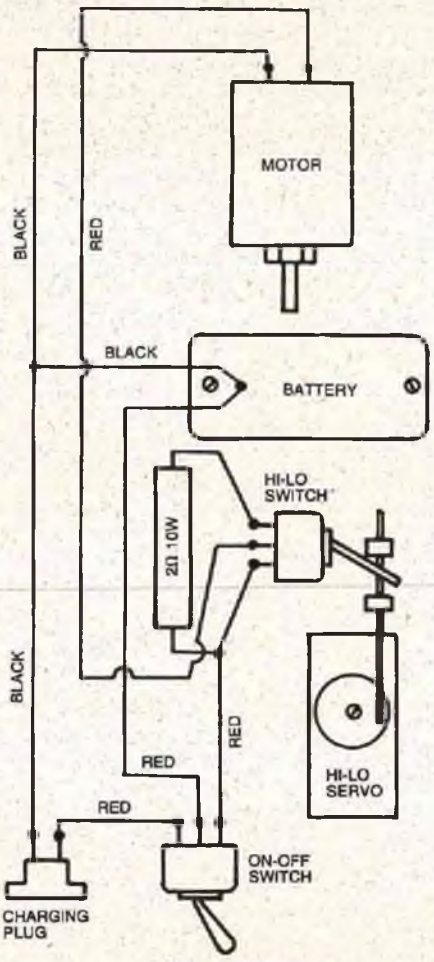
Using the Dumas SK-20 fiberglass kit, most of the building is already done. It's really just a matter of installing the gear and then putting the top deck in place. As previously mentioned, I used a sheet of 1/64" birch plywood instead of the glass deck to save weight. The motor mount used was home-made, but I now have the Astro Flight Marine Motor Mount and Cooling Fan which is all finished for you. I would highly recommend the use of this equipment. For the drive line you can use the standard Dumas hardware or flexible speedometer cable as I did (see diagram). The Dumas rudder works satisfactorily with counter rotating props, so I recommend that piece of hardware as well.

Don't forget the cooling fan on the motor. It **is needed** and without it you will get one run of about one minute! Remember we are asking these motors to deliver almost three quarters horsepower and that takes a lot of juice! Since the batteries are delivering over 20 amps, they need some cooling. For this purpose I put air scoops on the rear deck for more cooling and it worked quite satisfactorily.

The Astro Flight electric system and the fiberglass Dumas SK boat makes a project that is a lot of fun and saves a lot of time over normal boat construction techniques.

Dumas Deep-V 20 Electric

Although electric RC boating has been around for many years and, in fact, Astro Flight motors now hold three US speed records in special boats designed and built by Gary Preusse of Chicago, Illinois, somehow I always wanted to try one but never seemed to have the time. This year, at the Nurenmberg Toy Fair, where I shared a booth with Jay Brandon of Dumas Products, I casuallly mentioned this interest to Jay and asked him if it was much work to fit one of his fiberglass Deep-V 20 boats with an Astro Flight 10 Marine System. Jay said he figured it would be no more than a few nights work and promised to send me one when he returned to the states.



WIRING DIAGRAM

After the show, I visited Austria and England and spent an extra week on the Continent. On returning to the office at Astro Flight, there was a big box waiting for me on my desk. Opening the box revealed two ready-made beautiful fiberglass boats - a Deep V-20 and a Deep V-40 with all the necessary hardware. This time I had to do it!

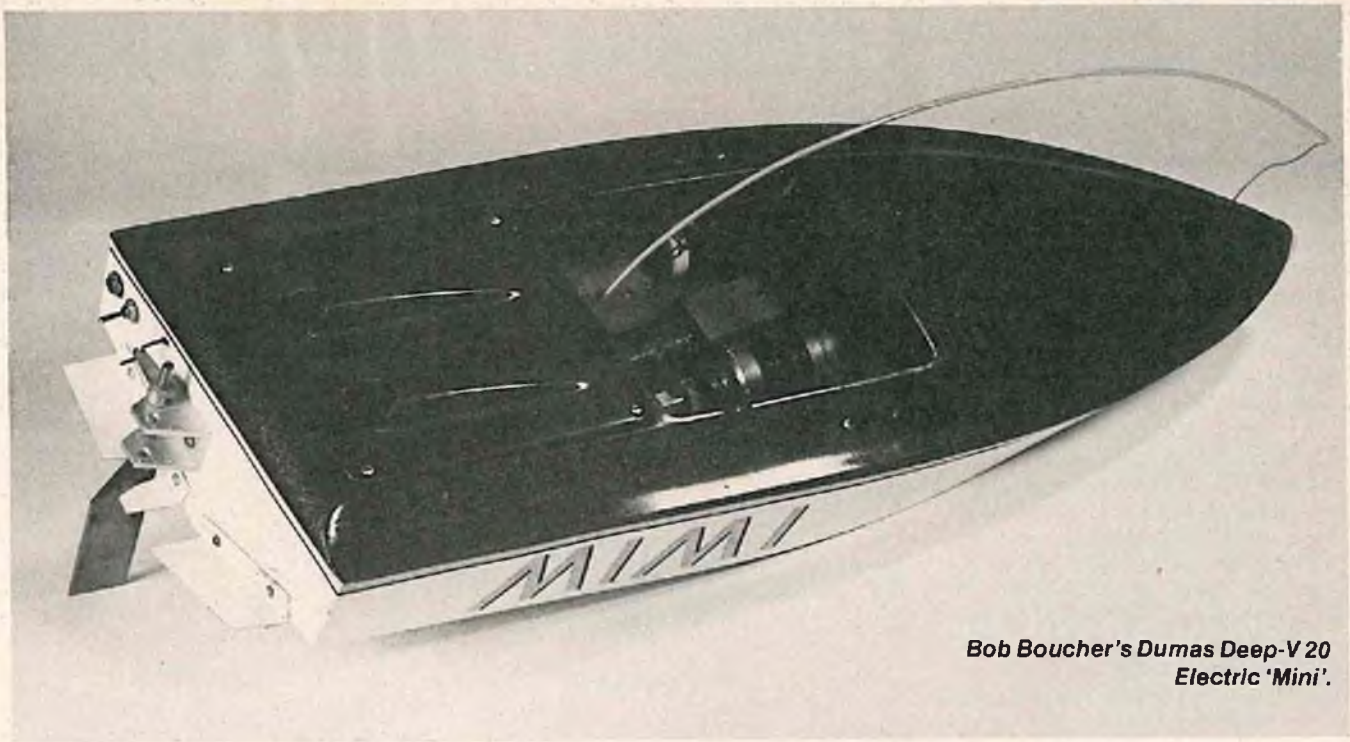
Since the boat is fiberglass, all that is necessary is to assemble the drive train and install it in the hull with resin and micro-balloons. Be sure to make a tray for the radio and servos, and then install the beautiful metal-flake top deck in place. The complete operation took about 10 hours of work extending over three days. The operations were performed in the following sequence.

First, open the hardware bag and assemble the drive train components. Follow the diagram which comes with the boat. I found that the notch in the prop, which engages the prop drive dog was a bit small. This is easily remedied with an X-Acto knife since the prop is made of nylon. Put some 3-in-1 Oil on all parts before assembly.

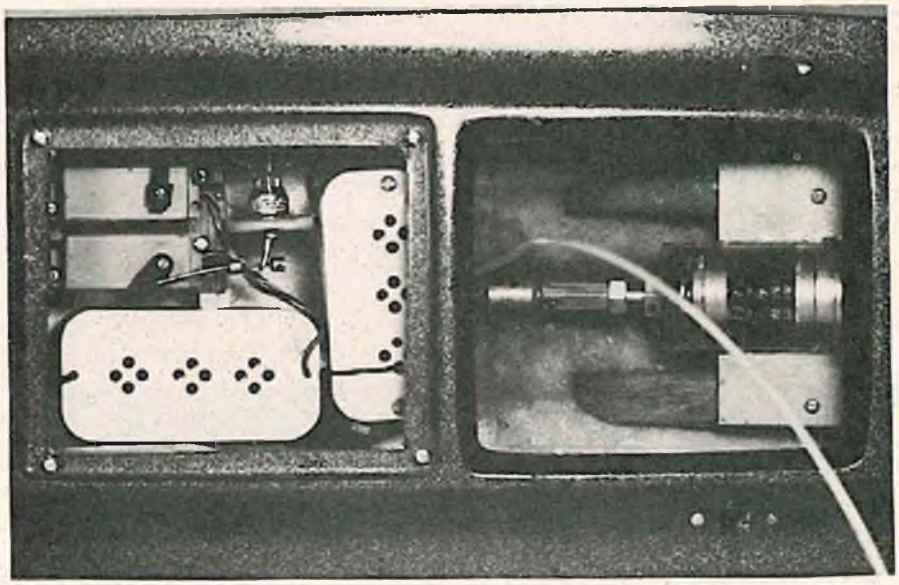
Next, drill and file a slot in the keel to accept the stuffing box. The latter is beautifully made and contains two roller bearings. I drilled two 1/4" holes — one 5½" and the other 4" from the transom — and filed the slot with a rat-tail file. When this was done, the stuffing box was installed with the prop set at the transom with 1/4" clearance and the motor end aligned with the centerline of the hardwood motor mounts. Everything was held in place with masking tape and a batch of resin and micro-balloons poured into the hull to secure in place. Put some tape around the front bearing and drive pin assembly to prevent getting resin into this area.

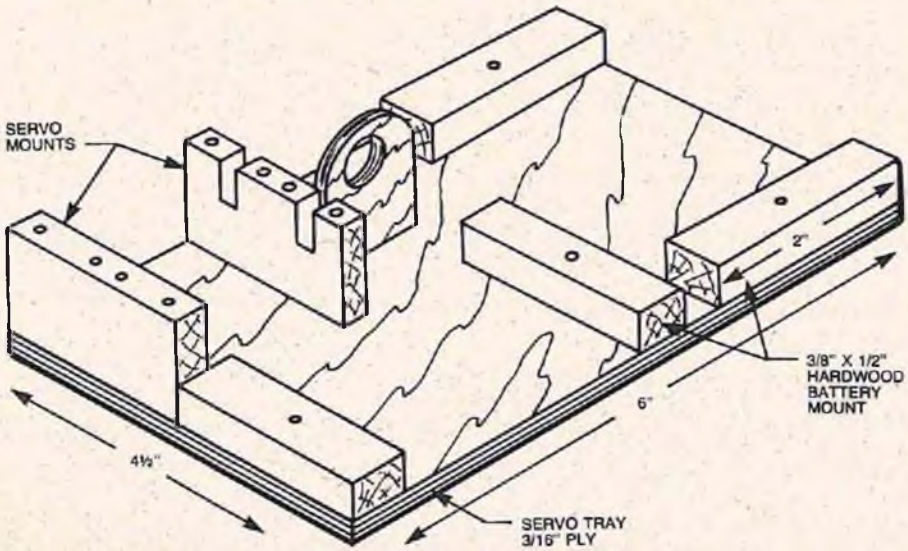
The motor mount was fabricated from a piece of scrap 1⅝" diameter plastic tube and a 3" x 3" piece of 3/16" thick plywood. The plastic tube was cemented with Ambroid glue and the complete assembly waterproofed with a coat of K & B polyester resin. Motor cooling is assured by mounting a cut down Cox 3/2 prop on the motor shaft behind the aluminum prop adapter.

The servo tray was fabricated outside the boat on a piece of 3/16" thick plywood, 4½" x 6" in dimension. The propulsion battery is held in place by two 2½" long 6-32 screws going through the battery case and into blind nuts in the plywood. A 3/8" spacer to provide air circulation under this battery, was made from two pieces of scrap motor mount stock. When completed and waterproofed with one coat of resin, the tray is dropped into the hull and cemented in with resin and micro-balloons. Next, install



Bob Boucher's Dumas Deep-V 20 Electric 'Mini'.





the rudder, hook-up the servos, and make sure everything is working.

At this point, I couldn't wait and took the complete boat, less the top deck, to the pool for its trial run. I was lucky and ran the boat almost twenty minutes before the water spray got to the radio and the boat went out of control at top speed straight for the side of the pool. Luckily, my 11 year old daughter caught the boat just in time. So, be forewarned — wait until your boat is finished before truing it out!

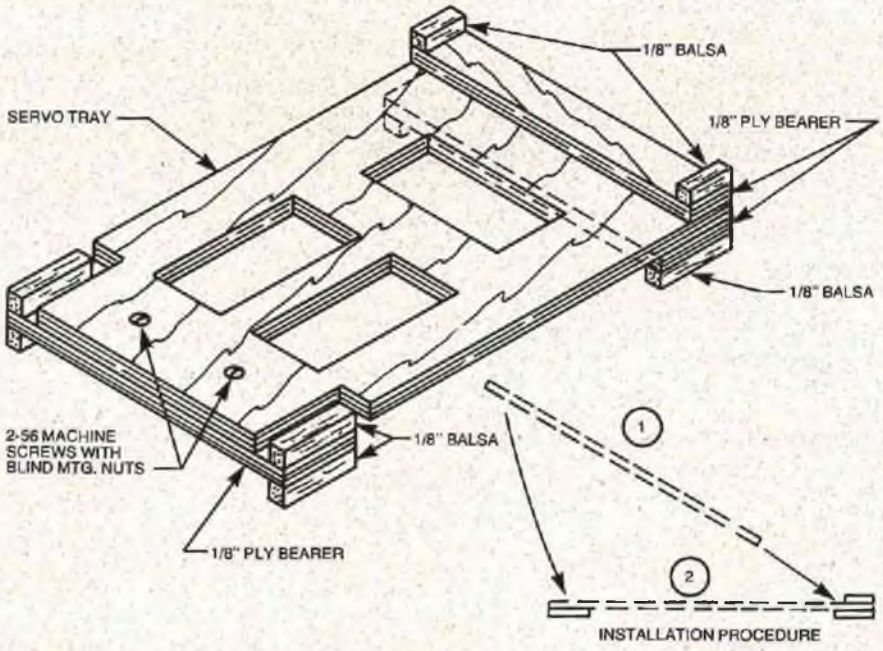
Installing the top deck requires that all removable objects such as the motor, batteries, servos, and receiver, be taken out of the boat. The top deck is then fastened to the hull with masking tape every inch or so and a layer of 2" wide tape is resined all around the joint inside the boat. If you have a brush with a 10" long handle, you will be able to reach every corner of the boat. It's a little sloppy, but not at all difficult.

For a throttle, I used a two speed motor control consisting of a servo driven SPDT switch and a 2 ohm, 10 watt resistor as shown in the accompanying diagram. With this set-up, low power is about 2 miles per hour and high speed will plane the boat nicely. It appears that the speed is between 10 and 12 miles per hour and very realistic. With a Rocket City extra long servo arm on the rudder, I was able to race around a standard size swimming pool with only an occasional bump on the side, although the boat is much happier in larger quarters. If you are going to run in a lake or deep water, be sure to put enough foam into the boat to prevent it from sinking if you accidentally capsize.

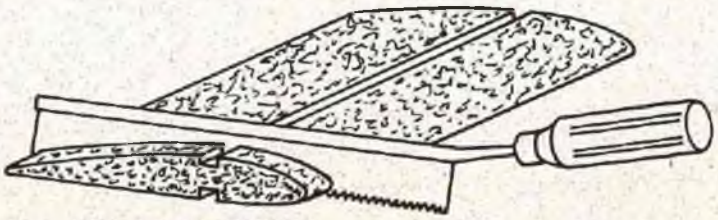
In conclusion, it can be said that the Dumas Deep-V 20 combined with an Astro Flight 10 Marine Electric System are blissfully compatible — all in all, a very relaxing and enjoyable project. □

FOR WHAT IT'S WORTH

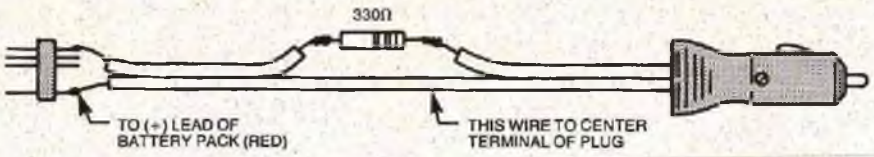
In certain R/C models it is desirable, or necessary, to secure one end of the servo mounting tray in some inaccessible place, such as forward under a windshield on a high-wing ship. As the fuselage is assembled, provide two 1/8" plywood bearers, the top one narrower than the lower, as noted on the drawing. The space between the two bearers is sufficient to provide a gentle force fit when the servo tray end is slipped in-between. Thus, the inaccessible end of the tray is secured by the two bearers. The other end is secured by one bearer beneath the two 2-56 machine screws. Note that the bearers are reinforced by 1/8" square balsa strips which are secured with epoxy glue. According to Mike Jablonski of Bethlehem, Pennsylvania, this can be used to good advantage on many smaller aircraft such as the Goldberg Half-A Skylane. To install the tray, start in position one, drop the rear of tray slipping the tray into position two.



Recently, Larry Osborn of Pueblo, Colorado, has been making wing panels using the following method: First, Larry cuts a foam wing of the airfoil needed and then takes an X-Acto saw and slices 1" slabs of the foam off to make up the ribs for his wing. While doing this, Larry cuts the 6" section of the foam wing in half and bevels the end of this piece to make a center section for his wing. This section then has the correct dihedral in it similar to a normal foam wing. The wing is then built using balsa trailing edges and 1/4" balsa spars. The wing is finished by using leading edge sheeting, cap strips, and shear webs. The prototype wing, using this construction, was built in one day and used on a scratch built biplane. Each panel of the biplane weighed less than three ounces. These wings survived a crash which totaled the plane but did not injure the wings at all. Presently Larry is building three Quarter Midgets using this lightweight but extremely strong wing construction method.



A 220 mah battery pack is very handy in those two or three channel lightweight models which are becoming so popular, but such a pack should not be charged using a fixed-rate charger designed for a 500 mah pack as the current level will be much too high. The charger described by Don Tankersly of Kinsington, California, is designed to charge such a battery pack at the recommended 18-20 ma rate. The total cost, if all parts were purchased new, would be about $1.50, but this can be reduced to 15¢ or so if you have the usual junk assortment in your shop. The parts you will need are a three foot length of lamp cord, a plug to fit an automobile cigarette lighter (available from Radio Shack or salvaged from a discarded baby bottle warmer) a plug to fit your battery pack, and a 330 ohm, 1/4 or 1/2 watt resistor. Wire these components as shown, being careful of polarity — wiring shown is for a negative-ground automobile (almost all are). The resistor gets warm, indicating proper charging current.

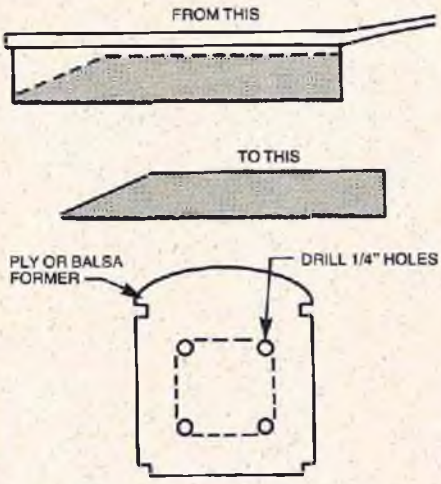


Ralph J. Leidner, DDS, of Coral Gables, Florida, recently had to repair some damage to his fiberglass T2A fuselage at an internal area on the belly just behind the wing. The area was inaccessible to apply epoxy glue by brush. To solve this problem, Ralph took a piece of clear plastic film (Saran Wrap, Baggie, etc.) and cut it slightly larger than the area that he repaired. He then coated it with Formula II Hobbypoxy. Next a layer of "Easy-Does-It" cloth was added. Finally a coat of glue was applied to the top of the cloth. Ralph then picked the patch up by the clean side of the clear plastic and pressed it into place with his fingers. After the epoxy cured, he removed the clear plastic film and had a beautifully formed patch covering about a 3" square.

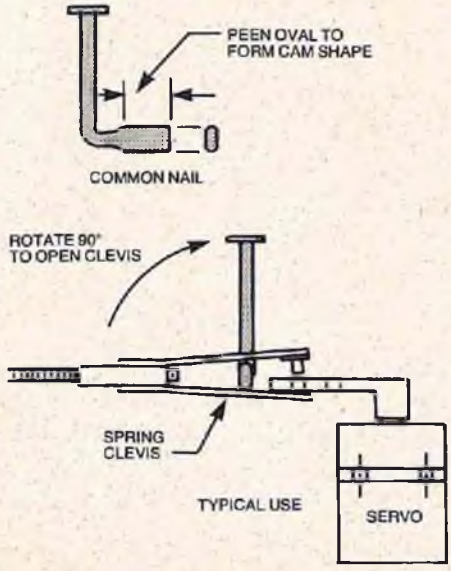
The very useful Razor, or Zona Saw set can be made even more versatile by trimming the thick rigid backing from one

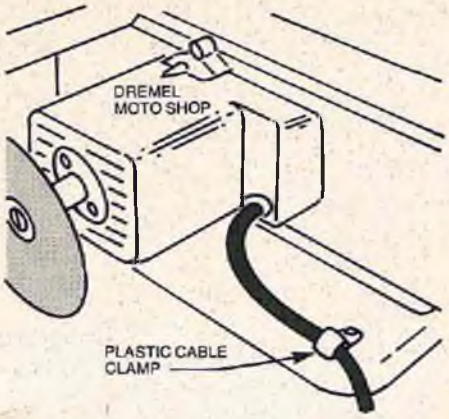
FOR WHAT IT'S WORTH

of the blades and reshaping as shown in the sketch using tin snips. Use this modified blade in sabre saw fashion to cleanly remove die cut plywood and balsa kit parts by "chasing" the part outline prior to pressing the part out of the die cut sheet. When cutting rectangular access holes in plywood or balsa parts such as formers, drill a 1/4" hole in the corners of the hole location, then use this modified razor saw blade to cut between the holes to remove the center piece. Finish up with a file and sandpaper as needed. This blade will also cut deeper than the unmodified version because its progress through the material being cut is not hindered by the rigid back piece. This suggestion was submitted by Earl Milliron of Portland, Oregon.

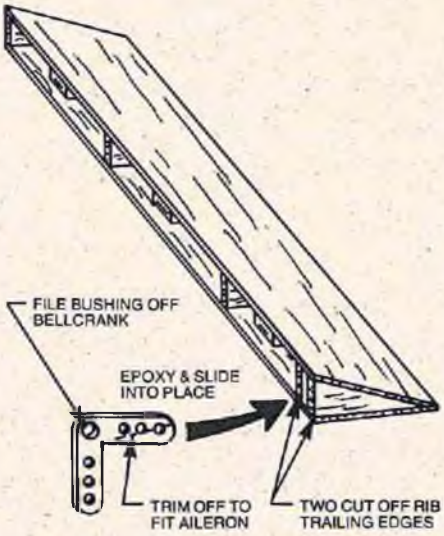


To open spring type clevises, such as the Kwik Link, without risking control horn or servo actuator damage, use a tool fashioned from a nail as indicated in the sketch submitted by Richard Lafever of York, Pennsylvania. Simply saw the point off of the nail, bend it 90 degrees, and peen the end flat until 90 degrees rotation opens the clevis adequately to slip it on or off as required.





Ken Gardner of Salt Lake City, Utah, writes that, the first day that he purchased his Dremel Moto Shop, he was having so much fun that he didn't notice the sanding disc grinding away at the electrical cord. The latter comes straight out of the motor housing right behind the disc. To prevent a hazardous condition from developing, Ken placed a plastic cable clamp, available at most electrical stores, on the cord and secured it to the frame by attaching it under the screw that holds the right rear foot in place. Now the cord is held in a safe position away from the sanding disc.



Here is a suggestion for making a light and strong aileron horn for 1/16" built-up sheet balsa ailerons which have worked very successfully for the father of Allen Johnson of Palm Desert, California. First, you take your 1/16" sheet balsa aileron and glue two cut-off rib trailing edges on the end as shown in the sketch, leaving enough room for an aileron bellcrank to go in between them. Next, file the bushing off the aileron bellcrank and epoxy it in between the two rib trailing edges. Put in your hinge blocks and cover the front of the aileron with 1/16" sheet balsa.

"Building the second side on top of the first . . ." has never seemed to be the easiest way to get duplicate fuselage sides when using stick construction. Here's an alternate method suggested by George A. Polk of Chester, New Jersey. Carefully pre-cut all longerons, cross-pieces and diagonals, making duplicate pieces as you proceed. Lay one set aside, then pin the other to the plan and glue together in the usual way. After the glue has set, preferably overnight, pull out just a few pins as necessary to remove the assembly. Do not remove the pins on the outside of the longerons if possible. Do not shift the plan on the building board. Build the second side in the same sequence as the first, using the same pin holes through the plan. The sides will be identical — they can't be otherwise.

Michael Vinciguerra of Akron, Ohio, suggests that, for the hobbyist who likes to do nice work and takes pride in his construction, he will find that the Head Band Magnifier can help him do even better work. Detail work can be improved, joints can be made to fit better, sanding of bare wood can be sanded smoother, as well as doing a better job of rubbing down a finish. An inexpensive Head Band Magnifier with two power can be purchased for about $3.00.

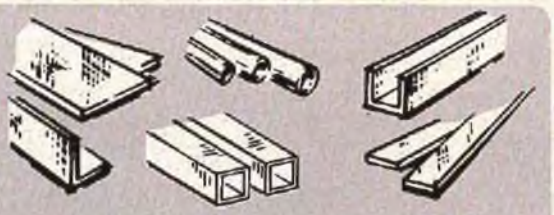
Terry Terrenoire of Endicott, New York, suggests that you can have all the triangular stock you will ever use for one-fifth the price of pre-cut stock. Simply take your Dremel Jig Saw, tilt the table to 45 degrees, then clamp a straight piece of hardwood level from the front to the rear and just touching the blade from the low side. Now, simply slide your square stock of any size through the blade and you will have two nearly-perfect triangles. Even 36" and 48" pieces present no problems as they will bend to clear the throat.

Handi-Wrap makes a clear plastic Ziploc Bag that measures 11" x 11" and are packaged twenty to a box. The bags can be used to protect your R/C transmitter. If you happen to get caught flying in the rain, simply slip the transmitter into the bag and zip the bag from either end toward the antenna. You will still be able to move the control sticks very easily. With the transmitter antenna collapsed, or removed, you will have a great dust-free container. Once you try these bags you will find many more uses for them. This idea was submitted by Joe Oltra of Monroe, Connecticut.

Leon A. Katz of Palm Beach Gardens,

to page 90

K&S FOR TUBING



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102	1/8	.25
103	5/32	.25
104	3/16	.25
105	7/32	.30
106	1/4	.30
107	9/32	.35

ROUND BRASS TUBE (12")

125	1/16	.20
126	3/32	.25
127	1/8	.25
128	5/32	.30
129	3/16	.35
130	7/32	.35
131	1/4	.40
132	9/32	.45
133	5/16	.50
134	11/32	.55
135	3/8	.60
136	13/32	.65
137	7/16	.70
138	15/32	.75
139	1/2	.80
140	17/32	.85
141	9/16	.90
142	19/32	1.00
143	5/8	1.00
144	21/32	1.10

COPPER TUBE (12")

120	1/8	.30

SOFT BRASS FUEL TUBING (12")

121	1/8	.35

RECTANGULAR BRASS TUBE (12")

262	3/32x3/16	1.10
264	1/8x1/4	1.05
266	5/32x5/16	1.10
268	3/16x3/8	1.20

BRASS STRIPS (12")

230	.016x1/4	.15
231	.016x1/2	.20
232	.016x1	.35
233	.016x3/4	.30
234	.016x2	.65
235	.025x1/4	.20
236	.025x1/2	.30
237	.025x1	.55
238	.025x3/4	.50
239	.025x2	1.00
240	.032x1/4	.20
241	.032x1/2	.35
242	.032x1	.65
243	.032x3/4	.50
244	.032x2	1.20
245	.064x1/4	.38
246	.064x1/2	.75
247	.064x3/4	1.00
248	.064x1	1.50

SQUARE BRASS TUBE (12")

149	1/16	.35
150	3/32	.40
151	1/8	.45
152	5/32	.50
153	3/16	.60
154	7/32	.65
155	1/4	.70

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252	.015 Brass	1.20
253	.032 Brass	2.10
254	.008 Tin	.45
255	.016 Alum	.45
256	.032 Alum	.65
257	.064 Alum	.95
258	Asst. Brass	.95
259	.025 Copper	2.20

BRASS ANGLE (12")

171	1/8x1/8	.30
172	5/32x5/32	.35
173	3/16x3/16	.45
174	7/32x7/32	.55
175	1/4x1/4	.65

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182	5/32	.45
183	3/16	.55
184	7/32	.65
185	1/4	.75

SOLID BRASS ROD (12")

159	.020	.08
160	1/32	.08
161	3/64	.12
162	1/16	.20
163	3/32	.25
164	1/8	.40
165	5/32	.50

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FOR WHAT IT'S WORTH

from page 85/84

Florida, mentions that the Coleman Portable Air Compressor looks like a great accessory for the sophisticated R/C flier. It operates from 12 volts D.C. and, besides the obvious use of re-inflating a flat tire, etc., can be used in Rom-Aire type retractable landing gear as well as to pressurize fuel jugs instead of hand pumping.

If you're tired of getting dents in the leading edge of your foam wing, here's something you can do about it as suggested by K. MacArthur of Titusville, Florida. First, "hot-wire" a slot in the leading edge. Then cut some hardwood dowel stock to the right length. Now glue the dowel in flush with the airfoil to carry out the original leading end lines.

Bill Skipper of Greeley, Colorado, writes that airborne R/C switches become a problem in Half-A models, such as the Joy Stick. They're bulky, heavy, and cost seven bucks a throw, to boot! And you don't need 'em, anyway. Instead, purchase a miniature closed-circuit phone jack and a mating plug, for about a buck forty, and insert it in one airborne battery lead — either by splicing or by attaching the male and female connectors a la switch, only with short leads. Determine which two terminals connect to the closed circuit and run one wire through these. Presto! You now have a small, compact switch! Mount it through the fuselage side. Phone plug IN is switch off, and vice-versa. Incidentally, this only works with two-lead flight packs, such as Pro-Line. The center-tapped packs with three leads must have at least two wires "opened" for OFF. □

NRCHA

from page 79

..... into the bell (Pictures 5 & 6). You can make the 1/8" pilot bearing shaft a sandwich piece between the engine crank and transmission shaft with a couple of thousandth clearance. You will have to bush down the extension nut to fit without slop around the 1/8" pilot pin.

If you don't have the air baffles around the engine plate base, cut some out for installation. Re-assemble the engine/transmission assembly and make sure you re-install the original starting belt and also install the spare I had you buy, just push it out of the way. Hold on to the tail rotor output shaft on the transmission and, by turning the main rotor output back and forth check for slop in the bevel gear drive. If it is loose, install thicker gaskets under the top plate till you have a good fit. You should also parallel the two horizontal shafts. Add a little STP to the transmission oil, it will also do wonders!

Tail Rotor

Make sure the two 48 pitch bevel gears mesh properly, and shim as necessary. Many failures

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PIETENPOL

(Pete 'N' Paul) by House of Balsa

Features:
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MRC

NRCHA

from page 90/79

were reported at the end of the tail rotor output shaft. (The 1/8" shaft being pressed into the brass hub!) Make three cuts across the outside of the hub with a Dremel cutoff wheel or hacksaw. One cut, approximately 1/16" deep across the center of the hub and 1/8" shaft and two lesser cuts on each side of the shaft on the hub, now **high temperature** silver solder or braze the junction. Clean and refinish the joint with a file. (Picture 7.)

Note Picture 8 shows a follower pin to keep the linkage from winding up. It's just a 2-56 rod end approximately 1⅛" long, covered with heat shrink tubing. Just drill and tap the outside rotating block at the appropriate spot. Cut off all the threads except for 1/4" from a rod end. Measure from the outside in of the threads 1⅛" and cut off the other end. Make sure the pin does not interfere with the tail rotor blade holder.

As my machine came with three sets of rotor blades and parts are no longer available, I would recommend using "Hegi Huey Cobra" (contact John Simone — J & J) rotor blades. Cut 2" from the blades off the pre-drilled end; drill your mounting holes on the same line as the "Hegi" blades were drilled. The final rigging will require you to set 5° pitch in the main rotor blades (twist the blade holders **not** the 1/4" base). Also, the coning angle should be approximately 1¼" under each blade tip; bend the 1/4" base at the lightening holes. Also, set the stab at 5" up elevator, i.e., leading edge down, trailing edge up. The lead time is approximately 2", i.e., with the swashplate output pin straight forward; the rotor blade should be 2" short of lining up on the CL of the tail boom in the direction of rotation.

PARTS LIST
All From Stock Drive Products

4 — #7Y55-F3118; 3/16" x 5/16" flanged bearings.
1 — #7Y55-F2512; 1/8" x 1/4" flanged bearings.
36" — #7C1-0636; 3/16" C.R. steel shaft.
1 — #6R12-2L120; 12" V belt.
1 — #7C1-11608; 1/4" I.D. collar.

That's it, good flying!!! □

SUREFLITE FLOATS

from page 73

. . . . is not possible, then mount the floats as far out as possible and don't taxi cross wind.

In general, any landing that keeps the propeller above the ground when equipped with wheels is high enough to keep it above water on floats. Don't be alarmed at the amount of spray on take-off. If the propeller does not hit the water with the engine at idle the gear is long enough.

The critical placement is the location of the step at the bottom of the float. This must be directly below the CG or not more than 1/2" behind the Center of Gravity. The rear landing gear should be mounted over or up to 1" behind the step. If the gear is too far back the model will be difficult to lift from the water on take-off. If it is too far forward the model will bounce on landing.

LANDING GEAR ATTACHMENT

Aluminum Gear:

Perhaps the simplest method of mounting the floats is to use aluminum gear attached to the

to page 94

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SUREFLITE FLOATS

from page 92/73

floats with four tongues. The rear gear is placed above the step as previously described, and the front gear installed as far forward as is practical, preferably under the firewall. Since this type of gear is stiff, no cross wind braces are required. This method is illustrated in Figure 3.

Torque Rod Gears:

The wire torque rod gears that are most common to low wing models provide a good mount for the rear of the floats. If the model is designed for a nose wheel the wing gears are simply connected to plates on the floats. If the model is a tail dragger the gear should be bent back to achieve the location described under Placement.

The torque rod gear is usually stiff enough not to require a cross brace. A front mount may be provided by an aluminum gear mounted to the rear of the firewall or by a 1/8" wire gear and brace. A typical wire gear and brace (illustrated in Figure 4) is a wire triangle with a flat spot to mount to the fuselage and two axles to attach to the float plates. The flat spot may be attached to the fuselage with the formed metal straps.

FUSELAGE MOUNTED WIRE GEAR

Wire gears mounted in the fuselage are attached to the float plates and require a cross brace to keep them from spreading on landing. This cross brace is a piece of 1/8" wire attached to each leg of the gear as low as possible with wire wrapping and solder. A front mount is provided either with an aluminum gear or a wire triangle as previously described. If the model is a tail dragger, bend the gear back to the correct location.

WATERPROOFING THE MODEL

Absolute waterproofing is not required for float flying. The approach to use is to plug obvious holes in the fuselage with tape or silicone rubber. Place the receiver switch inside the model and provide a good wing seal. Most modern radios are nearly waterproofed already. Some electrical tape around the joints of the receiver and servo is about all you will need for protection. If you feel the need to wrap the receiver in plastic wrap you should remember to air it out occasionally to prevent condensation from forming. If disaster does strike and your radio winds up full of lily pads and tadpoles, wash it with clean water, dry it with a hair dryer, and spray it with a light lubricant. (This will congeal any remaining moisture.) If there is any need to send it to a repair station be sure to explain in a note to the repairman what happened.

FLYING

In some ways water flying is easier than field flying mainly because the flying site is usually larger and there are no holes and rocks to avoid. The direction of take-off is usually not restricted, and landings and take-offs can be headed directly into the wind.

When you are ready to fly, start the engine and, when the idle is good, push the plane away from the beach. The plane should steer easily with the rudder. If it does not respond, hold the rudder over and give a short burst of power. Point the model into the wind, and ease the power to full. As the plane accelerates it may start a slow left turn. Correct this with a little right rudder and let it build speed. As the model nears flying speed the floats will "plane" with just a small area touching the water in front of the step. When the model is on the step apply a little up elevator and wait for it to lift off. **Don't jerk it into the air.**

to page 96

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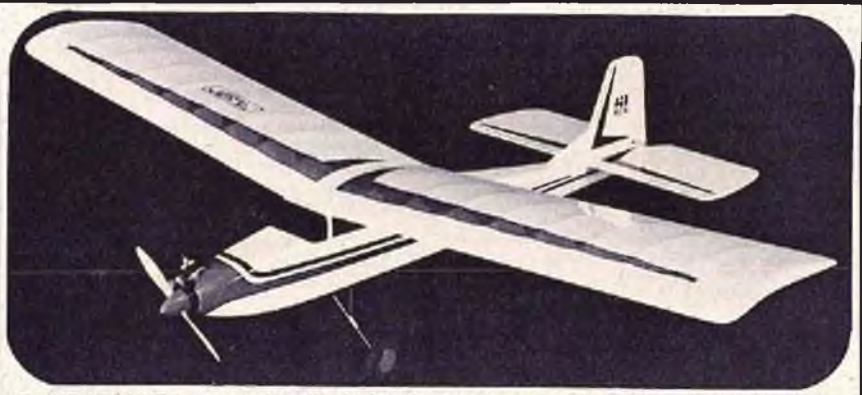

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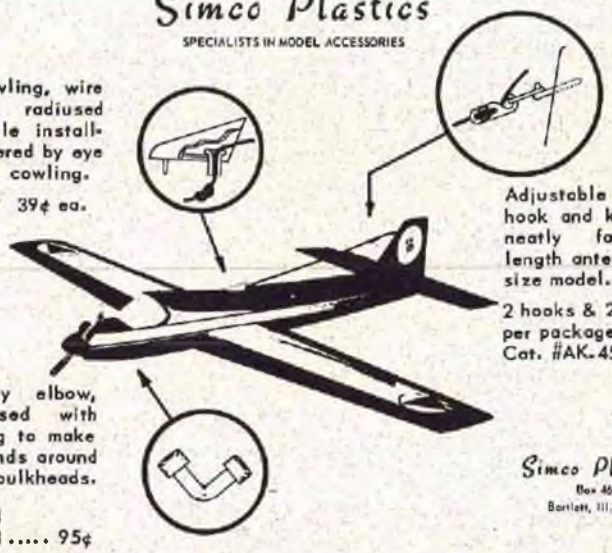

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SUREFLITE FLOATS

from page 94/73

When the plane is airborne check it out for tail "waggle". This sometimes occurs due to the increased drag caused by the floats. If it does waggle add a small sub-rudder or fin below the stabilizer.

Water landings are like any other landing except easier. You may land a little faster than you would on wheels due to the smooth uniform nature of the landing area. A good technique to use is to watch for the reflection of the model in the water, then ease the plane down until the reflection and the floats meet. Taxi back holding up elevator and using short burst of power put the plane on the beach. After the first flight look inside the fuselage for water. Dampness around the wing and hatch are normal, but puddles are not good. After a few flights you will have located all the leaks.

WATER RUDDERS

Water rudders are not required and, in many cases, are more trouble than they are worth. If, however, you want to try them epoxy a 1/8" plywood plate to the rear of the float and mount the rudders to the plate. These rudders should be the kick-up type so that if you hit the beach too hard you will not pull the plates off of the foam.

The rudders may be controlled from your now useless steerable nose gear via two sections of cord or light wire. The only problem that you will encounter adjusting the water rudder is to synchronize them with the air rudder so that they don't overpower or fight the air rudder when taking off.

FINAL TIPS

Repair any breaks or dings in the floats with epoxy. Holes from rocks can be filled with a mixture of epoxy and ground foam and then sanded smooth.

A good way to retrieve a plane, if the engine quits before you get to the beach, is with a fishing pole equipped with a tennis ball on the line. Just cast the ball over the plane and wind it in. □

BUILDING FROM PLANS

from page 72/70

. . . . . control surfaces. I have used a borrowed heat gun on my last three models. This makes a smooth finish by reducing those mars and dents that always seem to appear no matter how careful you are with the MonoKote iron.

The model was finished in red wings and stabilizer with yellow fuselage and rudder. Cros-

to page 98

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FAST TACK AND GRAB

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from page 96/70

ses are black MonoKote trim accented by thin strips of white trim. I fuel proofed the cabane struts and cockpit area with Formula 2 Hobbypoxy, and gave a similar treatment to the engine and tank compartments during building.

Installation of Equipment: The prototype was designed for a .15 size engine. Since I don't own a .15, I installed an O.S. Max .20 engine using the appropriate Kraft-Hayes glass filled nylon engine mount.

My R/C equipment consists of two Kraft Series 71, 4 channel systems with KPS-12 servos. Two identical systems provide maximum flexibility in the exchange of servos between systems and systems between models. I used the Kraft three-across servo tray anchored to maple bearers. Rudder and elevator pushrods are Gold'N Rods. I used a 1/16" braided cable and casing for the throttle control. The aileron servo hook-up presented a challenge because of the short distance (1¼") between the back of the servo and the control horns.

I always breathe a little easier when my R/C equipment is installed and ground checked. This is one chore which requires motivation and a proper frame of mind before attempting. The control function that I most dislike installing is nose wheel steering. This was a particularly easy function to install in the Fokker. Experience will improve my confidence, and perhaps someday the installation of equipment will become routine.

FLIGHT TEST AND CERTIFICATION

Comes the day of reckoning. The supreme test of your modeling efforts, and the final verdict on the inspiration. It was an overcast Saturday in mid-December with temperature in the high 40's, slight breeze, and an estimated ceiling of 350'. Not exactly an ideal flying day, but then this time of year you have to take them as they come.

Tom Vincent is President and Chief Pilot of the Sierra Flyers R/C Club of Yuba City. He is our most experienced R/C'er, and is always willing to give advice and lend a steady hand at the controls. I called Tom and asked him to do the flight test honors. We arranged to meet at the flying site for an afternoon session.

I fueled up and started the engine. Tom preflighted the controls, adjusted the engine to his satisfaction, and gave the go signal. I released the model and, after a slightly erratic take-off run, it became airborne. Tom climbed the model to test altitude where he proceeded to evaluate its response at various control and trim settings. He pointed out how the elevator trim setting was sensitive to air speed because of the high lift characteristics of the flat bottom wings. He suggested that the model be trimmed for level flight at high throttle and nearly full down trim. Down trim could be reduced for slower flying such as touch and go's.

I assumed in-flight control with warnings of, "Be careful with inverted flight and watch out for outside loops," ringing in my ears. After 5 minutes of familiarization flying, I attempted my first landing. I throttled back, reduced down trim and set up my final approach in the usual manner. Was I surprised when the plane floated in losing only half the anticipated altitude. I finally got it down on the third attempt. Everybody gave me a hand as the model rolled to a stop a few feet short

to page 102

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2nd	K.C., Mo.	1975
1st	Tulsa	1975

	JIM	
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3rd	Oklahoma City	1974
1st	Tulsa	1974
2nd	Ft. Worth	1975
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BUILDING FROM PLANS

from page 98/70

of the weed filled ditch at the end of the runway.

Take-offs can be erratic because of a tendency to over control the rudder. I had to abort several take-off rolls until I got a better feel of ground handling. My hours on a Bridi RCM Basic Trainer have given me experience with ground control of a tail dragger. But, I can see where someone unfamiliar with tail wheel steering could have problems. That night I was leafing through the newly arrived January RCM, and noted in Chuck's column that other modelers had experienced take-off difficulties with the DVII. Chuck explained his take-off procedures for a tail dragger. The main thing is to use a light hand on the rudder.

My model appears reluctant to hold sustained inverted flight. Outside loops are risky at low heights. Rolls are a good imitation of axial, and what you would expect from a sport model. I particularly like to do Immelman turns, but my favorite is the spin. This model is a spinning fool. Spin recovery is probably hands off. However, I still get a little nervous when my bird is aimed at the ground and unconsciously apply my standard left and up recovery procedure. It also does a neat stall turn. Warning! Be careful in tight turns, or you may end up chewing on your own tail.

Tom's suggestion to improve performance was to lower the gas tank to an in-line position with the throttle venturi. The tank centerline and outlet are approximately 1" higher than the venturi. This was a building error on my part. I unthinkingly installed the tank in the upper part of the compartment as I had done on previous models. The details of the fuel tank installation were not covered in the plans and article. I should have used a slant style tank positioned as low as possible in the compartment so that the outlets just cleared the engine mounting ring. The battery would go above, rather than below, the tank. He also suggested moving the main landing gear back to improve the ground handling. I mounted the gear 1/4" ahead of the location shown on the plans to compensate for a rearward slant in the vertical landing gear strut.

EPILOGUE

This model is really fun to fly and provides a great change of pace. I get a thrill out of watching those two wings flying overhead and knowing that they are under my control. I have proven to myself that I can plan build and handle a biplane. As for my next project — plan or kit — that all depends on the inspiration. □

TOWLINE BREAKAGE

from page 68

. . . . . this rod is restricted by the compression spring. Rotation of the platform, caused by the pull on the towline, is sensed by the switch which cuts power to the solenoid when the pull reaches a pre-set value. If the pull does not reach the pre-set value — nothing happens. As the pull exceeds the pre-set value, the power to the winch is cut, the pull reduced, power is restored, and the cycle repeats cyclically as required to maintain the applied force at the pre-set limit (which is pre-set to a value below the line breakage point). Actual operation is easier than it is to describe in words. The amount of allowable force is easily varied by screwing in or out on the nut on the spring rod while holding the fish scale (or equivalent) and noting the pull exerted on the towline.

Try it — it works — you'll like it. □

from page 61

. . . . . handles light lift quite well and, when the wind comes up, adding ballast smooths the flight characteristics and improves the control response. One interesting point is that our reviewer, during the initial test flights, entered the Bunny in a Southern California thermal meet and took first place before he had completed the trim flights on the machine! □

SOARING FROM THE GROUND UP

from page 60

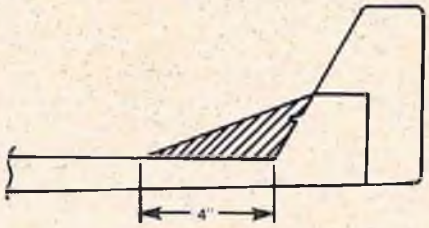
good deal of practice with my own Hawk.

First, remember these immutable facts: The Hobie Hawk is a heavy airplane with a thin wing (12½ oz./sq.ft, 8.6% airfoil). It **must** go fast. The wings are shaped in such a way that it is hard to detect warps. The tail is small. The wings have some effective forward sweep.

Now, applying what we learned in Part I, let's go over the Hawk point by point. First, the warps. **Carefully** and **diligently** de-warp the wing, using the technique described in Part I, supplemented by actual measurements made per the manufacturer's instructions. Be sure of the washout in the tips, and start the washout 18" in from the tips.

When you are positive of the C.G., cut a piece of white tape 6" long and stick it to the fuselage, from the leading edge of the wing aft. Make marks at 25%, 30%, and 35%. Start with the C.G. between 25 and 30% of this 6" tape (i.e., about 1⅝" aft of the l.e.). This will look ridiculous to you, but don't change it. Be sure that the rudder and elevator throw are limited.

Mount the towhook about 3/8" forward of the location shown in the instructions, at least to start. Now, let's get ready to make one simple modification.



SHADED AREA IS NEW PART.
MAKE FROM 3/32" SOFT BALSA.
MONOKOTE TO MATCH FUSELAGE.
GLUE IN PLACE WITH SMALL
AMOUNT OF EPOXY.

FIGURE II

Cut a dorsal fin as shown in Figure II, from 3/32" balsa, MonoKote it to match the fuselage, and stick it on with a few drops of epoxy. This simple modification makes a difference which is hard to believe. It almost eliminates the snap roll tendency which characterizes the Hobie Hawk.

The plane may require an alarming amount of lead in the nose to bring the C.G. far enough forward. My Hawk weighs 52 oz. all up. This apparently excessive weight will not hurt anything if the plane is properly set up.

Now when you get ready to hi-start the Hobie, be sure to check that the rudder is exactly straight. A slight deflection can cause an alarming veer which is hard to correct. I mention this because the plane is much more sensitive to this type of slight misalignment than other planes, and launch crashes which are often blamed on the design, could often have been avoided by a simple ground check.

to page 105

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SOARING FROM THE GROUND UP

from page 103/60

Flying the Hobie is pretty straightforward, if the plane is set up as described. With the dorsal in place, the plane will stall straight ahead every time, with little tendency to fall off on one wing. Just remember that its flight speed is about 20% faster than that of a Cirrus (about 28 ft/sec, or 19 mph, at a "slow glide"), and don't expect to slow it down to a standstill.

Next time, we'll talk about some ideas which might help you be true to our club motto — once you start soaring, you love to keep it up. □

RACING AT RANDOM

from page 59/58

Hint: Hollow Wing Fillets:

Cut normally shaped wing saddles from 1/32" plywood and epoxy them to the fuselage with the wing in place. Use waxed paper or Saran Wrap between the wing saddle to prevent them from sticking. Cut two strips of light to medium weight glass cloth (2 to 6 oz. cloth) about 2" wide and a little longer than the saddle. Use Hot Stuff or Zap to stick the cloth to the fuselage sides and then to the outer edge of the saddle, allowing the natural spring of the glass cloth to form the rounded concave fillet. Trim away any excess cloth and apply 2-3 coats of resin over the cloth, sanding between coats until the fillets are smooth.

Next month, the updated 1976 RCM 1/2A racing rules. □

SUDS CITY SOAR-IN

from page 56

..... director at the S.O.A.R. Nationals and witness to Jack Hiner's record flight; Father Dignan, Flying Priest from Scranton, North Dakota; and Bob and Barbara Robinson, husband and wife team, from Lansing, Michigan, who both fly. Barbara won a trophy on Sunday and, also, manufactures tow line chutes. Also, Ken and Helen Olsen of Springfield, Illinois, another husband and wife team who both fly. An interesting note here — Helen Olsen is Sec.-Treas. of a new glider group for women called WINGS (Women in National Glider Soaring). Any of you gals wishing to join this group, send your name, address, AMA number, and $4.00 to Helen Olsen, 2339 South 14th Street, Springfield, Illinois 62703. Make checks payable to Helen.

Another fine group who did a tremendous job, in both rain and shine, was a group of young boys from Racine, Wisconsin, and the National Nypum (National Youth Program Using Mini-bikes) Organization. This chapter, backed by the Racing Underground Safe House, Police Department, and YMCA, with help from Phil Smith and Officer Bill Chesen, is dedicated to the rehabilitation of young boys, using mini-bikes donated by the Honda Corporation, as an incentive to promote pride and responsibility. They spent two days retrieving tow lines for the flyers on four launch sites. The club raffled off an Airtronics' Grand Esprit kit with all proceeds going to the boys club.

I talked to long-time flying friend and Contest Director, Julio Fornary of Racine, Wisconsin, about the contest in general. Several new innovations were used to make things more attractive to flyers of all degrees of skill. The

to page 108

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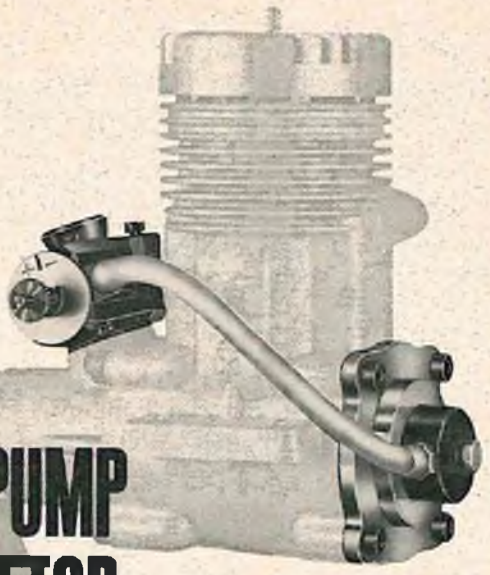

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SUDS CITY SOAR-IN

from page 105/ 56

open winch system was used, meaning there was no flight order by the numbers. Any contestant who had his frequency flag, could fly at any time until his three flights were in. This eliminates rushing or leaves time for adjustments or repairs, and makes all contestants feel free to set their own pace.

Breaking down each class into three events, two minute precision, ten minute duration and overall score, allows more people to win awards, and encourages beginners to compete in the hope of one lucky flight instead of all of the marbles. This method allowed for 42 trophies in two days of flying.

Julio confessed to being disappointed at the total number of entrants. Possibly bad weather predictions held down the total who planned to attend. It is this writers opinion that the vast publicity this meet had may have scared off many people who planned to attend by causing them to expect large numbers of glider experts to compete against or, perhaps, overcrowded conditions. To anyone who passed up this meet for any reason, you missed a great weekend of fun and tension-free flying. The Old Milwaukee people were not at all displeased with the First Suds City Soar-In, so there will be a second and third and, hopefully, many more. Next year's contest is already in the planning stage and there is talk of pre-registration only. If this happens, when you read the first ad for this contest in R/C Modeler, get your entry fee right in the mail, because I really feel that the 100 entry cut-off will certainly be reached early for the 1976 event and you will hate yourself if you miss the Second Annual Suds City Soar-In.

Winners in Sunday's events were as follows:

August 3
Standard Class
2 Minute Precision

1 — Ken Olsen
2 — Mike Connel
3 — Jack Hiner
4 — George Louthain
5 — Jim Bensen

Unlimited Class
2 Minute Precision

1 — Jeff Mrlik
2 — Jim Porter
3 — Chic Erkman
4 — Jim Bensen
5 — Jerry Mrlik

August 3
Standard Class
15 Minute Duration

1 — Jack Hiner
2 — Barb Robinson
3 — George Louthain
4 — Larry D'Attilio
5 — Ken Olsen

Unlimited Class
15 Minute Duration

1 — Jeff Mrlik
2 — Jim Porter
3 — Jim Bensen
4 — Jack Pitehr
5 — Jerry Mrlik

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Jeff Mrlik
JUNIOR AWARD (best record)
Jeff Mrlik □

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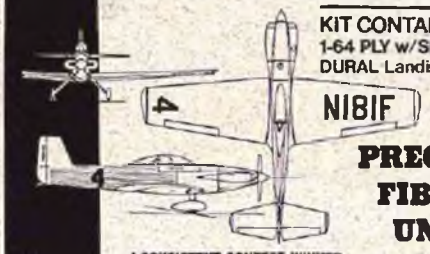

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LAS VEGAS CHOPPER

from page 53/52

A parts package for the Las Vegas Chopper is available from World Engines, Inc., 8960 Rossash Avenue, Cincinnati, Ohio 45236.

( ) Remove the old aluminum and plastic knob from the stick shaft using an Allen wrench to loosen the two setscrews. Remove the screws completely and carefully remove the black plastic bushing from the aluminum portion of the knob. Some of the later versions of the Las Vegas used a new knob without a bushing, so just discard the whole thing. (Photo #2)

( ) Clamp the stick shaft in a vice such that the back of the transmitter is open to you. (Photo #3)

( ) Center punch the small plastic bushing in the back of the stick assembly. This is the one that rides between the open slots in the metal yoke pieces. It will help to file a flat spot on the rounded end first.

( ) Drill a 3/32" hole into the plastic piece such that it enters the hollow center of the stick shaft. This step must be done with great care. The drill bit will be self aligning when it enters the shaft but, until that point, you must control the drill carefully. Clean the hole and shaft using a piece of string. (Photo #4)

( ) Place the plastic knob bushing over the stick shaft until the tops of the two pieces are flush.

( ) The wires coming from the new knob assembly exit the potentiometer in a triangular fashion. Arrange the wires in this order and insert two of them into the stick shaft until they protrude into the transmitter. Add the third wire in the correct lay and, using the other two as pull wires, pull and push the third through until it also protrudes. Even up the wires and continue pulling until the new knob slips over the plastic bushing already in place on the shaft. Twist the wires together into a cable from the stick assembly to the rudder pot. (Photo #5)

( ) Install the setscrews in the aluminum portion of the knob and lock the knob assembly to the shaft. Care should be taken to align the World Engines logo upright.

( ) Open and consume the first beer.

( ) Remove the centering spring from the two metal arms on the rudder lever. (Photo #6)

( ) Attach the ratchet plate to the rudder lever arm in the same manner as it is attached to the throttle lever. It may be necessary to drill a 1/16" leader hole in the lever arm. (Photo #7)

( ) Strip 1/2" insulation from the three wires of the new knob and pre-tin the conductors.

( ) Remove the throttle lever side plate of the transmitter and fold it back over the transmitter back and tape in position as shown in the photo. You now have clean access to the old rudder potentiometer. (Photo #8)

( ) On some Las Vegas transmitters a 2.2K ohm resistor (red-red-red) was installed between the center lug and one end lug. Using a soldering iron, remove this resistor on the rudder potentiometer only and discard. Do not try to re-use later.

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LAS VEGAS CHOPPER

from page 112/52

( ) Solder the blue/white wire from the new knob to the center lug of the rudder lever potentiometer. There will be two blue/white wires soldered there now — the old and the new.

( ) Remove the black wire on the rudder lever potentiometer with a soldering iron. Remember its position near the top of the transmitter case. Twist it together with the blue wire from the new knob and solder.

( ) Repeat this procedure with the remaining blue wire on the old potentiometer and the red wire coming from the new knob. You should now have two pair of wires hanging free and two blue/white wires soldered to the center lug of the potentiometer. (Photo #9)

( ) At this point we are ready for the initial system alignment. Remove the plastic top of the new knob by unscrewing the locking ring and removing it and the plastic cover. Insert an Allen wrench into the hole in the center of the plastic half circle operator. Plug the battery into the transmitter, assemble the receiver et al, plus the rudder servo, and turn them all on. The rudder servo will drive to an extreme position. Firmly grasping the half circle operator on the new knob, adjust the Allen wrench until the servo returns to its original centered position. Remove the Allen wrench and twist the operator — the servo will follow but with a little more throw. Reinstall the knob cover and locking ring. Turn it all off again.

( ) Attach and solder the new 2.2K (red-red-red) resistor to the top end lug of the rudder lever potentiometer. Solder the 8.2K resistor to the lower end lug. (Now check photo #11 for placement.)

( ) Solder the black and blue wire pair to the other end of the 2.2K resistor and the blue and red wire pair to the other end of the 8.2K resistor. (See photo #12.)

( ) Now for the final system alignment. Turn the system on again, and again the servo will shift to off center.

( ) Using a small screwdriver, loosen the shaft locking screw on the rudder lever and, while holding the lever in the center position, insert a screwdriver into the slot of the rudder potentiometer shaft and turn until the servo centers. Tighten the shaft locking screw.

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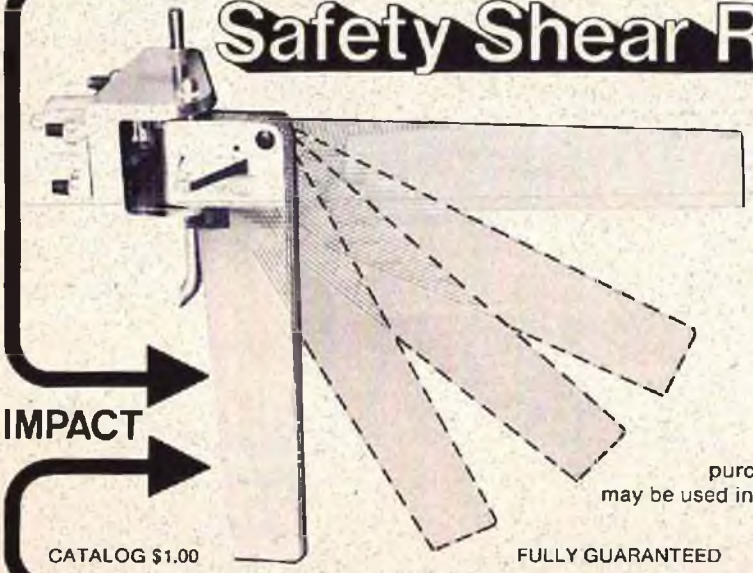
Safety Shear Rudder Assembly



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from page 10

. . . . . sand to make the mold from which sand castings for the crankcase and other sand cast parts are made. If only a few parts are intended to be made by the sand cast process only one master pattern is needed. However, if one intends to produce in production quantities, match plates are made from the master pattern. With the ending of WW II, war time restrictions were lifted and manufacturers could again produce model engines. However, foundrys were swamped with back orders and the match plates for the Cave Cobra were more than a year being produced. In the meantime, Walt built up his first prototype of the engine from the master pattern. Unlike the original A/C Special, and the Hornets, the Cobra left a lot to be desired in the performance category. It had a lot of bugs to be ironed out. One of these was the lack of a baffle on the piston. However, with a hasty tool-up, 50 engines were produced and sold around the country on a trial basis. Unfortunately, the engine was released in 1947 when the Hornet was selling like crazy, McCoys' were establishing their reputation, and the Dooling also had just been released. The competition was just too much for the unproven Cave Cobra so Walt folded shop.

So there you have it for another one of the lesser known old time engines. Although Walt Cave produced 50 engines, he did have additional parts for more engines. These parts were acquired by a good friend of mine who prefers to remain anonymous and another 25 engines were assembled from these parts for engine collectors. So a total of approximately 75 Cave Cobras were produced. How many are still in existance is not known. The engine is a highly sought after collectors item.

As mentioned last month gang, if you would like to see these articles on some of the lesser known old time engines, as well as engines with unusual features, let me know. If the interest justifies it, I'll keep doing them. If it is obvious the interest isn't there then we will forget the whole thing.

•

Dear Clarence:

I notice in the Staggerwing Beechcraft article (RCM December '75) that Mr. Dehn states that (page 28) he tied the model to a post, and measured the engine thrust through a spring scale. He finally came up with a choice of 13/6 prop. How, whilst one line of thought tells me that this is a logical way of going about choosing a prop, a little bird at the back of my brain says no way! What's the story?

Thanks,
Jim Anderson
Hamilton, Bermuda

Jim, a lot of fellows have used this test to judge propeller efficiency, engine power, etc. Actually, it is not a very conclusive test since you are only measuring static thrust, or pull, with the aircraft stationary. What it does in the air is a completely different story. Any large area, low pitch prop is going to give a high thrust reading. Yet this same prop in the air could be a real turkey! A higher pitch prop might not 'bite in' as well with the aircraft stationary but perform much better once the airplane is airborne and up to speed. About the only time the stationary pull test might be useful would be in testing props of the same pitch — to see which blade area, diameter, etc., for a given pitch would pull the best. Even this, however, would not be all conclusive.

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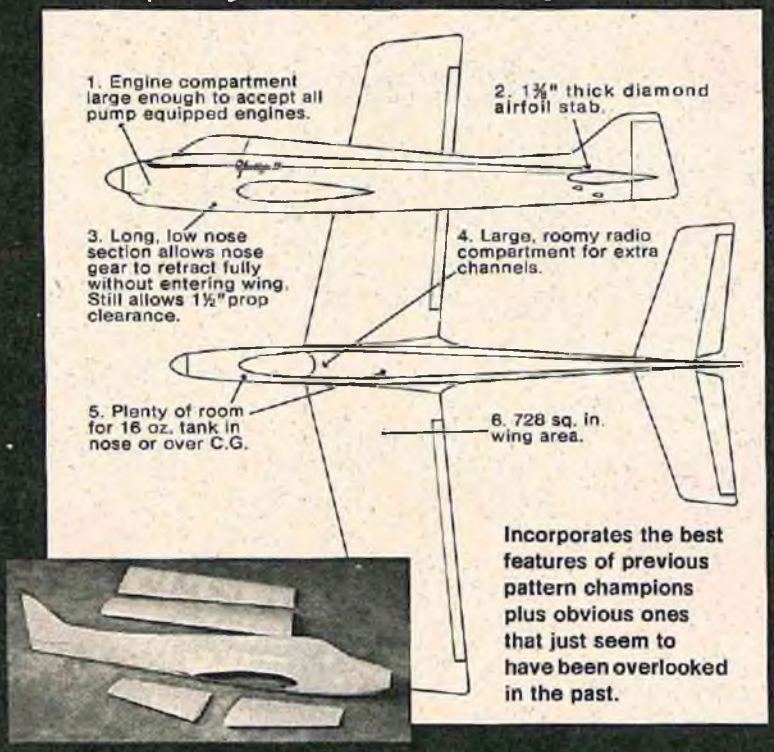

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LAS VEGAS CHOPPER

from page 114/52

( ) Reinstall the side and back plates and you're finished.

( ) Consume the second beer and take out the garbage — you're done.

I hope you have enjoyed making this conversion and will enjoy flying with it.

PARTS LIST:

1 — 2.2K 1/4 watt resistor
1 — 8.2K 1/4 watt resistors
1 — World Engines Expert Single Stick knob with potentiometer and bushing
1 — Throttle Ratchet Plate for Las Vegas Transmitter □

THE BIRTH OF TWINS

from page 51/48

. . . . . and one to the left which presumably with the help of engine torque, was very rapid. With short range tanks there was not much time to fool around or check flaps, so I set it up for a fast and flat approach with little attempt at flare out, which was just as well because with all that nose heaviness, elevator response at lower speeds was somewhat lacking.

With patience born of many, many years of flying, Bob and I packed it all away to go home and sort things out. On closer inspection at home, it seemed we were a long way from Harry's usual 'zero-zero' and the wing had over-much 'plus' incidence. Harry suggested cutting away the wing saddle to raise the trailing edge by at least 3/16". Secondary result: instant down thrust. I also cranked in some 'up' into the flaps and ailerons — then promptly undid some of the good by adding a few ounces of weight to the tail to improve the CG, which moved back a reluctant half inch.

Out to Redair Club again, and this time it ran a whole twelve feet down the runway and climbed out at only 45°. A little down trim took care of everything and soon it was time to check out flap and landings.

My first landing approach was at far too shallow an angle and even at quarter throttle she would have set down a hundred feet short of the runway. I opened to 'half' and tried again a few more times until eventually I got the hang of it. With all that frontal area (remember, three fuselages!) and flap, the right approach angle was as steep as 30° even with fast idle in zero wind conditions. It looked and sounded beautiful, coming in on a slow, steep, scale-like glide path. Down to slow idle, flare out with rapid loss of flying speed, and the mains kissed the earth as smoothly as I've ever accomplished. We taxied in on both engines, and killed them at the apron. I wondered if Harry could get those letters **"Trouble"** off the right hand wing and change the name to **"Double Delight."**

The amount of down elevator that she needed with flap looked positively alarming, but she had behaved so well that I decided to leave the whole darn thing just as it was. To this day we are flying around happily with wrong decalage, bad thrust lines, dislocated CG, and bags of down trim.

After notching up four more trouble-free flights, I decided the time had come to try out the single motor performance which, after all, had been the original 'dumb idea.' The following afternoon (late afternoon, of course — like after lunch) I went out again and flew around until I was sure that everything was working. Then I did the fancy bit with the servo switcher, locked the

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starboard throttle into the fast idle position and opened to full power on the port motor. Surprisingly, there was little change necessary to aileron or rudder controls, but a big change on the elevator axis. It needed full up trim on the large elevators to compensate; for the first time we were able to fly around without droopy elevators!

I took care initially to make left hand turns only, thereby keeping the 'live' engine underneath, lifting the nose. All turns tended to be slightly climbing turns. Correspondingly, right hand turns, even gentle ones, produced considerable drop in altitude. Not being at all competent in applying small deflections to rudder, elevator, and aileron, all at the same time, I decided it would be best to stick to the full scale rule of 'never turn into a dead engine.' In straight flight, a comfortable degree of climb was possible, and that was sufficient testing for one flight. I flicked the 5th channel switch, and the starboard engine immediately resumed a healthy beat. Oops, dearie, I forgot to remove the up trim.

And so, with flight after flight on our short range tanks, we continued the exploration. Flying with power off on the port engine was not nearly as comfortable as the other way around, trim levers were pushed hard over the pick up the left hand wing and the tail. By the nature of Murphys Law, this was the one time when the starboard 'going' engine died and so, nearly, did the pilot. Fortunately, I was in the right position to come straight into a (half) dead stick landing onto Durban Deep's lengthy grass runway without flap or finesse. What I should have done, as the expert reader will have instantly spotted, was to flick rudder and aileron trim smartly over to the other side, click off the 'dead switch,' and fly a landing circuit on the revived port motor. Sometimes I think that 20 years of R/C has taught me mainly how to crash with aplomb. Y'know — cool, calm and disconnected!

After a few more one and a quarter engine flights, it was time to experiment with the starboard motor fully stopped. And, irrevocably, with single-motor landings. For this venture we took off with only half a tank on the starboard engine, and an extra few turns on the throttle linkage to ensure it would quit on any idle setting less than 'fast.' One discovery was that the dead engine kept kicking over through compression, several times every second; another was that the drag of the windmilling prop still did not produce really uncomfortable trim changes. However, with a full tank the port motor was not peaking fully, and controls were rather mushy for a few minutes until the tank level dropped and the engine leaned out.

One point I haven't explained is that around Johannesburg, South Africa, we are flying at altitudes over 6000 feet. With air temperatures over 80°F, there are many full scale twins that don't fly all that well on one motor, either.

It was back to the drawing board to get some ram effect exhaust pressure into the fuel tanks. This, like the use of flaps, is an exploration in itself, and we won't take it in on this trip. But I ended up able to fly with full power needle settings throughout the flight. Obviously, the birth of twins involves pressure nipples, a perfectly natural situation.

Further flights, further discoveries. Double Trouble 'on one' can do three horizontal rolls, to the left from level flight. One right hand roll. A smallish loop, with a little screwing off. A larger loop, with an unexpected inverted spin when it stalls out at the top. This was one of the several times we almost 'dinged' it. The ooh's and aah's of the spectators could just be heard over my clanking knees. Fantastic how she climbed her way from very firma terra on one motor when I

to page 128

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THE BIRTH OF TWINS

from page 124/48

opened up the throttle. It was obvious that you must get nowhere near the stall while 'on one' this being a guaranteed way of inducing a spin, inverted or otherwise.

We are still learning on every flight. Single motor flight with 45° of flap is mushy but possible. Flying with this set-up on a gently descending approach is entirely safe, but dragging in 'on one' is a situation to keep away from. Another thing to avoid is inverted flight because your comfortable right thrust changes into uneasy left thrust. However, it can be handled. I don't think the flights for photographs added more than a year or so to my age!

Single motor models, sooner or later, miss the landing strip by virtue of a cut motor. But with normal flying on a twin, the stopping of a motor is no excuse for not returning to base. My resolution always to make base has succeeded, so far, for all 44 landings. I don't think, in any event, she would like landing in the rough, but this is one airplane where anything but a proper touch down will almost certainly be pilot error.

Now, if some expert designer will piece together all our discoveries, and turn out a real nice twin with short nacelles, big tanks, CG in the right place and all, I do hope he will send the plans in to R/C Modeler Magazine. Then, maybe Harry will build one instead of just tacking it together, and Don Dewey, too, can give birth to twins. □

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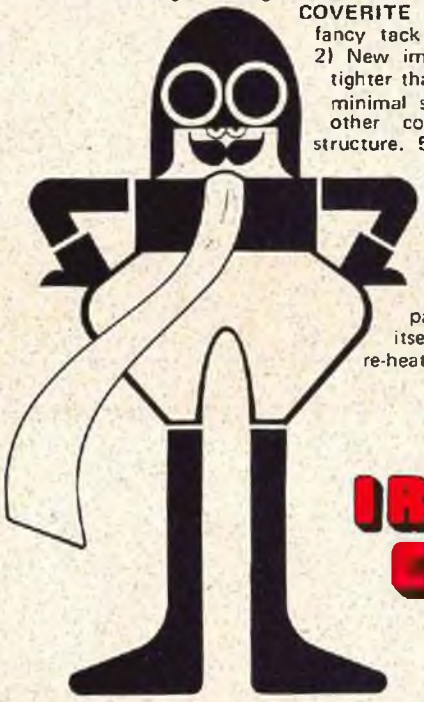

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ON THE LINE

from page 47/46

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Soaring Hints:

Richard L. Shirey, of Sewickley, Pa., having recently built a Centurion sailplane, found that a method for attaching a power pod was needed as their field did not lend itself to using a winch or hi-start. The attached sketch shows the method used and it works very well indeed. It was used all summer with no problems at all.

If a winch or hi-start is used, the power pod assembly may be substituted with just a 1/8" rib in its place. Epoxy glue is recommended for construction and small wood screws, or sheet metal screws, were used to fasten the D & R mount to the plywood platform. A bead of silicone, or hot glue, may be run around the bottom of the platform to cushion the wing if desired.

A 5" diameter prop was used on the original. If a larger prop is used, the platform may be extended a little higher for clearance, while keeping the platform parallel to the chord line of the rib shape. □

LI'L SWIFT

from page 36/32

An optional removable nose block is shown on the plans. The first prototype had it, and it worked, but I later abandoned it since it involved some "Mickey Mouse" and didn't improve the plane's appearance much. It's simpler to just cut away enough wood to allow the engine to drop in from the side. I leave it optional though, and if you want to use it, tack glue it on lightly during the carving stage so it will come off.

Tail Surfaces

The stabilizer is made from firm 1/4" sheet and is cut at the center for dihedral. After shaping the tips, make two saw cuts — one on top and one on the bottom — at the center line. Do not cut all the way through. Now crack it so that it bends up one inch per tip and fill the seam with epoxy.

Make the elevators from 2" wide tapered stock if you can get it, otherwise taper a piece of 1/4" sheet. In either case leave them together during the cutting and shaping stage so they're easier to hold onto. Cut them to the right outline, sand the tips to match the stabilizer tips, then separate them.

No tie bar is needed for the elevators, rather, each one has its own control horn. The elevator pushrod is made in the standard manner (1/4" dowel with wire Kwik-Link rods attached on each end with thread and epoxy), except that the aft end has two link rods instead of one; the pushrod is Y-shaped with adjustable links at each of its three points. In this way you can either trim each elevator individually or trim both at once by adjusting the single end. 'Nuff said?

The rudder and fin are nothing fancy. The top of the tailwheel strut is epoxied into the rudder for ground steering. Don't leave off the dorsal fin — the rudder has no bracing of its own and depends on the dorsal for support.

to page 132

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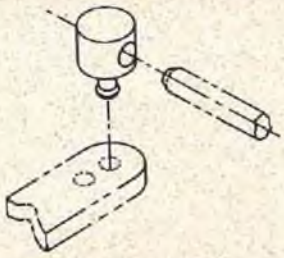

We originally designed this snap retainer to be used with our retract arm but since its' introduction some years back we have had many requests for the snap retainer by itself.

From the mail that we receive they are widely used on gliders for control hook ups.

Snap retainer may be used on servo arms or control horns but the hole must be an accurate 1/16" dia. for good retention.

The hole in the snap retainer can be tapped with a No. 2-56 tap and wil then accept a std. 2-56 threaded push rod, this will allow easy adjustment of control surfaces. Pushrod may also be soldered to snap retainer but this must be done before attaching to nylon part.

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LI'L SWIFT

from page 130/32

Flying

Make sure that the surfaces are all straight with no warps and that the controls all work the right way. Double check the balance point with the tank empty then gas 'er up. On takeoff, hold in about half up-elevator and just a tad of right rudder. Go easy on the rudder as it is sensitive. Trim flights should be made on a calm day, and make those first takeoffs "steady-as-she-goes" until you are familiar with the airplane.

For landing just cut back the power and hold in a little "up". The Swift glides well despite its high (19-25 oz.) wing loading and will not tip stall if balanced properly. You may find landings the most fun of all — I average about five touch-and-goes per flight.

Here's a fairly complete list of the raw materials you will need for this project. It includes everything I can think of besides pins, glue, engine and radio. The total cost of all this stuff is about $50.00 but you probably have a lot of it, such as wheels, wire, hinges, etc., sitting around the shop already. All items are balsa and/or in 36" lengths unless otherwise specified.

FUSELAGE AND TAIL:

2 1/8" x 3"
2 1/8" x 4" x 48"
1 1/8" x 1/4" x 48" spruce
2 3/16" x 4"
1 2½" x 2" x 6" block
1 3/16" x 6" x 12" ply
2 3/4▶ x 36"
2 1/2▶ x 36"
1 3/8" x 4" x 12"
1 1/4" x 4" x 48"
1 1/4" x 2" tapered balsa stock

WING:

4 square feet of foam
1 3/32" x 6" x 12" ply
3 1/6" x 6" x 48"
1 package aileron linkages
2 1/4" x 1" tapered balsa stock (T.E. stock)
2 slotted hardwood landing gear blocks 1/2" x 3/4" x 6"
2 hardwood L.G. anchor blocks 1/2" x 3/4" x 1⅛"
4 L.G. straps
8 #2 x 3/8" wood screws
2 wing tip blocks 3/4" x 1½" x 6"
1 5/32" music wire

MISCELLANEOUS:

2 nylon bolts 1/4-20
4 5/32" wheel collars
1 1/16" music wire
2 1/4" dowel (pushrods)
6 link rods, ends threaded 2-56
6 clevises
4 control horns
1 package of 15 hinges

Contact cement for wing sheeting
1 metal or nylon engine mount with bolts, blind nuts, etc.
1 6 or 8 oz. fuel tank
1 7/8" tailwheel
1 tailwheel bracket
2 main wheels 2¼" or 2½"

OTHER: Wing seating tape, spruce servo mounting rails, 1/4-20 tap, covering material, thread, fuel tubing, fiberglass cloth.

I really like this Li'l Swift and I hope you do too. If you build one you're proud of, send me a photo of it in care of RCM. I can't guarantee a reply but I'd enjoy hearing from you.

Good luck and good flying! □

duke's mixture

I would like to discuss today the various reasons why some motors seem to have, or develop an appetite for glow plugs and what you can do about it.

1. Flooding. Cranking out a flood is murder on the glow plug. Large droplets spraying up from the by-pass can easily crumple a glow plug element. If the element is hot you have thermal shock to boot. A flood can be poured out by positioning the piston at bottom dead center and rolling the model over two or three times. If you must clear the flood by cranking, remove the plug first.

2. Overheating. An element that burned in two, when viewed under a microscope will have a lump on each end of the break. This usually occurs when a motor is run full lean with the booster connected. Or when you continue to run with an overlean mixture.

3. Vibration. If a motor is permitted to vibrate from side to side with appreciable amplitude, the plug element being springy by nature will want to follow and amplify that motion. It doesn't take too much motion to get the coil swaying quite a bit. It can eventually fail either by bashing the side of the housing or fatiguing from the 24,000 or so stress reversals per minute. A flimsy motor mount or front end is the usual cause of this type failure, although a loose connecting rod is sometimes the culprit. The more the RPM, naturally the greater the vibration. Solution, beef up your motor mounting system-prop your motor down a bit and be sure your con rod play is within .010.

4. Contaminants. Minute quantities of iron or aluminum will vaporize and alloy with the element material, this produces an alloy much more brittle than the original, this in turn fails from vibration. Fuels with synthetic oils are harder on plugs than castor oil type fuels, because they wear metal off faster and loosen debris.

5. Shock waves. Sonic shock waves from a squish area or squish band will shatter a glow plug wire the same way a sonic boom from a fast aircraft will shatter a window. As a rule an .015 min. clearance from head to piston is safe. Under .010 is guaranteed to knock a plug out every run. The cure is to install an extra head gasket.

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SERVO TRAY RAILS

from page 31

..... compartments in your models.

However, I have to add a qualifying word or two before we describe how-to-do-it. To arrive at the measurements for the Universal Servo-Tray Rails shown in this article, we applied our ruler to the trays manufactured by Kraft, Royal and Orbit. The dimensions we tabulated are representative of most of the servo tray sizes in use today. We didn't include tray measurements for EK Products (No offense, Jim Simpson — I own two EK radios, myself!) because their trays provide for mounting the receiver as well as the servos. Thus they are substantially longer than other servo-only installations. In general, our rails will hold the fuselage-mounted servos in both the three-abreast and the two side by side, one-across trays of the major radio manufacturers and those who use the same size servo cases/trays.

The "Universal" rail system is shown in our drawing. The prototype rails were made of 1/4" by 1/2" maple servo rail stock. The slots (1/8" wide) for the 6-32 length adjusting bolts were routed, using a Dremel routing bit, as were the slots that accept the same sized bolts that hold the servo trays in place. The slot width was derived from the diameter of the 6-32 bolts, and — the same sized bolts are used, rather than the usual machine screws, to hold the tray to the cross-pieces.

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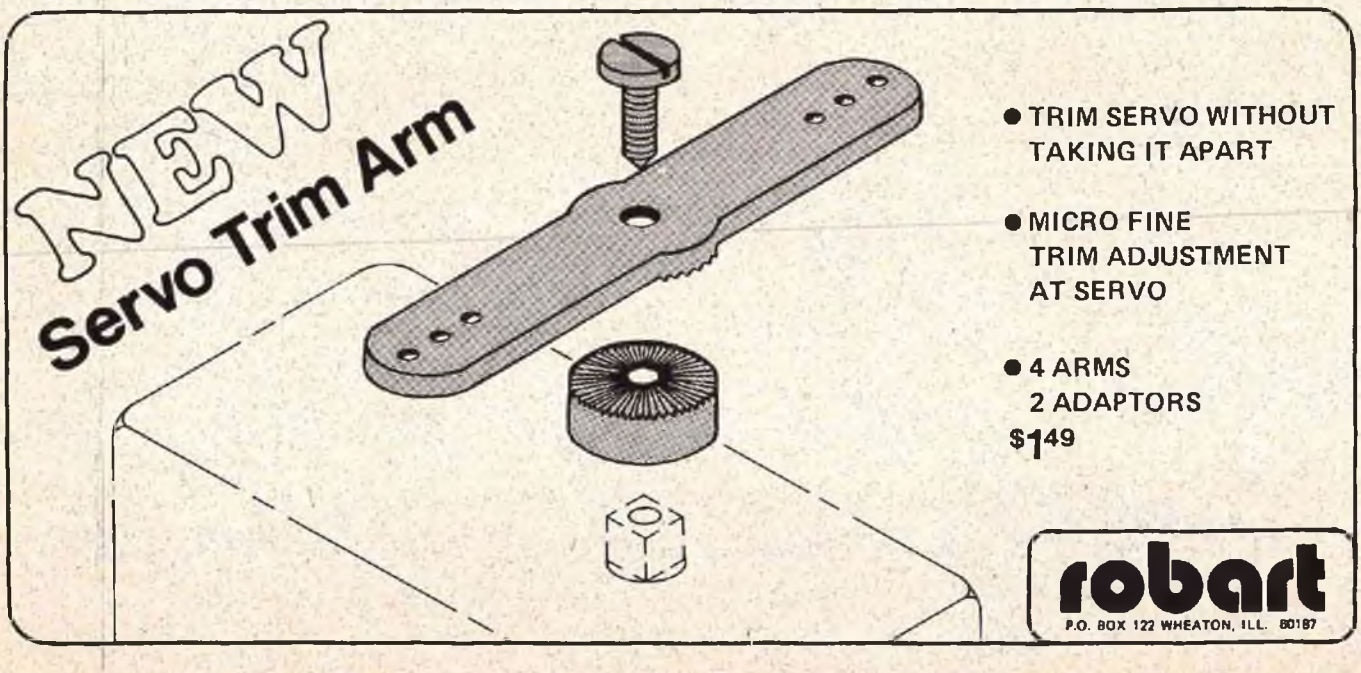

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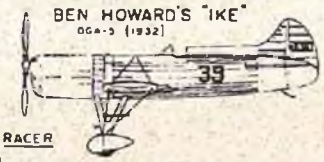

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SERVO TRAY RAILS

from page 134/31

The front and rear cross-pieces are mounted **above** the side rails. The side rails are leveled and epoxied to the fuselage sides. The cross-pieces are cut to fit snugly, perpendicularly across the fuselage. In the prototype rails, the front cross-piece was epoxied to the side rails. Thus, all fore-aft adjustment of the tray is made with the rear cross-piece and the slot in the side rail had to be routed to suit. Certainly, both cross-pieces could be made movable — the side rails would be slotted fore and aft, each slot in this case being one-half the length shown in the drawings. In a model with a critical CG, it might be a good idea to use double-slotted side rails. In addition to allowing the installation of several sizes of trays, double-slotting allows for servo shifting for balance.

If you're faced with a narrow fuselage and a relatively wide servo tray, the adjusting bolts could be 4-40's running in narrower (3-32") slots. The side rails may also be made of aluminum or brass right-angle stock epoxied (or pop-riveted) to the fuselage sides. The adjusting slots, using metal side rails, may be produced by drilling a series of in-line holes that are "opened" by filing. The fore and aft cross-pieces may be made of stiff metal strips, too. This might be advisable if you have a fuselage that is short, top to bottom. We haven't tried the all-metal "universal" system yet, but we have a "gut-feeling" that it'd be a good idea to keep the receiver and antenna as far away from it as possible. No sense building in "glitches" — it might be a good idea to use insulating washers between side and end rails.

There is one other consideration to the use of "Universal" servo tray rails and that's the connection of servos to pushrods. If the servos are positioned properly for CG reasons, and pushrods are of a fixed length, we may have a problem.

I say "may", because there might be enough length-adjustment in your pushrods to permit them to be connected to the servos by simply screwing Kwik-Links in or out. This situation is more likely if you install your pushrods with Kwik-Links on both ends. Of course, if you build your Universal rails with adjustable cross-pieces both fore and aft, shifting the servo tray a tad will help with pushrod fitting. The best solution to the pushrod length problem is to use Du-Bro E/Z Connector Control Rod Adaptors. These handy devices attach to the servo control arms, or discs, and allow for a pass-through wire or cable pushrod end. Cut the wire (or cable) at the pushrod's servo end as long as possible (make sure it doesn't hit any part of the model's structure at the extremes of its movement) and swapping radios from model to model will be a simple task.

One final point — always recheck the CG of the model after installing the radio and servos, using the Universal system!

Acknowledgement: The basic idea for a Universal Servo Tray mounting system is the brain-child of Jack Aycock, owner and proprietor of Custom Hobbies, Colorado Springs, Colorado. Design and "engineering" is the work of the author. Of course, Aycock and Custom Hobbies provided all of the servo trays that were measured to provide the data for "sizing" the "system". The prototype rails are installed in a Stik and they fit everything from big KPS-9's to the tiniest Bantam servos. □

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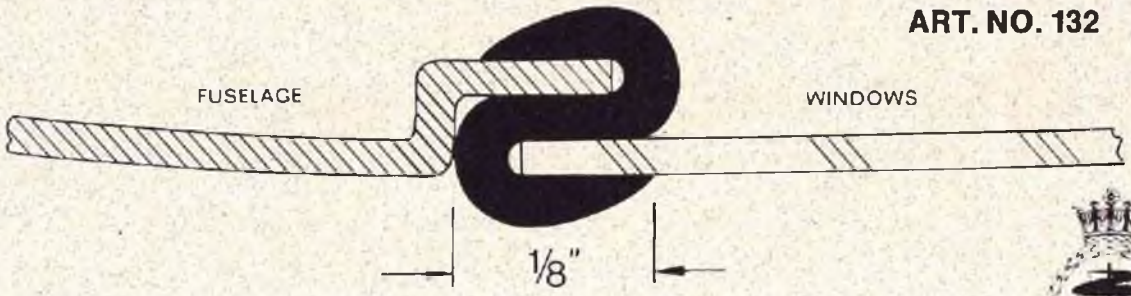

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SARACEN

from page 28/25

..... removing the covering before epoxying.

☐ Attach the elevons to the wing.

☐ Install your control linkage, making sure that left rudder control on the transmitter results in the left aileron going up and the right elevon going down.

☐ The neutral position of the elevons should be such that the elevons are raised about 1/8" to 3/16" above what you would normally expect as neutral. This will produce a slight reflex.

Flying — **Don't over control**. Easy smooth control must be applied until you become familiar with the craft. Fly it a bit on the fast side to start with. On your first Hi-Start launches, run a bit to give a straight launch and don't apply excessive aileron control — go easy on the aileron.

Good flying with your Saracen. ☐

CUNNINGHAM ON RC

from page 22

..... this Spring. Thanks again for these two ideas and to the others who have written in mentioning ways to accomplish this stunt.

Another way of making that little something extra for a fun fly, or an air show, was sent in by Mrs. Mary Corbin. Mary's contribution is in the form of an easy to make bomb. (Hooray for the

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gentler sex!) But, Mary's bomb is used for Fun-Fly Bomb dropping.

"For 12 bombs pour 1/4 cup of water into a plastic bowl, add 1 cup of dry Plaster of Paris (one or two drops of white glue may be added as a hardener, but is not necessary). Mix by hand until the mixture is smooth, pour at once into styrofoam egg carton cups filling about 3/4 full and insert pre-shaped twist ties into each cup. Allow to dry. To remove from the egg carton, hold the twist tie and gently push up on the bottom of the egg cup. To shape the twist tie, place over the tip of your finger and twist the ends together leaving just enough on the end to form a hook. For streamers, cut red crepe paper strips 1/2" or 3/4" wide and 10" long. To attach the streamer to the bomb, thread the paper through the eye of the twist tie, hold the ends of the crepe paper together, and mash the eye of the twist tie closed with fingers. One last thought, — always put the water into the bowl before the plaster."

Thanks, Mary — I'm now equipped with both a banner and a good, dropable bomb — wait until the next time that I go to the flying field!

This Winter the ideas that seem to be working upon my fellow modelers in this area are both Quickie 500 races and Old Timer events, so I have found myself very busily building a Q-500 racer, which I have yet to get a chance to fly. Then, this past weekend I got enmeshed into an Old Timer project. For this I am building a Taibi Powerhouse from plans and a wing rib kit from P & W Models in Monrovia, California. The old stick type machines build very quickly and in just a short time I had the framework all done, waiting for covering. Thank heaven for plastic films! I

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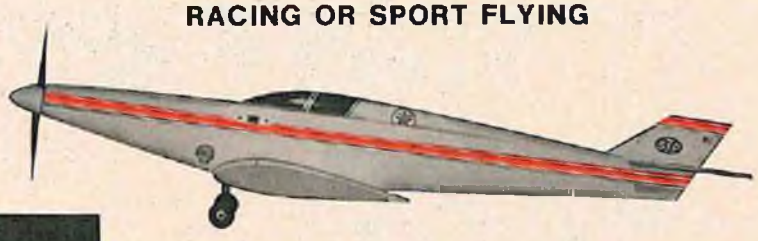

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would hate to start out silking and doping this monster. The fuselage is as large as my Telemaster, and the wing isn't much smaller. There are two things that I think that need to be done by the average RC'er when he tackles an Old Timer and that is to beef up the fuselage and the wing center section. On the fuselage I have added quite a bit of strength by adding triangular gussets to each joint, as well as extra sheeting around the nose and the cabin area. The wing, as shown on the plans, does not include any plywood doublers, so I used spruce spars in lieu of balsa, and added webbing to the front pair of the spars, and then 1/4" plywood dihedral braces at both spar areas that extend six inches into each wing panel. Lots of epoxy was added to this joint. If you are going to have a structural failure, it is either going to be at the wing center section or in the cabin area, if you ding a wing tip on landing. With radio control of the aircraft you are going to be tempted to do some small stunts that just might be beyond the capacity of the wing to withstand.

Just this evening my flying partner and chief sand pounder, Helmer Johnson, called to report the first flight on his Super Quaker, powered with a hot .40 engine. Helmer cut his teeth on free-flight, back about the turn of the century (or perhaps just a bit later) but after umpteen years in RC he had forgotten some of the rules of thumb when testing out a new aircraft that was designed to fly on the wing rather than the engine. He poured the power to it, and the 7' Quaker leaped off of the ground with no roll, arched up into a beautiful 9 point loop, plunged earthward again, pulled out and into another loop, and then finally

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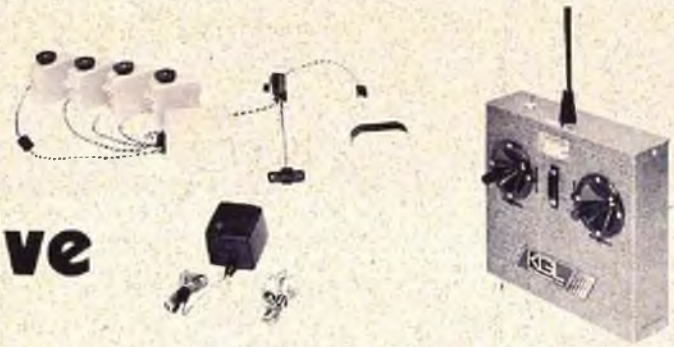

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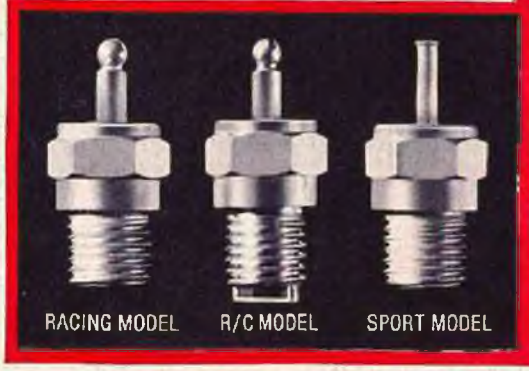

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CUNNINGHAM ON RC

from page 144/22

his trembling fingers shut the throttle and killed the engine. He told me that the landing was at only about two miles an hour, but his knees were shaking so hard from the thought of what almost happened, that there was no more flying for the day. So, what's the drill for checking out this type of aircraft for those who are used to flying quick responding, heavily loaded pattern aircraft, or gliders flying at a reasonable speed?

First, take your time. Check out the balance of the aircraft, be sure that it agrees with the plans, and if no balance point is shown, then start working with a 30 to 33% figure. Next, check the wing and stab for warps, and to be sure that they are aligned well with each other. If the plans do, or do not, show it, add down thrust to your engine mounting. Lots of the Old Timer plans do not show down thrust, but you sure can't go wrong in adding down thrust, as well as some right thrust to the engine mounting. You may not need a lot, but I believe that you will be happier on your first flights with about three degrees of right thrust and four or five degrees of down thrust. You can take it out, or at least reduce this thrust setting as you trim out the aircraft, but at first, use some offsets.

Next, take off slowly. Don't pour the coal to it, but go easy on the power. Back in the old days we used to make the first test flights with the engine barely ticking over and the prop on backwards to be sure that some unwanted gremlin didn't creep into our pride and joy. Only after you are sure that everything is functioning correctly should you make a full power take-off. Sure, you want to grab a lot of sky, but you also want that aircraft to be able to fly again and again. The Old Timer movement is beginning to catch on, and probably the one thing that adds the most fuel to the fire of interest is that you can have your cake and eat it too. I can think of lots and lots of old beautiful birds that I wanted to build back in the Dark Ages, and now through people like John Pond, and P & W the chance to build them lives again. But, this time, there's no chasing — you simply put it into the sky and watch it fly majestically around, then bring it home again. Boy, wouldn't that have been great back in the thirties and forties!

★

When I was building my 7' Powerhouse this last weekend, I wanted to spend some time with my family as well as watch a tennis match on the tube while I was building, so I sweet talked my wife into letting me do some building on a table in the den. Usually these efforts are restricted to the garage, and a corner of the bedroom. But since I told her how careful I would be of the quarry tile floor in the den she relented and let me spend the day dropping bits of balsa and glue onto some newspapers. This combo is great, but I very quickly decided that I really needed to work up a traveling work shop, or at least a tool kit, as I was spending all of my time either going out to the garage workshop, or to the upstairs bedroom looking for pins, pliers, glue, pencils, etc., — you name it, I didn't have it and needed to get it. So, I decided to take a leaf out of our flying book and to make up a working tool kit. The easiest way was to purchase an inexpensive plastic fishing tackle box to use as the basis of my tool kit. Into this box I put a supply of pins, small screws, small and middle size screwdrivers, long nose pliers, larger pliers, T-pins, pencil, ball point pen and felt marking pen, ruler, epoxy glue, toothpicks, razor blades and my ever handy Stanley Utility knife, small bottle of Zap or Hot Stuff, and so on. I tried to put everything in that I

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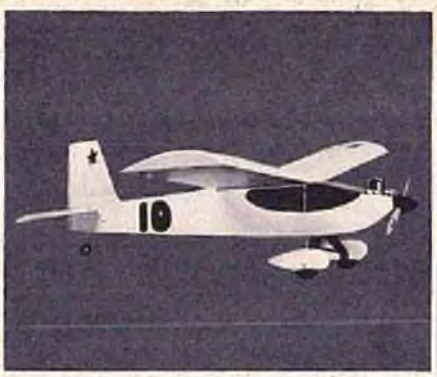
"QUICKIE"



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CUNNINGHAM ON RC

from page 146/22

would normally use in the construction of the framework of the aircraft. The best and cheapest containers that I have found for small parts in a small kit is the discarded plastic cans that come when you purchase a roll of 35 mm film. Put a piece of masking tape on the can, jot down the contents with a felt marker, and you can keep everything neat and handy. One other thought on construction — I have found that, by using an old piece of corrugated cardboard on top of the table, when cutting MonoKote or Solarfilm it makes cutting these films much easier. Just lay out the cut with a metal edged ruler, and slice along it with a razor or Stanley knife. You don't dig into the table top and the blade cuts through the plastic film and sinks into the cardboard, and keeps from snagging the film.

Now if I could just find a substitute for sanding the structure of the aircraft, I would almost have it made — unless I spill epoxy on the floor.

★

One of the things that make this sport the most fun of all is that there is always something new going on. Try a cross country race, or pulling a banner, or a Quickie 500 race, or an Old Timer, or any of a hundred different ways of enjoying this sport. Just remember, a lot of fun is in the anticipation of the event.

Good luck and good flying, until next month, see you at the hobby shop or the flying field. □

SUNDAY FLIER

from page 18

. . . . . *think Kraft could speed up their service? Air Mail to California is only 2 days there and 2 days back; so Kraft could have put the part on an R/C plane and saved a whole day.*

The same Summer I ran into the side of a barn at full speed and totaled my Ugly Stick. I couldn't believe that one of the control arms broke and it cost me almost 75 cents for a new arm. Can't Kraft make a radio that will take a 65 mph crash and not break control arms?

This Summer, after seven years, the whole radio system quit. It just stopped working altogether. I can't understand why, after only seven years, the battery went dead. Of course, I did forget and leave it on charge for about six months. Don't you think the batteries should have lasted a little longer? I had a car battery one time that lasted almost five whole years.

to page 152

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SUNDAY FLIER

from page 150/18

There is one other small problem. The radio has been in and out of 7 different planes, 2 different gliders, 2 different cars, and 1 boat. All of the planes and gliders were crashed and the boat sank. The problem is that the bolt holes in the servo's are wearing out. Can't Kraft make better bolt holes?

My P.C.S. (Kraft) radio is now in a Shark helicopter which I have only crashed two times. Once it hit in a muddy spot and got dirt all over my radio. The dirt really looks bad. So you think I need a new radio and what kind would you suggest as the best? Kraft maybe?

Kind regards,
George W. Poteat
Morganton, N.C.

And that's a pretty good illustration of what we may come to expect, the way the scientists are perfecting solid state, integrated circuitry, chips, and all those good things that I don't fully understand. One of these days I fully expect some guy to come up and hand me a little black rock, about the size of an early spring pea, and say "Here, you wanna evaluate this new receiver?"

"O.K. But where are the servo outlets?"

"Doesn't have any. It's a transceiver, and sends a signal to the servo, which has its own receiver."

"Oh."

to page 155

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SUNDAY FLIER

from page 152/18

And don't be surprised if this happens before 1990. I remember when John Kennedy said, in 1960, that we'd put a man on the moon before 1970 — and I said he was out of his gourd. Look what happened.

Notwithstanding all of the marvelous technical advances which are occurring, we still come back to the basic fact that all these things have to be handled by human beings, who are more varied and complex than the whole lot. And they have to start somewhere. If it weren't for beginners, we wouldn't have any experts. I remember a day, long ago, out in Sepulveda Basin where the Los Angeles Model Airport now operates. At the end of the unpaved dirt strip, a modeler fired up the engine on a most unorthodox model; it was a low wing design. It was radio controlled — or, as Don Mathes once put it, it was a free flight model with the flight path periodically interrupted by the rudder moving in response to a radio signal.

The model ran down the strip, took off and started to turn left. Then it rather violently straightened out, ballooned up, and rolled over into a right turn which rapidly became a right spiral — and before anything else could happen, it smashed into the ground. End of flight. The "beginner" was having trouble. But he persevered, and overcame it later. His name?

Phil Kraft.

Another case. Up on a slope in Milpitas one day, I was flying an early slope design of mine called the Minisailer. A young fellow came up alongside, launched a nice looking sailplane, dumped it into the hill a couple of times, and finally got it up and flying all right. A few years later, at the slope in Sunset Beach, and then Thornton Beach, he was wiping out all the competition in the RCM Trophy Races. His name?

Rick Walters.

There is a difference, now. We still have all the beginners — and by the thousands instead of the hundreds. But a lot of the beginners from back then are still around now as experts, and still competing. This discourages a lot of beginners from even entering a competition. And that's too bad. So a lot of clubs are trying various ways to let beginners compete at their own level, until they are ready to step up to the tougher classes.

One of the best "stepping stone" methods I've seen has only recently been devised by the South Bay Soaring Society. It recognizes the fact — as nearly everyone else has by now, that the performance difference between Standard Class sailplanes and Unlimited Class sailplanes is

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hardly worth bothering about; it's the difference between pilots that really counts. So, the SBSS has established a program for 1976 involving three classes — fledgling, sportsman, and expert. Here's how it works:

(1.) Fledgling: Webster defines a fledgling as a newly feathered young bird; a beginner.

This competition level is intended to provide a means of acquainting the beginning flier with competition and still allow him the chance to win hardware by competing only with pilots of his own skill level. A first place in this class will net the pilot 15 points; a second place will get 10 points; third place, 5 points. After accruing 20 points, the pilot will be **required** to move up to Sportsman level. In the event that a Fledgling wishes to fly at a contest where there is no scheduled Fledgling event, he may fly in the Sportsman level and still be able to enter future Fledgling events until he accrues 20 place points. When flying in the Sportsman level, should he happen to win one of the first three places, those points will count towards his required total of 20.

(2.) Sportsman: Recognizing that fully 80% of AMA members are not contest oriented; i.e. — they are Sport or Sunday fliers, and our membership conforms to this general percentage as evidenced by comparing contest entries to the membership roster, it is only logical to name this level for them.

Participants in the Sportsman class accrue points in the same manner as in Fledgling. They may continue to compete in Sportsman class until they have accrued 45 points — not including the 20 points originally accrued as Fledglings. After collecting 45 points in Sportsman class, the individual must move up to expert.

(3.) Expert: This level is for the serious competition flier, and should be tough enough to enable a top flier in this level to do well in any contest in the world.

Initial level classification will be by self-declaration, but a flier need not wait until he has accrued the required number of points to move into the next higher level. He will not, however, be able to return to the previous level.

Points for LSF qualification requirements will be based upon the overall standing of the flier in the total point compilation of the contest.

Any size airplane with any number of controls will be allowed in all levels provided that it conforms with AMA, FCC, and FAI limitations.

In making a self-declaration for the class in which he wants to compete, certain guidelines were established:

CLASS GUIDELINES

Expert Class: Placed in the top ten for the 1975 season championships in either Open or

to page 159

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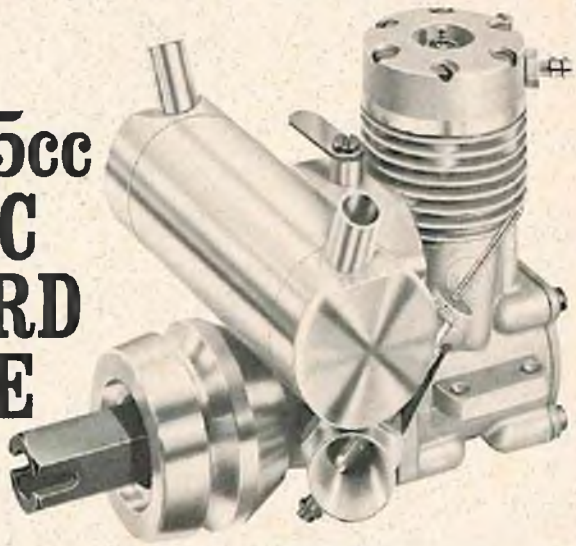

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5 TRAY PACKAGE — $4.95

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from page 155/18

Standard class, or placed among the top three in any one club contest in 1975.

Sportsman Class: Placed higher than 15th in one or more club contests in 1975, but never more than once in the top three places. Also not among top ten in either class for the prior season championship.

Fledgling Class: Did not place higher than 15th in any 1975 contest.

Exception: An experienced pilot who has not previously competed in a club contest should probably compete in Sportsman class, unless he wishes to declare himself in Expert class.

And there you have it. The committee that got together and drew up those specifications worked long and hard at it; even so, there will be borderline cases. But they are much more likely to be in the top two classes, and the beginners will have a chance to try their wings without worrying about competing against the club champion. Note that if he so desires, the beginner can compete using an Unlimited Class sailplane, complete with flaps, spoilers, and anything else that is within the AMA and FAI rules.

If the number of classes, and the attendant trophies, works a hardship on the club treasury, then change to the old blue ribbon approach for the Expert class. These are the guys who probably have a mantle of trophies already from previous events. Let the trophies go to the Fledgling and Sportsman contestants. They're the ones who need the recognition and encouragement.

So, if your club is having problems getting the members to come out for your contests, you might try this scheme. It looks like a winner to me. The foregoing outline of the method was taken partially from the newsletter of the SBSS, which went into more detail, but your club probably will have to make certain concessions to your own local needs.

Actually, there is no reason that the same general concept couldn't be adapted to power clubs, although admittedly, there are other complications. On the main, though, it is important to find some way to get beginners into the mainstream, without having to survive a direct confrontation with the "big boys."

•

Getting beginners interested in competing in pattern flying, thermal soaring, spot landings, and other events in which the beginner has the air virtually all to himself is one thing; all he has to contend with is his own skill level, insofar as making the airplane do what it should. When it comes to racing, though, it's a different story. Now he has to make his plane do what he wants it to, and at the same time share the air — and the racing course — with his direct competition. What's the best way to approach that condition?

Many systems have been tried, from the simple engine displacement approach (1/2A racing, Quarter Midget, Formula I, etc.) in power racing, to "one design" classes (Quickie 200 and 500) which have certain performance limitations. The problem with these approaches is that, unless you have skill level groups, the "experts" will win anyway.

One way to avoid the "cluttered air" situation is to have the races done against the clock instead of the competition. But nearly everybody agrees that that's no fun.

How about handicapping? Fine — but what standards will you use?

For what it's worth, when it comes to setting up racing standards which will encourage

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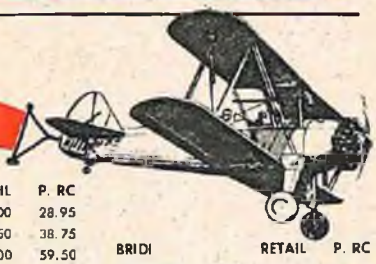

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newcomers, it seems to me that you have to do two things. First, establish skill levels, like the SBSS has done. Second, establish racing classes that have certain limitations which, in anything other than Unlimited Class, make it virtually impossible to get such high speeds. Look at the speeds we're achieving — 80 to 90 mph with 1/2A racers, up around 150 with Formula I. Why, even in slope racing, where your source of power is only the wind, straigtaway speeds in excess of 80 miles per hour are being achieved!

Now it's no problem to slow these speeds down. 1/2A racing requires 200 sq. in. of wing area, straight wing, and minimum airfoil thickness of 7/8". And they're still too fast for beginners. But they wouldn't be, if you were required to use a Golden Bee engine instead of a T.D. .051. Or if you increased the wing area to 275 sq. in.

Several approaches have been used in slope racing. Some time ago we had some races where everyone flew the same design, a relatively light weight job that wouldn't go over 30-35 mph. The Torrey Pines Gulls had a variation where they used the old Canyon Plastics foam job. But guys in general don't go too much for the one design approach. So another variation is going to be tried by the SBSS, which may be attractive to other clubs that do slope racing. The rules are simple; the airplane can't weigh over four pounds, can't exceed a wing loading of 12 oz. per square foot, and can only be controlled by rudder and elevator. Unfortunately, this bars the Gryphon, which only has two controls, but you have to draw the line somewhere.

Interestingly enough, in some experimental races, the airplane that has done the best so far in this "Sportsman's Class" for slope racing has been the Hobie Hawk. It can be ballasted up to a little over 3 pounds — about 3¼ lbs., and still meet the wing loading requirement. At the maximum allowable weight, it goes quite fast, and turns very fast. But, if you ever put it in one of the Unlimited Races, it wouldn't stand a chance.

Until the real amount of interest that exists in this limited slope racing class can be determined, no skill level classes will be imposed. But, if the idea catches hold, they will have to be imposed, otherwise the same old story will prevail; the "big boys" will be taking home the hardware.

And that brings me to the closing bit of information for this month. As I write this, the site has not yet been established for the 1976 RCM Slope Racing Trophy Races, but the dates have tentatively been set for the weekend of April 24 and 25. By the time you read this, the details should be pretty well worked out, and soaring club secretaries will have received notices and entry blanks. Check with your club secretary, or, alternatively, write or call Tom Christian, Contest Manager, RCM Slope Races, 893 Blazingwood Avenue, San Jose, California 95129, tel. 408-252-4966.

I can hardly wait. □

AERONCA 7AC CHAMPION

from page 16

The wing struts are 1/8" diameter piano wire covered with balsa strips and sanded to a streamlined cross section. The ends have a piece of steel tubing brazed to the wire at right angles to bolt to the home-made fittings on the fuselage. Each end of the struts that fasten to the wing has a threaded fitting to adjust the dihedral and the wash-in or wash-out of the wing panels.

The power plant is an O.S. .80 with a 13" x 5½" prop with a Lou Proctor scale hub. The fuel tank is a 16 oz. Sullivan SST.

This Champ is guided with a World Engines'

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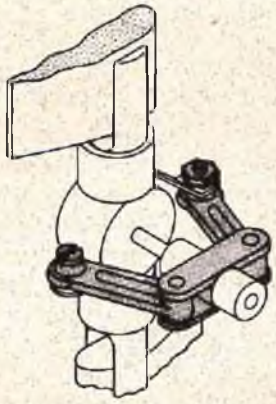

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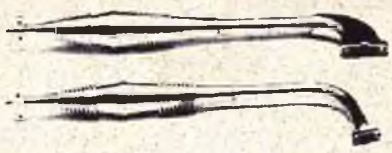

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Blue Max Mark II IC version 6 channel radio with S-5 servos. Believe me, you could almost lose those three S-5 servos in that enormous cabin area!

Four types of glue were used in constructing the model — Devcon 5 minute epoxy, Titebond glue, Ambroid, and a little contact cement.

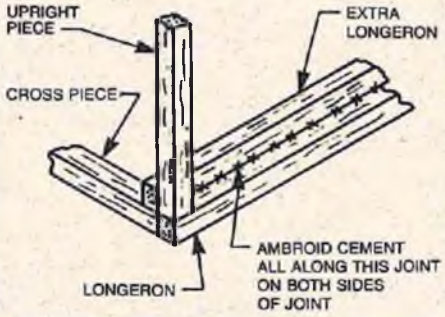
The registration numbers, NC84897, were taken from my old student pilots log book. These numbers were on the real Champ in which I took flight instructions and soloed back in 1946.

I suppose this model flies as near like the real airplane as any model possibly could. You have got to coordinate the rudder, elevator, and aileron movements to get this big bird to turn. It is no ball of fire speed-wise. All it wants to do is keep on flying, even dead stick, it just floats and floats and floats, almost like a sailplane. It also handles very well in mild wind. I have not checked the weight yet, but it feels that it should be very near ten pounds.

Take-offs are in about 40-50 feet with a long, slow climb out just like in the real Champ. Landings are a modeler's dream come true — 2 and 3 point landings like on a feather bed. You just have to see it fly to believe how fantastic this model really is.

The appraisal of the kit in the Product Report column on page 67 of the September 1975 issue of RCM is about as close as anyone could come to describing the kit itself.

I did not notice how weak the rear half of the fuselage really was until after I had finished it. To solve the problem, I put another piece of 1/4" square balsa strip on the inside of the fuselage in each of the four corners running along the full length of the four longerons. Each strip was glued to each upright and each cross piece with Titebond glue. Ambroid cement was then used all along the two strips on both sides to lock them together. This really added to the strength of the longerons. With the beefed-up fuselage and wing struts, the model is strong enough to stand most any maneuver. A plastic or fiberglass cowl would be an excellent addition to the kit.



SKETCH OF EXTRA LONGERONS ADDED INSIDE OF ALL FOUR CORNERS OF FUSELAGE

To sum things up, a kit, is a kit, is a kit — a box of bits and pieces. A model is what the builder makes it. Built right, this model will give the builder a lot of real satisfaction and be a real pleasure to fly. □

ENGINE CLINIC

from page 119/10

Dear Mr. Lee,

Recently a lot more manufacturers are stressing the amount of horsepower that their engines are capable of putting out. One manufacturer points out in one of his ads that his .40 is capable of over 1.0 hp. Wow! Does this mean I can throw away my old .60 that is advertised at .9 hp, replace it with a hot new .40

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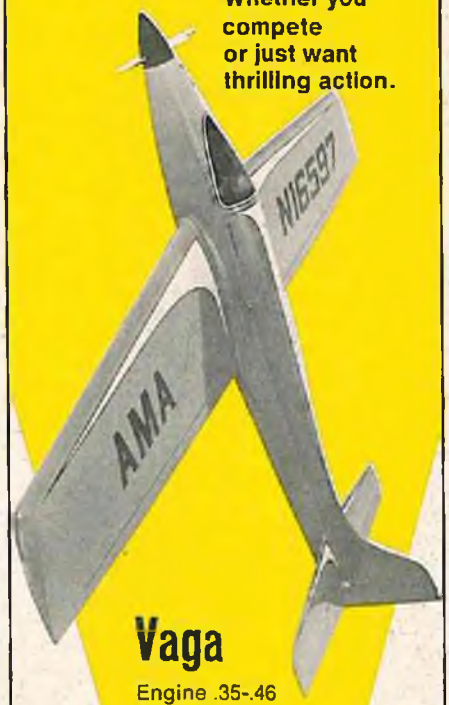

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GC 610-1B	.9	2.00	1.65	2.24	10.13	GRC-6150-CDE	19.30
GC 620-1B	1.8	2.95	2.00	2.06	14.42	GRC-6150-CDE	19.30
GC 626-1B	2.6	5.28	1.31	2.63	12.77	GRC-6450-CDE	20.30
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* H = High Rate + Add L for solder tab; B for button contact.

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and expect the same response with my airplane as before?

I am confused about horsepower ratings of engines and how they really effect the flight characteristics of models.

Also, is there any way to measure the horsepower that an engine is putting out without special expensive equipment?

Sincerely
Vincent Tolomer
Lancaster, California

I'll grant you this horsepower business can be a real confusing issue. It is a lot like the static thrust test of the previous letter — horsepower ratings aren't all they might seem to be. Horsepower is a function of rpm times torque. The .40's develop their fantastic power at a very high rpm. In the case of the S.T. X-40 and K & B SR II 6.5 (40) in the 24,000 range. This high rpm figure times the torque in inch pounds divided by 63,025 gives you the horsepower being developed by the engine. So, in theory, the engine is developing the horsepower but to do so a very small prop has to be used. On the other hand your .60 size engines develop more torque at a lower rpm. Although the horsepower rating is not as high, the torque is what swings the larger prop to haul that .60 size airplane around. So, when judging the power of an engine, you also have to take into consideration the torque and at what rpm it develops its horsepower. This is why an electric 1/3 or 1/2 horsepower motor will run a large power tool that one of our screaming 1½ horsepower model motors couldn't handle (without a lot of reduction gears). It is the torque being developed that matters.

For measuring horsepower, a means of measuring the torque and rpm is required. The rpm is easy but a torque stand, or dynamometer, is required for the torque measurement. Kavan manufactures a set of horsepower propellers by which the horsepower of an engine can be computed on accompanying graphs but these sell for over $100.00. I am afraid there is no inexpensive equipment available. You can build your own torque stand reasonably cheap. For further details on this see Volume I of the R/C Engine available from the RCM Anthology Library Series. It contains an article on measuring torque and figuring horsepower of model engines.

Dear Clarence Lee:

I read your excellent review of the new Perry/pump system back in the April 1975 issue of RCM. Re-reading the review I have developed some questions that would be informative to your readers as well.

(1) You mentioned that one way to stop the engine was to pinch the fuel line tube that leads to the carburetor. When you pinch this line, doesn't this cause a strain on the drum in the regulator? Since the flow has been stopped it would appear that the pump drum would be under a load having no relief from the pump pressure.

(2) You mentioned that the pump system increases power output at a substantial rate. What is the rate increase between the standard K & B and the K & B pumper?

(3) Why does the new pump system cause less fuel consumption that other .60's? Evidently there is waste or inefficiency in the .60's without the pump system. Please explain.

(4) How about a pump system for the well known K & B .40? Is it feasible to develop one? Needless to say it would sell well in the market today.

Thank you,
Allen Rodakowski
St. Louis, Missouri

to page 164

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After testing Perfect Paint, Grady Howard had this to say in the August 1975 issue of R/C Modeler:

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ENGINE CLINIC

from page 162/10

Taking your questions in order Allen:

(1) Pinching the fuel line does not seem to cause any harm. Perry Aeromotive markets a fuel shut off for the system that does the very same thing. The amount of pressure is not that great and the valves, etc., are stressed for far higher loads than the pump puts out.

(2) As mentioned in the article you can expect a gain of 400-500 rpm.

(3) The cross flow type of porting as used in the K & B .61, S.T. Bluehead, O.S. Gold & Blackhead, Webra Blackhead, etc., seems to be slightly more economical than the Schnuerle type of porting. My reference was in regards to the installation of the pump and large bore carburetor on cross flow type engines versus the later Schnuerle type porting as used in the Webra Speed, OPS, O.S. Schnuerle, etc.

(4) The K & B front rotor .40 will be available with the Perry pump/regulator and large bore carburetor shortly — probably by the time you read this column.

Dear Clarence:

I have a problem, and am hoping you can help me. I have just built a Debolt Champion, from an old set of plans, I lengthened the tail moment 1/2" and modified the nose for a more round shape, and installed my Wankel. I molded a epoxy glass cowl, giving it a bush plane look.

Upon trying to fly, I had the following problems: Using a 11/4 Top Flite nylon prop, the plane would take off nicely and after gaining about 100 ft. of altitude, I could not climb much more, and gradually the engine started to sag, so I cut the throttle and landed. As the Wankel runs hotter than conventional engines, I didn't become too excited at the feel of the engine when it landed. Next, I tried a 10/6, then a 10/5, Top Flite wood props, with the same result. The 11/4 prop seemed to work better, but the engine heat caused some smoke from the epoxy cowl. The Champ weighs 5 lbs., and I use K & B 500 fuel with X2-C. We are about 2,200 ft. above sea level.

Last Summer I flew a Sopwith Pup, which I built from Cal Smith's plans. The model weighed 7 lbs. and had only a small opening in the bottom of the cowl and at the bottom rear. Also, I experienced heat and sag problems then, as it was also 95° and about 85% humidity. I only tried one short flight, cutting the throttle when it started to sag.

Thank you very much for any help you can supply.

Cordially yours,
Paul W. Hook
Honesdale, Pennsylvania

Generally speaking, the Wankel does not run any hotter than a conventional engine provided it receives sufficient cooling. Herein lies the problem. The cooling fins on the Wankel, being very shallow, do not have the radiation area that conventional engines do. As long as the engine is hung out in the open on the nose of an aircraft there is no problem. However, when enclosed within a cowl the cooling air wants to follow the contour of the cowl. Coming in the front and passing out the exits and more or less just passing around the Wankel. When you cowl a Wankel in a radial type cowl a funnel type baffle or deflector should be used so that all incoming air is forced directly to the engine. If the diameter of the cowl was just large enough to enclose the Wankel there would be no problem. It is just the cowls that are considerably larger than the diameter of the engine that give the problems. This is also true

to page 166

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ENGINE CLINIC

from page 164/10

with conventional type engines as well. You have got to make the cooling air go through the engine fins, not just around the outside.

There is also the possibility that you may be running the engine slightly on the lean side. The Wankel sound is a bit different than conventional engines and it is hard to detect the difference between a rich and lean setting, especially if the muffler is used.

The Wankel likes to turn up. It is not a lugging engine so do not try to use too much prop. You want to prop the engine in the 12,000-12,500 range. The 10/5 would be the better choice for a propeller. □

RADIO SPECTRUM

from page 6

..... a regular servo. I don't know of anyone putting out a kit nor of any published circuits, however, we'll take care of the latter right now. I've built a couple of speed controllers using a standard servo amp IC for a building block. It would turn a prop on an Astro Flight motor so slow you could see it. The big problem is the power stage. To be a reliable design, it must be capable of driving a stalled motor. Some of the electric boys are using 20 volts on motors with less than .5 ohm resistance. This means your transistor must handle 40 amps.

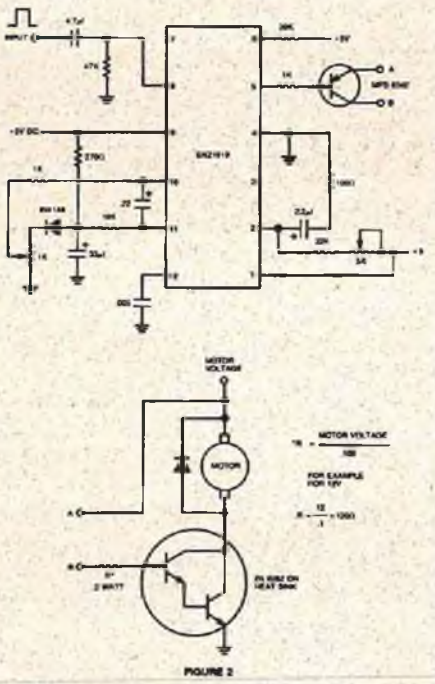


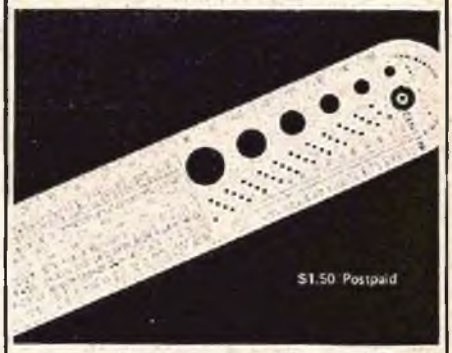
FIGURE 2

The circuit shown in Fig. 2 uses a 20 amp transistor so, if you want it to last, don't exceed the rating.

Set the 1K pot for the low speed end, so the motor just starts to move as you advance the throttle off of the stop. Set the 5 K pot for the high end such that the average voltage to the motor starts to drop just as you take the throttle off of the high stop. You may need a scope or a meter to detect this point because it is difficult to detect the change in motor speed unless you've got a good tachometer. This circuit will only give you one direction. It would take three more power transistors to make a bridge, or one more and a tapped battery to give you reverse. Have Fun!

to page 170

R/C MODELER MAGAZINE'S MULTI-PURPOSE SCALE



It's a compass for accurate circles to 6" in 1/8" increments.
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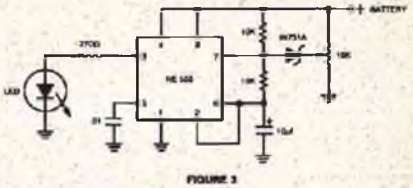
RADIO SPECTRUM

from page 166/6

I received a letter which I must admit I've misplaced (I never lose anything), from a guy who is interested in building the Ace transmitter battery indicator. The interesting thing is the guy compared it to the idiot lights in your car which I had never thought of before. Being a great believer in meters to tell you when you are getting into trouble before it gets you, I thought the comparison was great. Everyone knows that when the temperature light comes on, you've already lost your coolant. Anyway, he thought it was better than nothing at all. I guess he isn't aware of the many excellent expanded scale voltmeters available on the market.

So for those of you who like blinking lights, take a look at Fig. 3. Just add a resistor, LED, zener, and pot to a standard NE555 astable oscillator. You'll need an accurate meter to set the pot which is pretty touchy. I haven't tested the circuit, so I don't know how temperature sensitive it is.



I would imagine Ace would be happy to sell you all the parts.

I'm sure many of you laughed at some of the things we suggested in the November 1975 column, and thought I was too far out. Sid Kaufman, who did the Pro-Tach article, doesn't think so because he offered to do a construction article on a transmitter with the following features:

(A) Open-gimbal metal sticks.

(B) Seven channels all reversible with switches.

(1) Aileron, elevator, rudder.
- (a) Non-linear stick throw (soft around neutral).
- (b) Adjustable percent trim.
- (c) Symmetry adjust.
- (d) Adjustable coupling of rudder to aileron (can be zero).

(2) Throttle
- (a) Linear stick throw.
- (b) Adjustable percent trim.

(3) Flaps, Landing gear, auxiliary
- (a) Linear stick throw.
- (b) L.G. switch
- (c) Adjustable coupling of flaps to elevator (can be zero).

(4) Program Button
- (a) Pre-sets any or all primary channels.
- (b) Adjustable in flight.

The transmitter has a bunch of other features including an internal audible alert that tells you when your battery is low and gives you a beep as often as you want it, to pace your flight. After reading this I couldn't wait so I started breadboarding my own. That adjustable percent trim is a great idea. It's nice to have plenty of trim on a new plane but once you're close, you have more than you need with most transmitters. I recently replaced my 1.5K aileron trim pot with a 350Ω pot so I get about one-fifth the trim I did before. It is amazing how little I have to trim now. The problem was, a slight offset of the trim lever was hard to detect with the eye, and then there was a tendency to overtrim when you got in the

air. Anyway, I'm sure the technically inclined will be anxious to see this transmitter design.

■ ■ ■

I'd like to pass along some comments by our readers on previous articles. Richard Trost of Banks, Oregon, pointed out that our mod to the Kraft Sport transmitter in the December 1975 issue is an invitation to disaster. We ended up with two pots right across the battery which could be adjusted to put a short across the battery. This wouldn't be a problem if you didn't adjust R19, but I agree; for safety sake put a 470Ω resistor in series with the added 5K pot.

Matty Sullivan of Sullivan Products called and told us a few thing about Gell Cells®, all of which suggested that you shouldn't tap them. The biggest problem relates to depth of discharge. The deeper you discharge a cell, the fewer number of charge/discharge cycles you will get. If you continually discharge one cell deeper than the others, which you will surely do with a glow plug pulling 2 to 3 amps, it will fail first. Not only that, but if you charge at a constant voltage as recommended, you will end up with unequal voltages across the various cells, depending on their state of discharge, with the possibility of doing further damage.

Matty also said the mechanics of tapping the battery are fairly cirtical and the cell can easily be damaged in the process. A word to the wise is sufficient. □

FROM THE SHOP

from page 2

. . . . . *by most rural folk.*

A drummer was located, and requested to transmit a message to the effect that a large orange coloured kite looking like a bird, and built of wood and paper had flown away from the Institute of Tropical Agriculture, with some instruments on board. It was expected to fly over villages (..naming those down wind of our Institute) and would anyone locating it please bring it back to the Institute and collect his reward.

The message was promptly beaten out, and we heard it picked up and relayed from village to village until the sounds died down in the distance.

Next morning – joy of joys – the Hi-Fly was back at the Institute. Someone looking out for it had seen it descend into a tree some twenty odd miles away and had carefully brought it down, and back to the Institute quite undamaged. (The radio was still working perfectly! Amazing!)

Now beat that for a recovery tale!

Yours sincerely,
Ray Wijewardene

P.S. At this Institute we fly R.C. gliders (Hi-Fly, Cumulus, Hobie Hawk, Maestro); R.C. helicopters (Kavan Jet Ranger, Graupner Bell 212, Schluter Heli-Baby and Du-Bro Shark) and 'odd balls' such as the D.B. Auto-Gyro, the electric powered 'Humming Bird', etc. Our radio – Kraft of course!

☆

We have just learned that some modelers who have built Fred Reese's BD-6, recently presented in RCM, have reported extreme control sensitivity problems when the plane is balanced as shown on the plans. Extensive testing has proven this condition can be corrected and the model becomes very docile when the balance point is located 1" aft of the leading edge of the wing.

☆

If you are back in snow-bound country — we hope your hours of building in the shop will be pleasant. If you're in the sunnier, milder climates, good flying in the coming months. □

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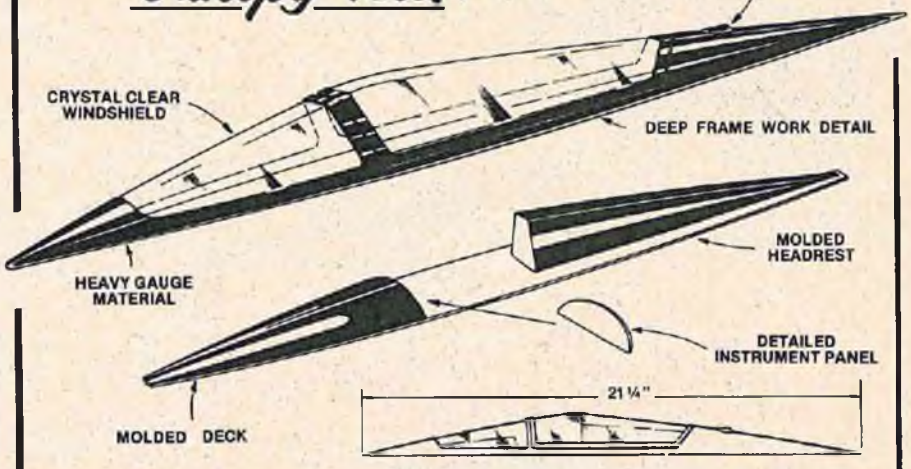

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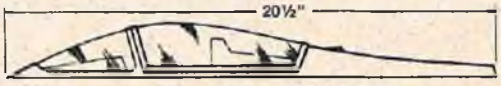

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